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FACIAL RECOGNITION TECHNOLOGY FOR RECRUITMENT IN THE RUSSIAN WORKPLACE

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FACIAL RECOGNITION TECHNOLOGY FOR RECRUITMENT IN THE RUSSIAN WORKPLACE²

1. ABSTRACT

Facial recognition technologies demonstrate a wide range of application fields. Among them is the use of facial recognition for recruitment. This has moved from traditional face scanning to actual emotion detection with the aim of identifying the right candidate for the respective job position. The purpose of this study was to show how facial recognition technology is applied for recruitment in Russia, as well as the benefits, risks, and challenges. The paper answers the question on how the technology has been applied in or adapted to the Russian environment as well as highlighting the corresponding benefits, risks and challenges.

Russian employers usually make certain changes to use this facial recognition technology for recruitment including a reduced number of interview questions as compared to a physical interview, interpreting emotions differently and combining it with physical interviews. The benefits include the possibility of checking facial expressions in order to detect emotions, analysing emotions to get information on some personality traits, analysing candidates' interests, creating candidates' profiles, reactions to specific questions, checking for culture fit, and finally more objectivity.

Finally, the paper argues that facial recognition technology for recruitment is still at an early developing phase in Russia. There is still a lot that can be done to ensure its proper usage for recruitment.

Keywords: Facial Recognition Technology, Recruitment, Artificial Intelligence, E-HRM, Automated Interviews

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2. INTRODUCTION

Over the years, there has been a rise in the use and advancement of artificial intelligence in most aspect and fields of the economy (Alam et al, 2022). As a result, the economy and society are predicted to undergo significant changes in artificial intelligence (AI) and automation with approximately 14% of the world's workforce potentially shifted towards new or revised occupational categories by 2030 due to these technological advances (Biswas, 2019). In Russia, the field of AI is evolving with the government and large companies constantly investing in its development (Digilina et al, 2023). Recently, AI has been used in the human resources (HR) sector for tasks including employee attrition prediction, chatbot systems for HR service delivery, and background checks for applicant resume screening. HR technology was once a useful tool for activities like candidate sourcing and resume screening, but it has recently come to be understood as a vital requirement for firms looking to scale and grow. Applications like Arya, Google Hire, HireVue, and Plum use AI to handle and assess applicants, enabling organizations to expand effectively without the involvement of human decision-makers (Mujtaba & Mahapatra, 2019).

Amongst the artificial intelligence technologies used, facial recognition technology has been one of the notable technologies used in the human resources sphere for recruitment, attendance tracking, security, etc. (Huang et al, 2019). Facial recognition technology involves the practice of recognizing or confirming a person's identity by their face using a person's facial features to collect, analyse, and compare patterns. The analysis of applicants' facial expressions, language, and voice tonality using FRT-based software may be used to rank each candidate according to an automatically produced "employability" score (Mujtaba & Mahapatra, 2019). The employability score is determined by analysing the facial expressions and detecting emotions that positively align with the job role (Mujtaba & Mahapatra, 2019). The facial recognition tool which is mostly used for on-demand video interviews has reported advantages as well as major problems. The benefits are efficiency, reduced stress, etc (Mujtaba & Mahapatra, 2019). Problems identified by research conducted by Boluwantinmi & Tinnit (2018), Su et al (2021), Nugent & Scott-Parker (2022) in the Western world (UK, USA, Canada, etc) include visual privacy, discrimination, wrong identification of candidates, anxiety, technical errors, etc (Huang et al, 2019). Also, it has been noted that this tool is not fully accurate and therefore not fully optimal which poses some challenges (Johnson et al, 2022; Liu et al, 2021). Companies have tried to adapt the use of these technologies to their environment to reduce the challenges it poses in terms of privacy, candidates' anxiety, errors, and discriminatory effects (Wired, 2021).

One recurring problem was the issue of bias. Though automation can make certain jobs more efficient and appear less prejudiced, FRT mainly relies on human-created data, and as a result, human biases and errors may transfer to conclusions made by a model (Singh et al, 2022). FRT has been known to demonstrate errors, mistakes, and challenges in candidate ranking and applications of machine learning (Meyer, 2018; Lohr 2022; Mabilio 2023). As the use of FRT spreads, there is rising worry that, as shown by a number of recently publicized errors where candidates are incorrectly identified, there may be a number of ways in which the judgments made by such systems may be influenced by the prejudices of the organization's personnel or the model creators. Amazon discontinued their AI-based candidate evaluation tool in 2017 when it was discovered that it discriminated against female candidates by giving their resumes lower ratings when evaluating applications (Meyer, 2018). The underrepresentation of female

candidates in the training dataset that was used to develop the algorithm led to its bias. This is an illustration of how the data used to train the algorithm can readily include biases that are frequently present in the recruiting process (for instance, hiring discrimination) (Lewis, 2018). Over the past five years, this has sparked intense study on the subject of fairness in FRT. In an effort to promote fair algorithms, a number of toolkits have been created to reduce biases and understand black box models, but still these tool kits are not still optimal in eradicating the problem of bias (Fernández-Martínez & Fernández, 2020).

In the fields of recruitment, the ability to recognize emotion has always been essential. The tool for feature extraction and emotion identification is now an integral element of video interview analysis. According to Abdulsalam et al, (2019) who extended Paul Ekman's (2003) work on a set of six fundamental emotions that are easy to express and comprehend (anger, fear, disgust, happiness, sorrow, and surprise) marked a significant turning point in the study of facial expressions. These set of emotions are usually expressed differently amongst cultures in different countries as well as the individuals within these cultures, but there are always similarities in some aspects which affects the way recruitment is being conducted there (Ma & Allen, 2009; Segalla et al, 2001). Despite these similarities, it has been noted that Russians have a very distinct way of showing expressions and body languages (Wierzbicka, 1998; Arapova, 2016). According to Vilimek, et al (2019), Russians have different facial, verbal and non-verbal systems of communication compared to other countries which could be taken into account when incorporating training dataset into these facial recognition technologies used in the Russian workplace. This is in line with the social shaping theory that states that a technology's application is affected by the environment or society in which it is being used (Woolgar 1991). So, the recruitment assessment with the use of on-demand videos will be different in the Russian workplace as compared to the companies in the Western world countries as they have different verbal and non-verbal expressions. This is usually incorporated into these training data which includes a dataset of the faces, expressions and voices of people that the computer should take note of when conducting interviews (Fernández-Martínez & Fernández, 2020). According to (Chernenkova, 2021), Russia has been known to use facial recognition technology in most aspects of its operations. Some of the famous technologies used for recruitment purposes include SAP Platform, VV.ru and RobotVera which are used for conducting one- way face interviews which are automated without an actual interviewer being there (Yershova & Sergeeva 2017).

The field of facial recognition technology for recruitment is growing and its application and usage by companies has been studied in most of the Western world countries (UK, Canada, USA, etc) (Peng 2023; Kostka 2023; Haley 2023; Albassam 2023). However, its application, challenges, benefits have been understudied in Russia which has a unique and different culture. This has led to our research focusing on 2 research questions:

1. How do Russian employers adapt FRT to suit the recruitment process in Russia?
2. What are the risks and opportunities that FRT generate for Russian firms in the recruitment process in Russia?

The search for the answers involves several objectives, including

- Determining how FRT is adapted by Russian employers to suit the recruitment process in Russia.
- Examining the risks and opportunities FRTs pose in the recruitment process for Russian employers in Russia.

The major aim of this Working Paper is to provide a background and general information of the current situation of facial recognition for recruitment in Russia, its application, benefits, risks.

The **first chapter** has to with the backdrop and theoretical underpinnings of the study with a use of the review of the literature. It will educate the reader on facial recognition technology, recruitment, and evolution, clarify the method used to define these concepts for research purposes, and provide the framework for the analysis of empirical data. The **second chapter** contains the research design and methodology. It offers a thorough explanation of the empirical investigation, along with the justification for technique choice and the actual steps that research takes, as well as the ethical considerations made. The **third chapter** contains the discussion of the study's results. It contains the conclusion that summarizes the most important findings, offers research-related insights, and suggests directions for future study.

LITERATURE REVIEW

2.1 Overview of Artificial Intelligence

The definition of AI is ambiguous and depends on the situation, purpose, and level of intelligence. Two connected sub-concepts make up the concept of artificial intelligence. The first one, which is contrived, is generally simpler to unravel. When something does not result from a natural process, it is often referred to as artificial. As a result, it is either created by humans or by machines. An artifact is the product of an artificial process of production, whether it is made by humans or machines (Cugurullo, 2020). A personal computer or a car are only two examples of the many shapes that artifacts can take. An artifact's shape may be anthropomorphic or it may be significantly different from the physiognomy of the human body. As we continue the conceptual investigation of artificial intelligences, it is important to keep in mind that, regardless of its structure, an AI often exists in an artifact. Numerous AI are embodied, particularly the ones on which this paper focuses. They take control of and provide life to an otherwise lifeless object, becoming an essential component of it. When an artifact, like a car, is animated by AI, it transforms into an intelligent autonomous vehicle (Cugurullo, 2020; Mouloudi et al, 2021).

Since philosophy's inception, the second sub-concept, intelligence, has been the focus of heated discussions. The purpose of this article is not to define intelligence, but rather to discuss what talents and skills intelligent creatures should possess in order to comprehend how intelligence shows itself in AI. To do this, we will draw on academic works on AI. First of all, an intelligent being should be able to learn through gathering knowledge about its environment. AIs engage in learning, which is defined as knowledge acquisition, both directly by detecting the environment with tools like cameras and microphones and indirectly through the use of massive data sets that developers install. The ability to interpret acquired data by drawing concepts from it is a second related talent. Third, an AI must have the ability to deal with uncertainty (Clifton et al., 2020). Fourth, an AI would act rationally by using the gathered and maybe unfinished data to make decisions. Fifthly, and most importantly, an AI would demonstrate intelligence by using the aforementioned talents and skills in an autonomous or unsupervised manner, which means that humans are not involved in the AI's decision-making process and do not direct

or direct it (Yigitcanlar et al., 2020). By merging the two sub-concepts of artificial and intelligence, we can broadly define an AI as an artifact capable of gathering information about its surroundings and making sense of it in order to act logically and autonomously even in ambiguous circumstances (Yigitcanlar et al., 2020; Kietzmann & Pitt, 2020).

In general, AI can be viewed as a system that mimics human-like traits like learning, speaking, and problem-solving, which causes it to act intelligently like a human. In more detail, AI may be described as a system that can comprehend and learn from outside inputs in order to achieve particular objectives by adapting to the environment (Javed & Brishti, 2020). It is clear from the definition that AI should be able to mimic and develop human-like intelligence, such as cognitive, emotional, and social competencies, in addition to having a quick and accurate ability to evaluate and solve problems (Dwivedi et al., 2021; Javed & Brishti, 2020; Blinnikova et al., 2020). AI makes use of algorithms which are systems of rules or directives that give robots the ability to process and analyze data, make decisions, and carry out activities without direct human participation. They serve as the foundation for AI systems and are essential for processes like decision-making, image recognition, natural language processing, and facial recognition. These algorithms can be divided into four categories: deep learning, reinforcement learning, supervised learning, and unsupervised learning. Through efforts in AI research and development, they continuously change and get better (Kaplan & Haenlein, 2020). In accordance with their level of intelligence, Kaplan & Haenlein (2019) divide AI systems into three categories: analytical, human-inspired, and humanized AI. Cognitive analytical AI, which may be used for image identification, fraud detection, and other applications, has the capacity to predict the future based on learning from and evaluating the past. Artificial intelligence that is inspired by humans and possesses both cognitive and emotional intelligence is able to identify and analyze human emotions like happiness, anger, and others that influence a person's decision. For instance, virtual recruiters can recognize a candidate's emotions during the application process. Cognitive, social, and emotional capabilities are all present in humanized AI. Such a system could be a virtual agent that interacts with the customer in real time. Artificial intelligence (AI) encompasses a variety of fields, applications, and algorithms, including neural networks, deep learning, machine learning, machine vision, genetic algorithms, and others (Kaplan & Haenlein, 2020; Raub, 2018; Ong, 2019)

2.1.1 Artificial Intelligence in Russia

In Russia, the AI ecosystem is now growing quickly. When compared to Chinese and American efforts, Russia's private-sector AI development was still in its early stages as of late December 2017. Russian public figures indicated that at the time, the AI market was only worth about 700 million rubles (\$12.5 million), as opposed to the billions invested by Chinese and American businesses (Bendett, 2019). Russia was a late starter, as evidenced by the fact that it adopted a national AI plan in October 2019—only the 30th nation to do so since 2018. In actuality, Russia's objective might not be to take the position of “global leader,” but rather to place among the top five AI countries while preserving and safeguarding its “technical autonomy.” (Nocetti, 2020).

When Putin said that those who master artificial intelligence technologies will “control the world,” Russia announced its entrance into the global competition to create these technologies. In spite of the aforementioned barriers to AI development, Russian government agencies and businesses had already started embracing the technology for internal usage. For instance, in April 2016, the state-owned bank Sberbank established a venture capital fund with the goal of funding companies in the fields of financial

technology, big data, and artificial intelligence in the hopes that this would advance the bank's operations (Petrella et al., 2021).

Russia has relied on huge companies to further its AI agenda because the realities of Russia's investment climate imply that its AI ecosystem will struggle to expand organically through the emergence of new startups. Sberbank, Rostec, Yandex, and Gazprom Neft, the country's major banks, leading tech companies, and fourth-largest oil producer, have all emerged as pioneers of Russian AI in their respective industries. They develop AI for a variety of uses, from enhancing bank operations and optimizing military production to developing driverless delivery trucks and controlling oil output (Petrella et al., 2021). 2017 saw the debut of Alice, an AI-enabled virtual assistant akin to Siri by Yandex. In order to develop big data and machine learning initiatives in the oil industry, Gazprom Neft and Yandex signed a partnership agreement in the same year. To develop AI and machine learning efforts over the following ten to fifteen years, Rostec reorganized its corporate governance and created the role of Managing Director for Science and Technology. These efforts weren't a part of a government-led AI development endeavor; rather, they were motivated by needs from within these organizations (Petrella et al., 2021).

Image- and speech-recognition systems developed by the Russian private sector have already had some success. However, the wider effort suffers from a lack of infrastructure, including venture capital availability, initial public offerings, and an investment environment akin to that of Silicon Valley, which has proven crucial to hi-tech triumphs in the West and elsewhere. Russia does not yet have the same "start-up" culture as the US, which is essential for technological advancements in software and IT. Even while Russian civilian designers have immense intellectual talent, they lack the necessary money and support to see their ideas through to completion, according to some well-known private-sector IT developers (Bendett, 2019).

AI does not appear to be particularly viewed as a threat or an opportunity in Russian society. A survey conducted by RBC news in 2020 reported that 54% of Russian respondents felt positively about AI and robots, yet an earlier poll revealed that only 29% of Russian respondents believed they understood the fundamentals of AI. However, the majority of respondents either had a neutral or positive opinion of using AI, with many anticipating that technology will enhance public services (administrative procedures, medicine, education). There are not many people who worry that AI will eliminate jobs. These polls' findings contrast with those of public opinion polls performed, for instance, in France and Great Britain, whose inhabitants are less enthused and even fearful about AI (Nocetti, 2020).

Nevertheless, the COVID-19 pandemic's impacts have increased concern about the use of digital technology for tracking and monitoring civilians both in Russia and worldwide. The widespread distribution of videos and petitions informing people that they might be "chipped" to enable the government to geo-locate them has stoked conspiracy theories and obscured the public's grasp of the relevant technological challenges. Another issue that is tangentially related to this is that on the Russian-speaking internet, AI is frequently linked to a plethora of technology—5G, robotization, and facial recognition—that is allegedly being pushed on Russia from overseas. Some religious leaders and well-known members of the cultural community have been known to express such views (Nocetti, 2020).

2.1.2 AI in Human Resources

Artificial intelligence (AI) has been employed more and more in recent years to assist HR and recruiting departments. Several facets of society have been revolutionized by AI,

but HR has generally escaped unaffected because AI has so far just served as an aid. Authors have emphasized the idea of strategic and global HR management over many years (Hmoud, 2021). More recently, there have been claims that working with business intelligence and AI is crucial to enhancing HR practices because the company environment is changing into a more complex system with a varied workforce. AI, which has historically been bias-free, has shown to be quite useful at reading resumes and keywords and extracting candidate talents. A new development in HR is the use of video interview analysis (Fernández-Martínez & Fernández, 2020). Knowledge management, HR policy creation, training, recruiting, a reward system, and job design are six examples of excellent HR practices that play crucial roles in enterprises. These various areas have seen the introduction of artificial intelligence. In terms of processing time-consuming and difficult tasks within the HRM functionality, developing AI-based solutions are being depended upon more and more, according to the HRM perspective (Hmoud, 2021; Bock et, 2020; Cavaliere et al, 2021; Felice et al, 2022).

2.2 Overview of Facial Recognition Technology

Facial recognition technology is a part of emotion AI that is used to map a person's facial features and then save the information as a face template. To compare facial photos or identify patterns in facial features for verification or authentication purposes, algorithms or machine learning techniques are applied to a database (Martinez-Martin, 2019). Also, face recognition is a biometric identification method that matches patterns to identify people based on information about their faces. Face recognition technology offers particular technical advantages over conventional non-biological recognition and physiological feature recognition methods (Jiang, 2019). One important non-verbal cue used in human communication to anticipate intentions is facial expression. According to Mehrabian's research from 1974, 55% of messages relating to emotions and attitudes are sent by facial expression, 7% through spoken words, and the remaining 40% are paralinguistic (the way that the words are said). It has been established that facial expression is crucial to the flow of information in general (Zhang & Zhang, 2006; Dureha, 2014).

In face recognition, visual pattern recognition is an issue. For humans it is easier as we constantly recognize visual patterns, and our eyes are how we take in visual data. The brain recognizes these facts as meaningful notions. Whether it is a picture or a movie, it is a matrix of numerous pixels for a computer. The machine should be able to determine what idea in the data a specific portion of the data corresponds to. This is a visual model recognition rough classification task. In the portion of the data that all machines interpret as the face, it is required to distinguish who the face belongs to for face recognition (Mu et al., 2020).

When used broadly, face recognition refers to associated technologies for creating face recognition systems. Face detection, face positioning, identity identification, image processing, etc. are all included. Finding the coordinate system for each face in a single image is the goal of the face detection algorithm. In order to determine whether the candidate region is a face, the full image must be scanned. The face coordinate system's output can be rectangular, square, etc. In the face detection coordinate system, the face position is the location of the face feature (Lander et al., 2018). The deep learning architecture essentially uses some of the best positioning technologies available today. Face positioning algorithm's computation time is significantly less than that of face detection. Face recognition technology is most commonly used in attendance access control, security, recruitment, and finance, though it is also beginning to be used in other industries such as logistics, retail, smartphone, transportation, education, real estate,

government management, entertainment advertising, network information security, and others (Lander et al., 2018). Face recognition can be used in the field of security to identify offenders and alert authorities to potentially dangerous circumstances. As a result of the significant advancements in artificial intelligence technology, we now need recognition technology that is more precise, adaptable, and quick (Mu et al., 2020).

The recognition algorithm is the fundamental piece of facial recognition technology. Additionally, the algorithm's efficiency and recognition accuracy serve as general measures of its performance. Technology for face recognition is a multidisciplinary field. It is a process of ongoing integration of biotechnology, quantitative statistics, and other fields. Every development in face recognition technology has unique phases, starting with basic mathematical statistics and model processing and progressing to neural networks based on machine learning and eventually in-depth learning (Zhu et al, 2019). Face recognition doesn't need the acquisition object to be operated in any way. It simply needs to remain in front of the acquisition tools for a brief period of time. It may also involve covert acquisition. It is harder to spot, comparatively more secure and dependable, and difficult to fabricate when compared to passive acquisition techniques like fingerprint and iris. Face detection and face recognition are two separate processes. Statistics show that the facial recognition algorithm's accuracy has surpassed 99.5 percent. Face recognition technology is thus acknowledged as one of the key information security authentication technologies (Zhou, 2020).

Face recognition technology is now widely used in a variety of industries, relying on pervasive mobile camera devices. Examples include face attendance, face payment, smart campuses, access control systems, and security systems, which show advancements in the face recognition service level in the intelligent hardware system. Face recognition technology has significantly raised the level of business systems' intelligence in various sectors. The features on a human face are numerous. The face served as our primary means of emotional communication and social interaction in the acquaintance society of the past (Liu et al., 2021).

An Oxford seminar research done by Kanade (1973) was one of the first research initiatives in FRT. He was curious to know how FRT recognizes faces by their morphological characteristics, such as the spacing between the eyes, the shape of the nose, and the shape of the mouth. In essence, he concentrated on comprehending the inherent variances that would later cause issues for FRT. However, increasing research in this field has focused on tackling various issues throughout the past ten years. Who creates FRT has been one of the central concerns. Nawaz (2020) also conducted a research identifying the various applications of AI in face recognition of the recruitment process. According to the study, using facial recognition technology throughout the hiring process is crucial for learning more about applicants and aids in choosing the best ones. Also, an interesting area also looked into by other researchers is the issue of ethical considerations, (Mujtaba & Mahapatra, 2019) concluded that there is bias in the models developed for facial recognition technology

Other researchers have concentrated on the use of FRT for IQ testing and psychometric evaluation. According to research by Duchaine & Nakayama (2006), there is no correlation between the Cambridge Face Memory Test (CFMT), a variant of the FRT, and standardized IQ tests. According to Wilmer et al. (2010), there is no correlation between CFMT and general ability. Other research concentrating on the use of FRT in one-demand asynchronous video interviews discovered that the use of FRT in candidate selection results in discrimination (Zhao et al, 2017; Lohia et al, 2019). Masud et al studies from 2020, however, asserted that despite FRT's drawbacks, it still improves human-computer collaboration to streamline the hiring process. Izario et al. (2017) and Black & Esch (2020) concur that the use of FRT in video interviews can be used to assess

a candidate's character and dependability based on how they seem, respond to questions, and make eye contact.

Another area of study focused on creating a real-time image and video processor with an facial recognition technological agent that could anticipate a job candidate's behavioural competencies based on facial expressions (Su et al., 2021). Based on their research, they developed a model that uses a CNN classification architecture with less data and a HOG-SVM facial expression detection and feature extraction method to significantly predict personal- and value-based skills in a field setting. The cutting-edge system can automatically record, identify, and extract a subject's micro expressions and produce the predicted scores of various value-based personal skills. They discovered that facial expressions in people can predict future conduct (Su et al., 2021).

To complement the theoretical foundation of facial recognition technology, we first offer some associated terms before going into the FRT techniques. How to translate facial action into expression is covered by the Facial Landmarks (FLs), Facial Action Units (Aus), and Facial Action Coding System (FACS) systems. Different definition criteria for expression categories include Basic Emotions (Bes), Compound Emotions (Ces), and Micro Expressions (Mes). The context of these terminologies and concepts is the basis for existing studies on FRT.

- **Facial Landmarks (FLs):** Facial landmarks are visually prominent features in the facial region, such as the corner of the mouth, the end of the brow, and the alae of the nose. The FLs' positions around facial features and contours capture facial morphologies brought on by head motions and expressions. Facial landmark point-to-point correspondences can create a feature vector of the human face (Wu & Ji, 2019).

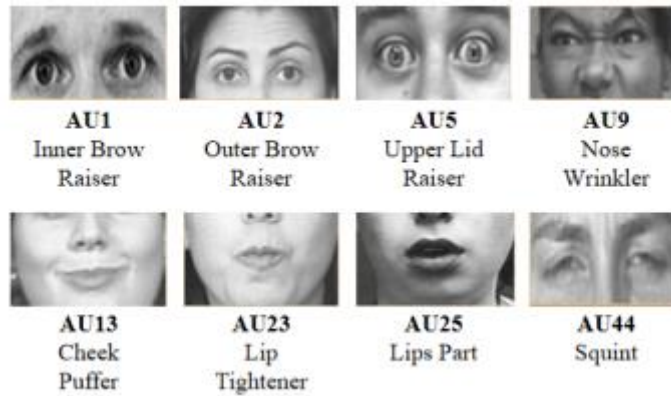
Figure 1 – Facial Landmarks



Source: Wu & Ji, 2019

- **Facial Action Units (Aus):** The basic muscular movements that are generally seen when a facial expression elicits a certain emotion are encoded by the 46 facial action units. The FER system examines the combinations of the detected facial Aus to classify expression categories. For instance, if an image has annotations of 1, 2, 5, and 25 Aus, it can be categorized as expressing the emotion "Awed." (Huang et al, 2019).

Figure 2 – Facial Action Units



Source: Huang et al, 2019.

- Facial Action Coding System (FACS):** The relationship between facial muscle movements and expressions is illustrated by Ekman and Friesen, two highly regarded psychologists, using observations and biofeedback. They first partition the entire face into numerous independent and linked AUs based on anatomical factors, and then further analyze the traits of these AUs. The Table displays the typical AUs for each of the basic and compound emotion categories. The FACS system, which serves as the undisputed reference standard for muscle movements in facial expressions, categorizes a wide variety of human expressions in real life (Huang et al, 2019).

Figure 3 – Facial Action Coding System

Category	AUs	Category	AUs
Happy	12, 25	Sadly Disgusted	4, 10
Sad	4, 15	Fearfully Angry	4, 20, 25
Fearful	1, 4, 20, 25	Fearfully Surprised	1, 2, 5, 20, 25
Angry	4, 7, 24	Fearfully Disgusted	1, 4, 10, 20, 25
Surprised	1, 2, 25, 26	Angrily Disgusted	4, 25, 26
Disgusted	9, 10, 17	Disgusted Surprised	1, 2, 5, 10
Happily Sad	4, 6, 12, 25	Happily Fearfully	1, 2, 12, 25, 26
Happily Surprised	1, 2, 12, 25	Angrily Disgusted	4, 10, 17
Happily Disgusted	10, 12, 25	Awed	1, 2, 5, 25
Sadly Fearful	1, 4, 15, 25	Appalled	4, 9, 10
Sadly Angry	4, 7, 15	Hatred	4, 7, 10
Sadly Surprised	1, 4, 25, 26		

Source: Huang et al, 2019

- Basic Emotions (Bes):** Happiness, surprise, sadness, anger, contempt, and fear are suggested as the six fundamental human emotions. These six Bes are typically used to label datasets linked to FER (Huang et al, 2019).
- Compound Emotions (Ces):** Two fundamental emotions can be combined to form compound emotions. Twenty-two emotions are introduced, comprising 12 complex emotions expressed frequently by people, 7 basic emotions (6 basic emotions and 1 neutral emotion), and 3 additional emotions (Awed, Appalled, and Hatred) (Huang et al, 2019).
- Micro Expressions (Mes):** Micro expressions are more involuntary, delicate, and spontaneous facial motions. For a brief period of time, they frequently display a

person's genuine and potential expressions. The micro expression has a very brief lifetime of only 1/25 to 1/3s (Huang et al, 2019).

- **Training Dataset:** Training data is typically quite scarce in real-world applications of image recognition, which is typically the main cause of the over-fitting issue and subpar accuracy. On the other hand, the typical approach to improving performance is to use more training data. Be aware that using an abundance of training data may result in low efficiency and high resource use. However, obtaining enough training examples for applications in the actual world is unrealistic (Huang et al, 2019).

These indicate that facial recognition technology makes use of a compound system of technology and process that needs to be carefully aligned (Huang et al, 2019).

2.2.1 Facial Recognition Process

There are three interconnected, widely recognized steps in the FR process. Face detection phase is the first process, followed by normalization phase two, feature extraction and recognition as phase three. These steps are interdependent and use similar strategies. They can be thought of as a part that is distinct from a typical facial recognition system. Nevertheless, it is advised that they be conceptually separated for the sake of clarity (Kayali, 2019). Each phase presents a difficulty that is essential for the system to function properly.

a. Detecting Phase

It may be an easy process for a human to identify a face in a likely photograph, but this is not the case for computers. The pixels in which the image is part of the face and those in which it is not are determined by the computer. When the background is transparent, anomalous passport images are usually simple to spot (Selwyn, 2019). The difficulty of detection becomes complex when the picture's context is full of things. In the past, facial landmarks like the eyes, which recognize the colors of the face in parts that are circular or have typical features, were the main focus of face detection (Mohsienuddin & Sabri, 2020).

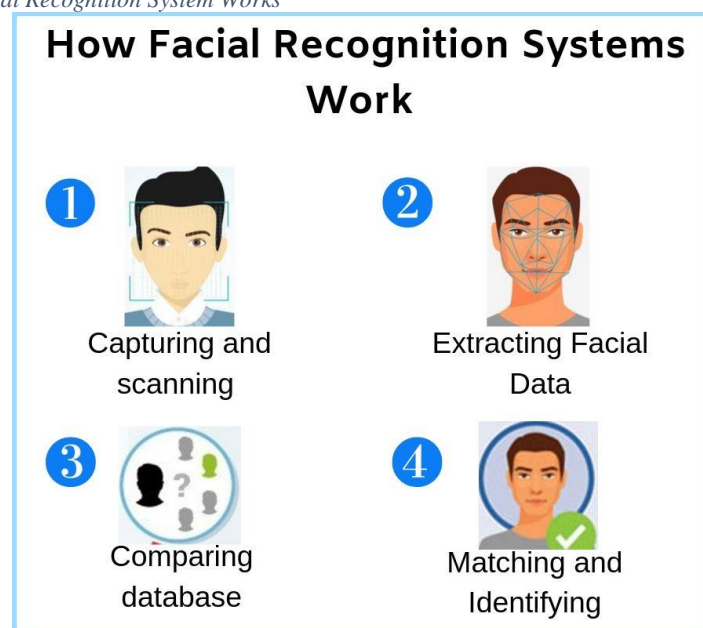
b. Normalization Phase

The look must be adjusted when the face has been fully detected. It implies that the photograph needs to be standardised in terms of lighting, size, and position when compared to the images in the database. It is important to correctly place the important face landmarks while normalizing a probed image. The normalization algorithm can identify variances in the image by using the landmarks on the face (Simonite, 2018). The approximations and inferred statistics that are used to adjust for image variations are not fully necessary to be accurate. Therefore, it is imperative that the probing image be as similar to the standardized face as feasible. Regardless of the overall recognition approach, face landmarks are a necessary component for all systems. The identification process will fail if it is unable to locate facial landmarks (Simonite, 2018). Only if the photographs in the gallery and the probe are identical in every way will the licensing be successful. Therefore, normalization is employed to guarantee that similarity is attained with a greater or lesser degree of precision (Simonite, 2018).

c. Feature Extraction and Recognition

After the image has been normalized, the phase of feature extraction and image approval begins. The feature extraction stage entails taking a feature vector called the signature from the detected face. This feature vector must be large enough to depict a face. It is necessary to examine the face's individuality and ability to identify between two different people. It should be emphasized that this process can be completed by the face detection step (Adjabi et al., 2020). In this phase, a template of biometric data, also known as a reference biometric, is generated (Prasad et al., 2020). This serves as the foundation for the work of recognition and is stored in the database. The process by which the image of the face is translated and transformed into a mathematical representation that is simplified to carry out the task of identification differs amongst facial recognition algorithms. Therefore, the database will serve as the foundation for the duty of care. According to Prasad et al. (2020), "the translation or transformation of a facial image into a mathematical representation that is simplified to execute a recognition task" differs between facial recognition algorithms. Successful recognition requires that the greatest amount of information is kept during the transformation process and that the biometric analysis template is sufficiently distinctive. The algorithm will not have the necessary capability to effectively recognize if the credit is not acquired (Prasad et al., 2020). Where the algorithms diverge is in the mathematical transformation and biometric analysis process, notably in a key strategy (Mohsienuddin & Sabri, 2020). Verification and identification are involved in classification. For access to a desired identity to be granted, verification entails matching one face to another. However, in order to determine a face's identity, identification compares it to a number of other faces that are presented with various possibilities. Some steps are occasionally not separated. For instance, face detection frequently makes use of the facial characteristics (eyes, mouth, and nose) employed for feature extraction. It is possible to detect and extract characteristics concurrently (Adjabi et al., 2020).

Figure 4 – How Facial Recognition System Works



Source: 5 Applications of Facial Recognition Technology by oodles 2021

2.2.2 Facial Recognition Technology Application in Different Areas

Facial recognition technology has shown rapid development and usage in various fields which include: financial services, authentication, retail, education, Law enforcement, social media, education, hospitality and travel (Forbes, 2021).

- **Law Enforcement:** There are three main methods by which the police use FRT. Officers may use one of the following methods to identify people they have stopped or arrested: 1) in-field facial recognition inquiries; 2) investigative searches of video footage; or 3) real-time scans of people passed by surveillance cameras. In the majority of law enforcement deployments, officers conduct one-to-many searches to compile a list of potential suspects. The software announces a match between the facial photos if enough biometric data is similar. A similarity score is typically generated, with higher values denoting a higher likelihood of a successful match (Johnson et al., 2022).
- **Financial Services:** In the financial area, FRTs have been used for biometrics and authentication. By comparing a customer's face image to a database of previously taken pictures, ATMs with cameras can confirm and validate a customer's identification. The customer can withdraw money or use other banking services following certification. Additional financial applications for facial biometrics include: Customers might be able to log in to online financial services so they can create new accounts, protect mobile wallets, or authorize transactions. The face scan is also compared to official identity documents or photos that have been previously saved in the database in these circumstances (Catalina, 2022).
- **Retail:** In this area, FRTs are used to identify shoplifters in order to prevent thefts and losses. Also, it is used to gather information on customers in terms of number of visits, movements, their experiences, and purchasing behaviours. Also, it has been used to detect negative emotions from customers to understand their state of mind when inside a store (Borges et al., 2019).
- **Education:** Campus security, computerized registration, and student emotion recognition are some applications of FRTs in education. Prominent usage can be seen in emotion detection. In order to achieve effective teaching outcomes, such as perception, understanding, and expression of emotions, teachers naturally expect a facial recognition system to be able to detect, evaluate, and process emotions. When students in virtual learning environments display a variety of facial expressions in videos, teachers can determine whether or not the students have a grasp of the material by analyzing the facial expressions and modifying their lesson plans accordingly (Yang et al., 2018).

Security, access control, identification verification, attendance tracking, customization and marketing, healthcare, retail and customer service, entertainment and gaming, humanitarian initiatives, and smart city applications are just a few of the industries that frequently employ facial recognition technology. It aids in managing medical records, enhancing security, enhancing client experiences, and assisting in various management and investigation scenarios. This shows that it is useful and has helped developed the various areas and fields in which it is being used (Shanthi et al, 2023; Kamati et al, 2023; Dang, 2023).

2.2.3 Facial Recognition Technology Usage in Russia

The major usage of facial recognition technology can be seen in the Moscow metro. Beginning in July 2021, the Moscow metro system began testing the facial recognition

payment system at four already-existing stations. As at 2021, Moscow introduced a new facial recognition system called face pay which was added to most metros in Moscow. (Chernenkova, 2021).

Other facial recognition technology (FRT) initiatives have been carried out in Russia over the past two years. These initiatives cover the majority of the known FRT development directions, such as using FRT for identifying verification for financial matters or implementing video systems at schools and universities. FRT use cases are increasing steadily in Russia (Seliverstova, 2020). The use of this technology raises concerns about personal data security and regulatory gaps, but those things are still happening. Moscow, the capital of Russia, is home to one of the largest facial recognition systems in the world (Mos, 2017). According to the city's official website Mos.ru, this network is built on around 200,000 cameras linked to a single system (Kasai, 2020; Mos, 2017). The Moscow face recognition system not only identifies people, but it also logs where and when they appeared in the database (Chernenkova, 2021).

2.2.4 Facial Recognition Technology Application in Human Resources

Human resources management also uses facial recognition technologies. One of the most prevalent uses of AI and facial recognition technology in modern HR practice is as a recruitment tool. It can be used to examine candidates' emotions and facial expressions during video interviews. Additional information about a candidate's suitability for a position, their communication abilities, and their degree of involvement may be obtained through this analysis. It generates an evaluation report based on that and sends it automatically to the human resources department (Ramasundaram et al., 2022). In general, facial recognition technology can be used to do different things in the human resources department. This can further be broken down below:

1. Recruitment Process

The recruitment process involves the identification, attraction, interviewing, selection, hiring, and onboarding of personnel. Recruitment used to be done in the traditional process but with the advent and shifting impact of internet technology, which altered the rules of the game, the traditional recruitment process began to experience a collapse in the middle of the 1990s (Boydell, 2002). According to Lisa & Talla (2021), "face-to-face" recruitment, also known as paper-based recruitment, using traditional media like newspapers and manual job boards, as well as networking in specific spaces, were the key locations for attracting candidates. As a result, the use of technology made it easier for the recruiter to find candidates for the position with less emphasis on understanding how to utilize the internet and trusting in human judgments (Lisa & Talla, 2021). Facial recognition technology can be used at the beginning of the recruitment process to do some sort of applicant screening against fraudulent databases. But the most common use of facial recognition technology is the use in video interviewing. The analysis of candidates' facial expressions, language, and voice tonality using FRT-based software can be used to rank each candidate according to an automatically generated "employability" score. This kind of software is apparently being used by businesses including Goldman Sachs, JP Morgan, Unilever, Vodafone, and Intel to increase recruitment efficiency. According to reports, Unilever asserted that these procedures reduced its typical recruitment time by 75% (Bird & Bird, 2020).

2. Time Recording and attendance tracking

Traditional clock-in/time recording and attendance tracking systems are vulnerable to abuse, especially at locations where a lot of individuals frequently arrive and go. In some

industries, like manufacturing and construction, where it can be challenging to track precise on-site attendance and where the habit of employees checking in for missing co-workers may be problematic, FRT was implemented in these areas early. In recent years, it has also experienced expansion in other industries. The software often calls for the employee to enter a special pin code and then stand in front of a camera while FRT verifies their identity (Bird & Bird, 2020).

3. Monitoring Activity and Productivity

In 2020, the use of FRT for tracking staff productivity has increased. Many firms were forced to implement homeworking arrangements by COVID-19, thus employers looked for ways to monitor their staff remotely. One monitoring technique that is becoming more and more popular gives the employer access to the employee's webcam and uses FRT to track when the employee is there. We have noticed a specific increase in this kind of solution during lockdown, which may be indicative of the frequent objections' employers voice to remote working situations. This has been especially common in the financial services industry, where security compliance is a major concern, but employers in other industries are increasingly adopting these types of solutions (Bird & Bird, 2020).

4. Compliance and Security

FRT is being used more frequently to control access and verify employees' identities as they enter and exit the workplace, or certain sectors of the workplace. FRT is being used by businesses more frequently to help with compliance and security needs. It should come as no surprise that this is more common in highly regulated industries, like the financial services industry, where businesses must adhere to exacting compliance standards. For instance, Pricewaterhouse Coopers ("PwC") created a FRT-based technology early this year that would enable clients to monitor their staff while they were working from home (Bird & Bird, 2020). According to reports, the system requires employees to provide a written justification for time spent away from their computer screens in addition to using cameras to track absences from their desks. In a statement, PwC stated that they are "particularly building the technology to support the regulatory environment required for traders and front office workers in financial institutions. Most importantly, it is made to support people who follow the rules while working remotely in the least invasive way possible. More recently, when workers return to the workplace, we have seen businesses take into account combining thermal cameras with facial recognition software and personnel directories as part of their COVID-19 health & safety measures undertaken by employers (Bird & Bird, 2020).

Facial recognition technology has practical relevance in most aspect of human resources and is still evolving beyond what it currently does (Ramasundaram et al., 2022).

2.3 Overview of the Recruitment Process

As already specified above, the recruitment process involves the identification, attraction, interviewing, selection, hiring, and onboarding of personnel. (Boydell, 2002). Two major components of the recruitment process (recruitment & selection) which are the most important to this research will be discussed below:

A. Recruiting:

To fill a post or job in a firm, recruitment is the process of looking for, locating, inviting, and allocating a number of persons from both inside and outside the organization as potential employees with specified criteria as decided in human resource planning. First and foremost, recruitment's goal is to find possible sources of labour—applicants who

meet the required standards for quantity and quality. Potential candidates who have been identified through adverts in respectable media or from respected universities or colleges (Adeyemi, 2022; Andriani, 2022; Iskamto et al., 2022; Nurhayana, 2021). Get a lot of qualified candidates who meet the requirements, second. Establish the minimal requirements for potential applicants, including GPA, age, job history, place of residence, and institutional accreditation. Fourth, fulfil the requirements for selection, which entails obtaining a large number of qualified applicants so that the decision-making process will be facilitated by the availability of numerous options (Munaty et al, 2022).

Planning for hiring must be done while taking into consideration both internal and external labour sources. Internal resource recruitment, which is used to fill positions within a company, has the advantages of relatively low costs, precise knowledge of potential employees with high abilities and potential, high work motivation, and prevention of good employees leaving the organization or company due to development. Workers can comprehend the company's personality, policies, provisions, and customs, and careers are not entirely clear. Internal hiring has the drawback of making it difficult for employees who are promoted to higher levels to exercise their authority because they are already so familiar with their subordinates. The hiring of individuals from outside sources, such as friends or relatives of family members, employees' families, resumes, schools of higher learning, staffing firms, and adverts (Adeyemi, 2022; Andriani, 2022; Iskamto et al., 2022; Nurhayana, 2021)

In Russia, leveraging a company's own networks to find candidates is the most popular practice. The procedure is rather cheap, and it is simple to check the references of personnel. However, this approach lacks objectivity, and there's a chance that social networks will form within the organization. These internal networks can be challenging to manage and lead. The biggest risk is that important individuals could leave and take a specific network with them as they look for other jobs (Vuorinen, 2015). In Russia, the internet is a crucial recruiting tool. For instance, social networks like LinkedIn are frequently employed in Russia when network recruitment is practiced. Open opportunities might be advertised in trade publications, on job boards, or on websites that attract job seekers. Examples of well-known job search engines are Head-hunter and SuperJob. Job seekers can post their CVs to the platform and peruse the announcements of open positions using various search parameters (Vuorinen, 2015).

B. Selection

The process of selection involves choosing potential employees who meet the established criteria or standards. Prospective employees who can work to the best of their ability will be found with the selection of personnel after going through the selection process (Munaty et al, 2022). After taking a battery of tests, selection is a process that determines whether applicants are approved or rejected. Selections that can be used include administrative selection, or selection through applicant letters to see if they meet the requirements set forth by the company, written selection, such as intelligence tests, personality tests, talents, interests, and achievements, and unwritten selections, like interviews, practice, and health/medical tests. Employees that are trustworthy, morally upright, and well-behaved are the types of people you want working for you. You also want people who are eager and able to put in long hours at the office since they feel like part of the team. And protect the business's interests, those of the company's highly loyal, honest, innovative, and driven personnel (Munaty et al, 2022).

C. Selection Process

In general, the initial interview (preliminary interview), which aims to gather applicants in accordance with the requirements established by the organization and test applicants' expertise, is the first stage of the selection process for possible new workers. The

selection test is the second stage, which determines how well the applicant can carry out the necessary job-related activities while adapting to the position and division (Munaty et al, 2022). The assessments take the form of quizzes on aptitude, practical skills, general knowledge, and personality. The test includes interest tests, handwriting tests, medical testing, psychometric tests, and other tests. The interest tests are called activity preferences tests (Munaty et al, 2022). The employment interview, which is the third stage, is a formal contact and discussion between the interviewer and candidates who may be hired. Background investigations and reference checks make up the fourth stage, which verifies the data submitted by candidates. To confirm that the information provided by the applicant is accurate and suitable, contact the applicant's close friends or family or write an official letter to the business where the applicant previously worked (Munaty et al, 2022). The applicant is subjected to a medical evaluation (medical selection) in the fifth stage to determine whether they are in excellent physical condition, in order to decrease absenteeism, lower medical and life insurance expenses, or to hire people who meet the physical requirements for particular positions. The selection decision is made in the sixth step, and it is based on earlier tests that were taken. During this procedure, the business will determine whether to accept the applicant as an employee or not. The final step is to issue an appointment letter to candidates who have been chosen to become employees (Munaty et al, 2022).

2.4 Facial Recognition Technology Application in Recruitment

Facial recognition is a component of emotion AI, a rapidly expanding branch of artificial intelligence technology. The technology advances when used in recruitment, becoming facial analysis or facial expression recognition technology. It interprets facial expressions, including tiny ones like little changes in the corners of the lips, eye movements, and body gestures. It also evaluates speech quality, such as the energy in the voice, and aids recruiters in determining whether a prospect could be a suitable fit for a position or business (Puja, 2020).

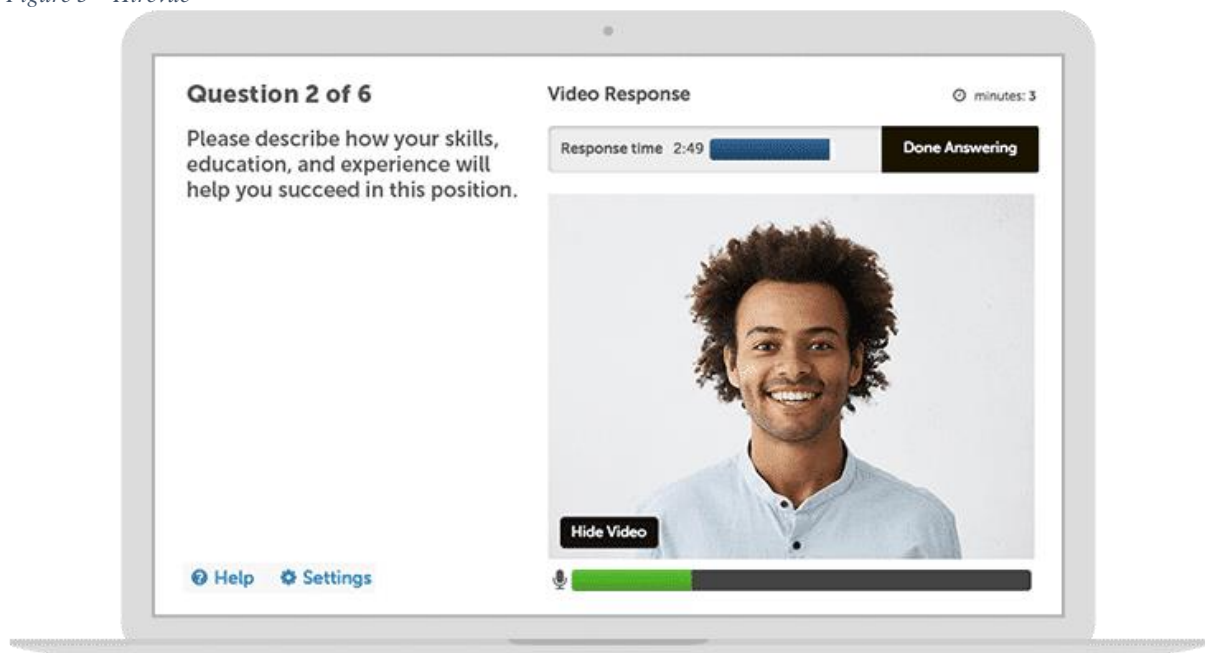
Various techniques for facial analysis are used in hiring processes. Some businesses use service providers that let applicants record their answers to a predetermined set of questions. Then, facial analysis technology is used to determine a candidate's suitability for the position. In other instances, the technology might be applied to a live interview, evaluating applicants as they answer to the interview questions (Puja, 2020). This is usually referred to as Asynchronous Video Interview (AVI). It differs from other interview modes in key ways (Torres & Mejia, 2017). An AVI is a one-way asynchronous encounter in which the applicant does not interact in real-time with any representative of the company. It is also known as a digital interview, on-demand interview, non-live interview, pre-recorded interview, or interface-based interview. Thus, AVIs differ from synchronous video interviews, in which the interviewer and interviewee converse in real time, much like in face-to-face or phone interviews (e.g., videoconferencing using a platform like Zoom or Skype). AVIs also differ from filmed interviews, which are often recordings of in-person conversations during which the interviewer is actively participating at the beginning of the conversation (Lukacik et al., 2022).

As part of the process, the applicant logs on to a web platform and responds to a series of questions that have been predetermined by the recruiter while filming a video of himself using a webcam, smartphone, or tablet. Later, recruiters connect to the same platform, evaluate the responses provided by the candidates, grade the responses, and then choose whether to request a face-to-face interview from them (Hemamou et al., 2019).

Face recognition software can be used to review video interviews, rate applicants' responses, and reveal specific personality traits and competencies during the assessment stage (Köchling & Wehner, 2020; Hunkenschroer & Kriebitz, 2022). This is usually done

with the asynchronous video interviews (AVI). Employers use AVIs by sending applicants a web link that connects them to a proprietary software platform where they can conduct an independent interview using a camera. The platform's questions can be pre-recorded in a video file or written in text-based format. The hiring manager(s) can access and review a candidate's interview at a time and location of their choosing. Prospective employees then record their responses and transmit the material back to them. Additionally, AVIs have the added advantage of enabling firms to distribute an interview to various managers. AVIs are currently supported by HireVue, Interview Stream, Vidrecruiter, and Interview Rocket, among other third-party software providers. These service providers assert that AVIs will speed up the employment process, lower travel expenses, and save time (Torres & Gregory, 2018).

Figure 5 – Hirevue



Source: The Ultimate Guide to Candidate Experience Hirevue (2018)

One of the top businesses is a start-up called HireVue, which is situated in Utah. After the interview, HireVue uses artificial intelligence algorithms to record the candidates' gestures, tone changes, and micro expressions in order to identify the best qualified applicant for the position. For instance, it is possible to tell whether a candidate lied during an interview based on the expansion and contraction of people's pupils or from a movement that the applicant made at the time. It also seeks to eliminate any biases that might show up in interviews with these analyses (Vardarlier & Zafer, 2020).

In order to identify and verify people based on their facial traits, facial recognition algorithms use phases including face detection, alignment, feature extraction, representation, classification/matching, decision-making, and verification/identification (Zhang et al, 2023). These algorithms can be used for both verification and identification tasks. They analyze and process facial images or videos to separate facial features from the background, align and normalize the face, extract key features, transform them into mathematical representations, compare them with known faces, and determine the identity of the person (Shang et al, 2023). An algorithm can record and examine human verbal and nonverbal behaviour using sensor devices like cameras and microphones (Langer et al. 2019). For instance, candidates can respond to multiple questions over the phone or webcam in Predict 2020, which are then algorithmically assessed. Candidates must record their responses to specific questions during the asynchronous video interview

and upload them to a platform. An algorithm extracts words, prosodic information (such as pitch, intonation, and pauses), and visual expressions (such as smiles, head gestures, and facial expression) in order to create a personality profile of the applicant (Dahm & Dregger 2019; Langer et al, 2020; Langer et, 2021). Faces and voice are excellent sources of cues for predicting personality, according to earlier research (Köchling et al., 2021). Supervised learning, unsupervised learning, and semi supervised learning are the three main deep learning methodologies used (Sun, et al, 2018). Semi supervised learning can be accomplished with only a little amount of unlabelled data and a small amount of labelled data for pattern recognition. Convolutional neural networks (CNNs) are the most widely used classifier that can be trained to accurately detect and recognize facial impressions without manual feature extraction (Sun, et al, 2018; Suen, 2021). CNNs have been shown to be high-performing models that can automatically classify patterns in image records (Sun, et al, 2018).

Semi supervised deep learning can be used to label and annotate behaviour. While the TensorFlow engine can be used to improve prediction accuracy and CNN can be effectively used to categorize patterns from AVI picture recordings, a CNN with a TensorFlow engine would be the perfect learning model to anticipate an interviewee's qualities based on his or her facial expressions.(Suen et al., 2020)

2.4.1 Behavioural Components of FRTs

Nonverbal cues in the form of visual and aural cues have been investigated in an effort to forecast interview performance, anxiety, candidate personality, and deceit (Hemamou et al., 2019). Throughout trials, a variety of visual cues have been used, including physical attractiveness, hand gestures, smiling, eye contact, nodding, head movement, body orientation, facial cues, and leg movements. For instance, it has been discovered that torso movement, face touching, leg fidgeting, neutral expression, and less smiling negatively connect with interview performance, but eye contact, hand gesture, and head movement positively correlate (Feiler & Powell, 2016).

Figure 6 – Facial Expressions



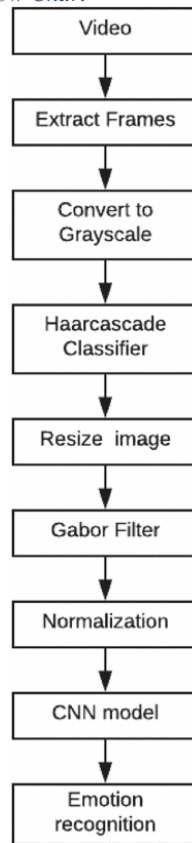
Source: Micro expressions by Science of People 2021

Additionally, these indicators may affect interviewer judgments differently based on the interview format, the employment type (blue collar vs. white collar), or the interview location (such as telephone, computer-mediated video chat and asynchronous video interview) (Feiler & Powell, 2016). The AI's algorithms evaluate applicants using a database of around 25,000 pieces of linguistic and facial data. These were assembled from prior interviews with "successful hires," or people who were hired and went on to perform well in their positions. The 350 linguistic components take into account things like a candidate's speaking rate, sentence length, and use of passive or active words. The thousands of facial expressions that were examined included frowning, rising of the brows, quantity of eye opening and closing, lip tightening, chin elevating, and smiling (Feiler & Powell, 2016).

2.4.2 How FRTs Work

FRTs are usually combined with a speech recognition software that records and analyses the candidate's responses (Adepu et al., 2020).

Figure 7 – How Facial Emotion Recognition Flow Chart

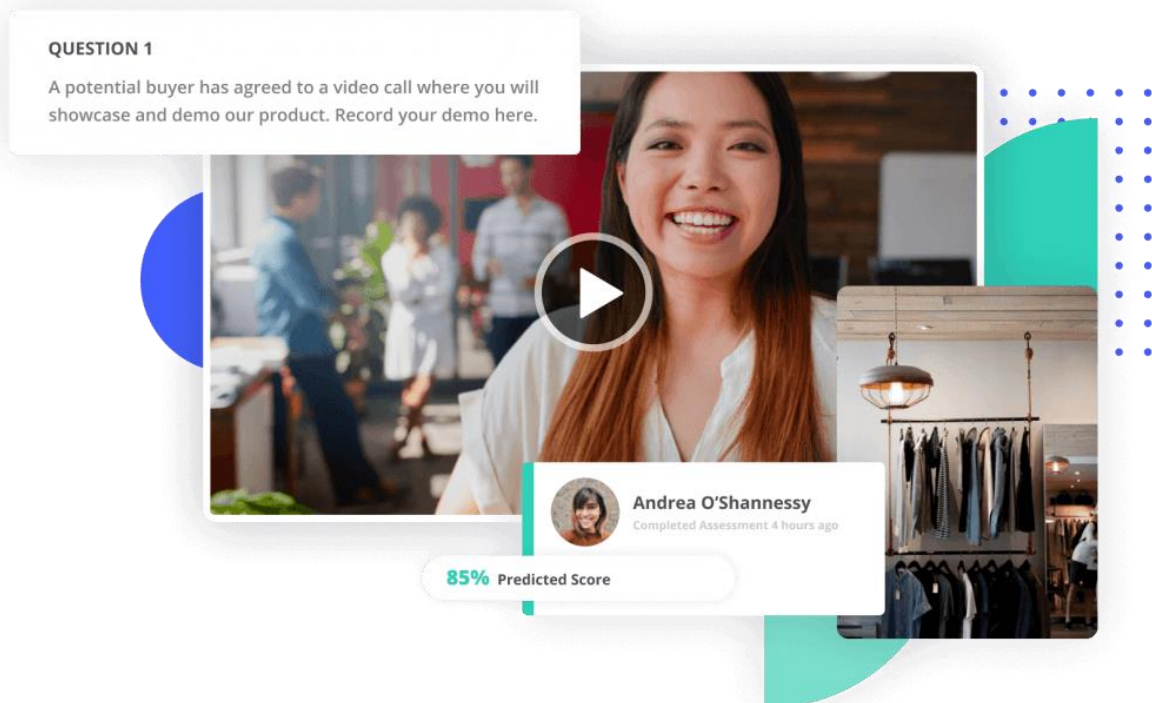


Source : Adepu et al, 2020

A model by Adepu et al. (2020) shows a process flow of the video analysis. Video is first turned into frames in the first stage after which grayscale and frame-based video conversions are done. Each grayscale image is given to the HaarCascade Frontal Face classifier, which recognizes faces in the images and gives their coordinates. Each frame is then resized using these coordinates to produce the face image that is given to the Gabor filter. The Normalization Function receives these Gabor-filtered images and normalizes each pixel's value between 0 and 1. The trained CNN model receives these normalized

values. This CNN model has an accuracy rate of 86% and was trained using Gabor filtered images. Given a 1-minute video as input, the model would receive 1800 frames because the video was captured at a 30 frames per second rate. Emotions are identified for these 1800 frames, but only one frame each second is taken into account, thus for a one-minute film, it takes into account 60 frames and discard the remaining 1740. During this process of elimination, only the frame with the highest confidence value of emotion prediction for the frames in each second is taken into account, with the rest frames being disregarded. The final calculation determines the percentage of each projected emotion, and the maximum percentage number is taken into account for determining the emotional state of the input video. Results of Facial Emotion Recognizer and Speech Fluency Recognizer are being combined. By combining the results of these two algorithms in the above table we can get a Performance Rating which shows how well a candidate performed in an interview (Adepu et al., 2020).

Figure 8 – Facial Employability Score

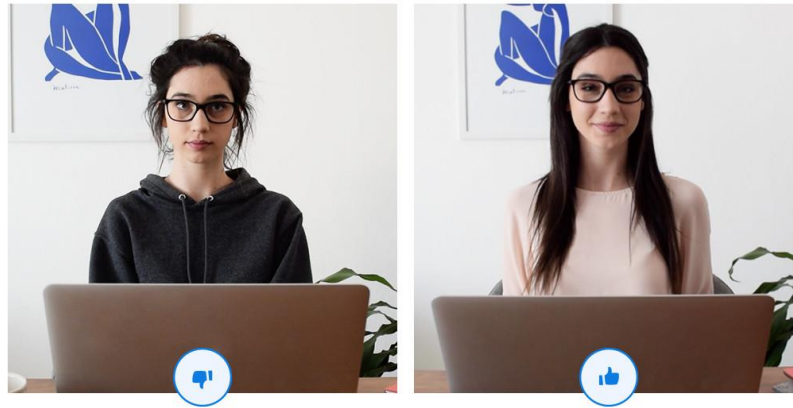


Source: How to Use AI in Recruitment (Carlson 2022)

2.4.3 Facial Expressions Western Employers Look for in Candidates

1. **Smile:** This will surely leave a positive impression. It exudes friendliness, self-assurance, and benevolence. A smile not only promotes friendliness but also makes you seem approachable and helps you hide your fears. According to psychology, a full facial smile is the equivalent of a body wave and signifies universally, "I'm someone you can chat to." Your resting face can also look uninterested or bored (Brendan, 2021).

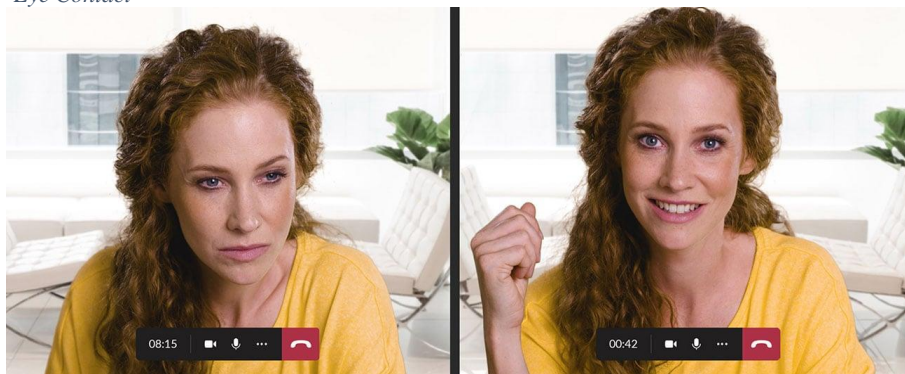
Figure 9 – Smiling



Source: Smiling Posture by Wepow (2023)

2. **Eye Contact:** This demonstrates assurance, sincerity, and a desire to establish a genuine connection. On the other side, avoiding eye contact conveys the sense that the individual is shy, lacks confidence, or is even being dishonest. Having focused facial expressions will give the audience the impression that you are a much stronger candidate (Brendan, 2021).

Figure 10 – Eye Contact



Source: Making eye contact by 4tiitoo (2020)

3. **Posture:** Whether or whether someone is interested in the conversation can be determined by their posture. It may be a sign of apathy or dismissal if the person is slouching or leaning back. They typically show interest and engagement when they bend toward their screen. Similar to standing tall in the chair, confidence can be seen by doing so (Indeed, 2021).

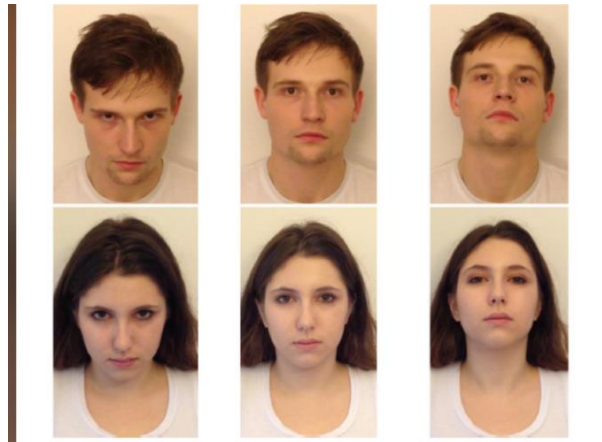
Figure 11 – Posture



Source: Posture by Hirevue (2018)

4. **Head Tilt:** When a candidate tilts their head throughout your speech, they are actively listening, participating in the conversation, and thinking about what you are saying (Indeed, 2021).

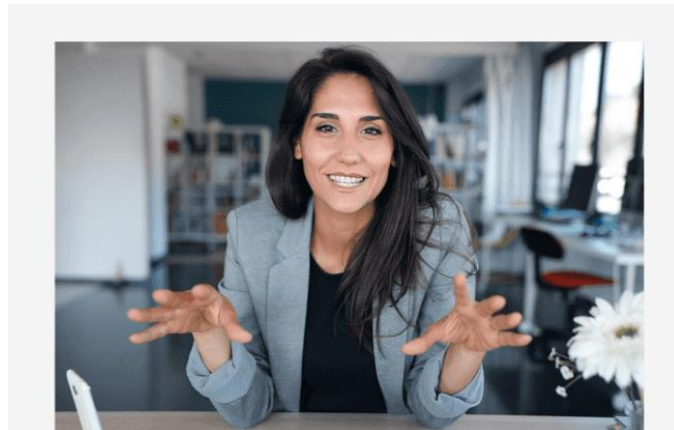
Figure 12 – Head Tilt



Source: Head Tilt Positions by Telegraph (2019)

5. **Gestures:** Strong indicators of personality, mood, or cognitive patterns can be found in hand gestures. For instance, a lot of pointing or cutting motions could be a sign of authoritarian inclinations. The candidate might be frustrated if they start rubbing their neck. Touching their faces or playing with their hair could be signs that the candidate is uneasy (Indeed 2021).

Figure 13 – Gestures



Source: Gesture during Virtual Speaking by SpeakerHub (2021)

6. **Mouth Movement:** A candidate's mouth will be audible throughout the video conversation, just like their eyes are. You now have access to mouth movement, another crucial body language indicator. Lips pursed typically signify disdain or mistrust of the subject or discourse. Lip biting could be a sign of anxiety or tension. The candidate may be trying to hide an emotion if they cover their mouth (The Muse, 2021).

Figure 14 – Mouth Movement



Source: Facial Emotions by Diaro Da Saude (2021)

“Facial expressions are not always the same; they can vary due to culture, circumstance, and impairments, and they can also be manipulated.”(SHRM 2021).

Figure 15 – Facial Expressions

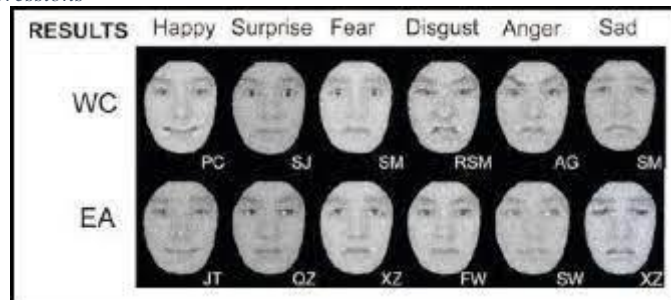


Figure 16 – Facial Expressions 2



Sources: Perception of Facial Expression by American Psychological Association (2011)

2.4.4 Russians Facial Expressions

A smile in Russia is a sign of happiness, success, and a positive attitude. While most individuals might not notice this, in Russia everyone does. In western societies like the USA and UK, a person’s smile is merely an expression of their general attitude of neutrality toward you. Russian grins are uncommon and only seen in situations where they are suitable and accurately convey an honest sentiment of satisfaction (Arapova, 2016). Sincerity and openness are hallmarks of Russian culture. In Russia, smiling or laughing could be taken as making fun of something or someone, and smiles are sometimes misinterpreted as ridicule rather than greetings. Some Russians have a difficult time distinguishing between smiles and laughing (Arapova, 2017; Vilimek, et al 2019).

Russians place the intelligence of a smiling face substantially lower than other cultures like in the American culture, and they place their culture quite low on the avoidance of ambiguity. Even the Russian saying “Smiling without a reason is a sign of stupidity” is applicable to this situation. In general, they have strong facial signals, but this does not always depict internal feelings.

Russians do have high level of emotional control which is being displayed facially (Hutchison & Gerstein, 2017.)

Eye contact at greetings is customary as a gesture of deference and reliability, yet in Russia, maintaining eye contact for an extended period of time could be seen as provocative (Vilimek, et al 2019; Vitezslav, 2019).

2.5 Problems of Facial Recognition in Recruitment

Despite the advantages of facial recognition technology being identified in terms of efficient processes, improvement in outcomes and reduction in stress levels of employees, many problems have been identified in the use of this technology. The researches that has been conducted in this area in the Western countries (UK, USA, etc) has identified the following problems:

1. Wrong Identification of Disabled Applicants

For example, facial analysis software could incorrectly evaluate and possibly reject people with facial paralysis or deformities as well as diseases like Down syndrome, achondroplasia, cleft lip and palate, or other illnesses that cause facial differences. Additionally, those who are blind might be unable to make eye contact with the camera or face it in a way that complies with the system’s requirements. Additionally, difficulties could be made worse by dark glasses and variations in eye anatomy. It may be difficult for people who lip read or need captions due to hearing loss to understand the questions. Alarming significant dangers are associated with facial analysis systems that go farther to decipher emotion and personality from facial expressions (Nugent & Scott-Parker, 2022). Beyond problems with accuracy and algorithmic bias, personality assessments based on measurements of facial features are not supported by basic scientific principles and have their roots in pseudoscientific race studies. When these technologies are used for recruitment, there is a chance that the incorrect methodological premise will be made to appear legitimate, which would perpetuate historical disadvantages and exclusion for marginalized groups (Nugent & Scott-Parker, 2022).

2. Fairness in Recruitment

Facial analysis has continuously demonstrated variable performance across demographic groups, indicating that employers cannot rely on it to accurately evaluate candidates. This issue is widely known. Google faced intense criticism when their automatic photo-tagging tool mistakenly labelled black people as gorillas back in 2015. More recently, research by Joy Buolamwini (2018) at MIT showed that women and people of colour receive fewer accurate results from AI facial recognition systems than white men do. For instance, 28 members of the U.S. congress were recognized as criminals using a database of mugshots in an ACLU investigation of Amazon’s Recognition technology (Buolamwini & Timnit, 2018). Despite the fact that only 22% of federal politicians are of Asian, Black, or Hispanic ancestry, the tool failed to match 40% of people of race. Additionally, there is compelling evidence that these technologies may be biased and exclude certain groups of job searchers. According to the Berkeley Haas Centre for Equity, Gender, and Leadership, approximately 26% of AI systems exhibit both gender and racial bias. Gender bias is present in 44% of AI systems. For instance, compared to men with lighter complexion, women of colour had a 35% higher detection error for gender recognition when using

face recognition algorithms. Any situation where an algorithm performs inconsistently is troublesome, but when it comes to making job decisions, it becomes more difficult (Buolamwini & Timnit, 2018).

Although the use of facial analysis, particularly in recruiting, has the potential to worsen bias, it also has the possibility of reducing it. Human prejudices manifest themselves at a very subconscious level, and occasionally recruiters may just not like “the appearance” or “feel” of a prospect if it doesn’t fit with their desired applicant ideal. In these circumstances, apparently impartial algorithms can remove the initial bias and possibly display a candidate as they actually are. Any type of AI, including facial recognition, is only as good or bad as the data it has access to. It also depends on who is gathering, collecting, cleaning, and simplifying the data (Puja, 2020).

3. Limited Transparency

In terms of technology, “black-box” machine learning techniques, which are not comprehensible to a human observer, are used to build picture analysis systems. Because of this lack of explicability, employers might not be aware of the data inputs influencing decisions regarding a candidate’s employability (Basch, & Melchers 2019; Hagendorff & Wezel, 2020). It is crucial to utilize “white” or “glass-box” systems wherever facial recognition technology is being used to make decisions that have a direct impact on people’s lives, such as hiring outcomes, in order to incorporate human oversight into the procedure. Over the past few years, this practice has received support from a wide range of organizations, including Microsoft, the European Commission, and the National Science Foundation. This is because the AI industry is aware that explainable models are the best option for facilitating just and moral outcomes (Basch, & Melchers 2019).

4. Lack of Understanding by Job Seekers

The type of interview they are being requested to participate in, and more specifically, the type of AVI, generally confuses job hopefuls. Additionally, they frequently had no idea how the AVI would judge them; for instance, several believed face recognition would be used when, in reality, it wasn’t. This ignorance reflects a general concern that job searchers are ignorant, to the point where some governments are starting to provide companies with legal counsel. Many job applicants performed rigidly by maintaining a fixed look, a phony grin, or an awkward posture, speaking in a monotone voice, and keeping their hands immobile since they were unfamiliar with the technology being used. They believed they had to act like automatons (Basch et al, 2022; Scott 2022).

5. Identification Errors

Technology for facial recognition doesn’t always function as it should. Low image quality or poor lighting conditions can have an influence on facial recognition systems. Due to obstructed camera angles, the data may not match the subject’s nodal points; this results in an error when matching faceprints cannot be validated in the database. Finally, the selection of the used device may also affect evaluations. A lot of applicants choose to use mobile devices; however, applicants can use AVI software on their computer, smartphone, or tablet (HireVue, 2018). Although the AVI platform’s limitations (on data storage and retrieval) may limit the calibre of the video responses that are retained, observable variations in image clarity or resolution between applicants may have an effect on how assessors see the applicant (e.g., socioeconomic status, technological competence). Problematic lighting or poor image contrast may cause a negative response from the evaluators. Similar to this, how candidates interact with their equipment when recording video responses (for example, movement or lack of stability if utilizing a hand-held device) may adversely affect how well-motivated, interested, or professional applicants are perceived by evaluators (Lukacik et al., 2022).

6. Anxiety

The outcomes of AVI design choices for facial and emotion recognition can also have a significant impact on how candidates feel throughout the interview, including interview anxiety. Performance issues caused by applicant anxiousness may arise. According to meta-analytic data, anxiety negatively affects interview performance on a state, trait, and interview-specific level (scores ranging from 0.08 to 0.24 (Powell et al, 2018)). All five of the dimensions of interview anxiety identified by McCarthy & Goffin (2004) could be significantly impacted by AVI design features: communication anxiety (i.e., worry about verbal, non-verbal, and listening skills), appearance anxiety (i.e., worry about one's physical appearance), social anxiety (i.e., worry about one's social behaviour driven by a desire to be liked), and performance anxiety (i.e., worry about performance outcomes).

7. The Lack of High-Quality Publicly Available Data

A data-driven task is FER. When training a deep neural network, it typically takes a lot of training data to catch small expression-related deformations. The lack of training data, both in terms of quantity and quality, is the main issue facing deep FER systems (Huang et al, 2019).

In the meanwhile, due to varied class distribution and the subjective annotation approach, the issue of data bias and inconsistent annotations frequently exists when using different datasets. The inequality of classes is another prevalent issue (Huang et al, 2019).

8. Visual Privacy

A significant obstacle with camera-equipped systems, such the real-time FER for smartphones, is the growing privacy-preserving concerns. Even if there have been a few attempts, a wide range of proposed FER methods often rely on high-resolution photos with little to no consideration for their users' visual privacy. Therefore, more reliable and precise privacy protection techniques are required to balance data utility and privacy for FER systems (Huang et al, 2019).

9. Human Considerations

A person's attitude can change quite quickly and for many diverse causes. Simply because someone is sad, a little irritated, or otherwise upset right now doesn't mean that they are unfit for a job or that that is how they always act. Negative conditions can be taken into account during interviews by human interviewers, but artificial intelligence may eliminate applicants before that happens (Powell et al, 2018). Issues with physical appearance may influence how artificial intelligence evaluates facial expressions. Technology may see a person differently if they have facial tattoos, scars, Botox treatments, or excessive or improper makeup. A human interviewer can see these things and consider them, but a computer might just automatically exclude that candidate from the talent pool (Powell et al, 2018).

2.5.1 How Companies in Western Countries are Solving these Problems

Some companies try to resolve most of these problems by doing the following:

1. Giving a clear description of the process. This involves instructing the candidates on what they need to do. There are also directions on how the candidates should present or sit or tilt their heads to be picked up clearly by the computer. Also, applicants are given the opportunity to listen to pre-recorded videos from human

resources on things to do and not to do. They are also given practise questions to make them feel comfortable moved to manually watching the pre-recorded videos to reduce the bias in the system (Wired, 2021).

2. Some companies have halted the use of facial analysis and have moved to manually watching the pre-recorded videos to reduce the bias in the system (Wired, 2021)

2.6 Relevant Theories

In order to direct this research, certain theories were observed to help explain why certain things have occurred in this research.

1. **Social Constructivism:** On advancements in the sociology of scientific knowledge, studies in this field have based their theories. It has been suggested that knowledge is a social creation rather than a reflection of reality in the sociology of science. Knowledge is consequently thought to be open to multiple interpretations. As a result, social construction and negotiation processes are used to establish scientific knowledge and technology. The social construction of technology claims that the system is anchored in and constituted by social factors rather than being only a purely technological output of design (Vygotsk & Cole, 2018). Social groups are the pinnacle of the “social creation of technology” perspective. Through the views of these social groups, technology and its significance are observed. From this point of view, it can be seen that facial recognition which is a technology is highly influenced by the social construction in which it is being utilized and not just its pure technological output.
2. **Actor Network Theory:** This idea takes into account both the content and the setting of technology. Technology is defined as the activities, processes, and knowledge that go into the creation of tangible items and artifacts, as well as their use (Woolgar, 1991). Thus, interactions between social and technical actors shape and interpret e-HRM technology. For instance, the technical component of a facial recognition program would include the system’s support for communication structures, network protocols, and cabling. Suppliers, network administrators, hiring managers, software developers, and users would all fall under the social category. In other words, the technical and social aspects of e-HRM technology are present. An e-design HRM’s and usage context also includes social and technical elements. Their social norms, cultural customs, and ways of interacting will influence the technology. How can the content and context of e-HRM technology be distinguished if, as traditionally characterized, both contain technical and social components? The two are basically indefinite and reflexively linked, according to Woolgar (1991). Context and content both mutually elucidate one another. To put it another way, decisions regarding how to divide up the roles that technology and its environment play are part of technology design. The socio-technical context in which e-HRM technology is used defines the technology itself. By “following the players” in their interactions as they build and elaborate the technology, context, themselves, and each other, theorists of this theory contend that it is possible to understand the process by which technological initiatives are carried out (Woolgar, 1991). Therefore, in keeping with tradition, the objectives of e-HRM research are likely to involve examining the technological and social aspects of the apps’ content and setting.

3. **Social Shaping Theory:** According to this view, society's prevailing social, political, and economic values have an impact on technology and that technology is not neutral. Therefore, shifting values result in diverse technical outputs, and as a result, social science factors can be used to influence technologies (MacKenzie & Wajcman 1999). It is suggested that crucial decisions originate from the social subsystem and that technologies are always socially entrenched. The state and government are given a lot of attention in social shaping theory. The structure of R&D, standardization, and the creation of applications and services are only a few examples of how social variables have an impact. While technology is not useless, societal influences have a tremendous influence on how it is molded. This strategy was improved upon in the currently very well-liked science and technology studies (STS) school, which views social and technological issues as being interconnected in a seamless web (MacKenzie & Wajcman 1999). This explains why the way facial recognition technology for recruitment is being adapted to different countries because all these societies have a different environment and values which is usually incorporated into this technology when used.

3. RESEARCH METHODOLOGY

Primary data from one-on-one interviews were used as the data-gathering approach for this working paper. One of the most popular methods for gathering data in qualitative research is the interview since it enables researchers to do so through in-depth discussions, stories, and narratives (Saunders et al., 2021). To gather information from the target audience, semi-structured interview questions were created using an appreciative inquiry method (Michael, 2008). Due to its ability to capture the respondents' emotions and non-verbal clues, flexibility, open-mindedness, and conversational flow, a semi-structured interview was chosen (Patton, 2014).

The following components comprised the interview guide:

1. What is your name and job role?
2. How is it like working in this field?
3. What are the benefits of face recognition technology for recruitment process?
4. Is this application benefit similar to other countries or specific to Russia?
5. What kind of training data is fed into this software?
6. How accurate do you think the on-demand video interview is, in analysing candidates' looks, languages, gestures, speaking style?
7. At what stages of the recruitment could this software be used?
8. What are the risks encountered when using this tool in Russia?
9. What do you think are the potential ways to curb these risks?
10. What are the behavioural traits you look for in candidates to successfully pass while using this tool in Russia?
11. How does the Russian environment affect the way this technology is used?
12. Are there specific changes that are made to successfully use this tool in Russia?
13. If yes, what are these changes?

The information was gathered in 2023 between January and March. All of the interviews were completely transcribed and conducted over Zoom, which was also recorded. Emails and phone calls with information about the study and the interview were sent to every participant. All of the participants requested that the interviews take place in a quiet setting because they felt more at ease there and could express themselves more freely. In a semi-structured interview, a list of questions in the form of an interview schedule is typically used, albeit the questions' sequence is flexible. The interviewer has a lot of latitude to dig and investigate further in response to comments that are deemed remarkable. While allowing for the development of a rapport and sense of empathy between the researcher and the participant (Bryman & Bell, 2007).

The target audience that the data were collected from were users of facial recognition technology. Hence, FRT users and other relevant stakeholders who have worked in FRT were interviewed. This included recruitment professionals and software development professionals. The author intended to work with experts from various employers who utilize face recognition technology and have a lot of experience with the technology in question, which is why they were selected.

Specifics: HR & Software teams within these companies with a minimum of 1-year experience that has worked with FRTs.

Recruitment: They were recruited through LinkedIn, personal recommendations, emails, and social media.

Place of Work: They all work in large IT corporations in Russia

Field of Work: Computer vision software, Recruiting, Machine Learning, Data Engineering

Detailed Profiles of Interviewees

All names mentioned in this chapter were pseudonymized in accordance with the ethical guidelines used in this working paper.

Table 1 – Interview Participants

Pseudonyms	Gender	Role
Victor Gnetle	Male	Recruiter
Sarah Asmta	Female	Recruiter
James Smuger	Male	HR Tech Analyst
Jene Hulits	Male	Head of Applied Data Centre
John Diiyk	Male	Technology Officer
Mats Ruooih	Male	Software Engineer
Boyer Nefti	Male	Software Engineer
Sean Carpem	Male	Software Engineer

The first group of interviewees that were recruiters are experts in the recruitment field for over 3 years and they have also worked with facial recognition. They currently work for major IT companies and were pleased to participate in the interview. The author was able to participate in a fruitful discussion about how facial recognition technology was currently used, its benefits, and its challenges.

The second group of participants who were involved in data and software development had over 2 years of experience in the field. They gave more details about the technicality of the facial recognition technology, as well as the emotions and some developmental processes.

Sampling Technique

A pilot interview was conducted prior to the actual research being conducted. Using this technique, the interviewee was able to express thoughts and emotions in response to the questions. This gave the researcher a chance to iron out any grammatical or structural difficulties with the questions and to draw attention to any faults that needed to be fixed in case they made a participant uncomfortable. The data collected from the pilot survey were not analyzed.

Data Analysis

After being transcribed, the data was coded, interpreted, explained, and verified. By allowing the researcher to listen to and read the transcribed interviews multiple times, transcription can help the researcher gain a deeper understanding of the subject. The data was coded once it had been completely transcribed. The codes were derived from the data which were placed in an excel sheet. Answers associated to certain questions were separated into different sheets. Each answer was then summarized into a code word. The applied codes, or keywords, are regarded as a crucial element of qualitative research because they are utilized to categorize or arrange data (Sarantakos, 1998). The data was then examined, classified, and arranged into themes and sub-themes that emerged from the coding procedure. A code was assigned to the emerging themes in order to identify them. A code was assigned to the emerging themes in order to identify them. The data was then evaluated by highlighting any similarities and differences and searching for reoccurring trends. The third stage was data verification, which involved rechecking the transcripts and codes to ensure that the researcher's knowledge was accurate. This allowed the researcher to validate or modify presumptions that had already been formed (Sarantakos, 1998).

Ethical Considerations

A study proposal was sent to the research project's supervisor. The supervisor gave ethical approval before the research got going. The researcher must always be aware of the impact of their work on study participants and society at large and must react properly. Kumar (2005) acknowledges that it is immoral to collect information without participants' knowledge, expressed desire, and informed permission. Because of this, the researcher made it clear to every participant that they might leave the study at any time and that their participation was completely voluntary. While conducting this study, the researcher made sure that every participant gave their informed consent.

Additionally, they were informed that they were not obligated to answer any questions that made them feel uneasy. Participants were given advance notice, a general overview of the subject matter to be addressed, a description of the kind of information that was anticipated of them, the justifications for the study, and an explanation of how the data they provided would be used. Before the interview started, participants were made aware of how long it would last, and there was adequate time before and after the interview for them to ask any questions about the subject of the study.

4. FINDINGS

Findings have shown that facial recognition technology used for recruitment in Russia offers some benefits, and challenges and also certain adjustments are been made to use this technology in Russia. The benefits/risks/processes highlighted in this section were experienced from its usage in Russia. Some interviewees noted that some could have general applicability based on how it is been used in each country, but there could be some disparities which will be highlighted further in this chapter.

The research's findings will be divided into several sections:

1. Aspects of recruitment facial recognition technology is used
2. Stages of recruitment facial recognition technology is used
3. Benefits of FRTs for recruitment
4. Challenges with the usage of this technology
5. Potential risks with the usage of this technology
6. Ways to curb these risks
7. Behavioural traits looked for in candidates
8. Facial expressions and meaning
9. Training data fed into the system
10. Current Russian situation with the usage of FRTs
11. Changes to make to use this technology in Russia
12. Further recommendations to make to use this technology successfully
13. Further areas where facial recognition technology could be used in recruitment

Findings 1 – Aspects of Recruitment Facial Recognition Technology Is Used in Russia

According to most of the participants interviewed, facial recognition technology is mostly used for candidate verification and digital interviews. This will be further broken down below:

A. On-demand/ Digital Interviews

FRT is mostly used at the interview stage. A link is sent to a candidate, and the candidate is given some days to record his or her responses which is then uploaded to the database. While recording the answers, the candidate has multiple chances to rerecord the answers, but there is usually a limit. This replaces the physical interview where a candidate has to meet up with a recruiter who comes in with a set or structured or unstructured interview questions. This was clearly highlighted by an interviewee stating

'They are used for digital or automated interviews with no real recruiter' (James Smuger)

B. Candidate Verification

Here, the candidate's face is run against certain databases for security reasons. This is done to ensure that candidates are not criminals or involved in certain fraudulent or dangerous acts. This is usually done by companies with access to government databases and for roles requiring access to classified information.

Finding 2 – Stages of Recruitment Facial Recognition Technology is Used

Firstly, for most recruitment firms in Russia, facial recognition technology for recruitment is mostly used in Graduate roles where there are lots of candidates to recruit. These graduates are usually people who just completed their bachelor's, master's, or certain types of specialist programs. Secondly, it could be used for certain functions or jobs with mass recruitment, search for blue collars or young talents. Thirdly, it could be used for some entry-level, specialist, management trainee or internship programs. Finally, it is usually the first or second stage of the recruitment process after a candidate has sent in an application. This shows that facial recognition technology is usually used for positions that require a large number of people and for roles that require people with no or little level of experience but never for experienced roles. This was pointed out by an interview participant who said:

It can be used at some stages, for mass recruitment, graduate roles, young talents, blue collars, entry-level and specialist roles, but it is not used for executive roles (Sarah Amster).

Findings 3 – Benefits of FRT For Recruitment

The benefits identified by the interview participants revolved around four themes:

- A. Saves Resources
- B. Automates Processes
- C. Analyses information
- D. Security

- A. **Resource Saving includes** cost-saving and time-saving. With regards to **time saving**, hiring managers can deal with the laborious process of interview screening with the help of facial recognition technology. This program can conduct the first round of candidate screening for personality and work suitability, saving time and relieving the recruiter's stress by removing the need to review the candidate's personal data. Most of the interview participants noted that it reduced the time needed to conduct physical interviews and this helped them to focus their time and energy on more strategic operations. Also, candidates do not have to waste time trying to get to the office to do an interview or attend certain interviews at specific times. It also gives recruiters the freedom to review these videos at any time they want. It also **saves cost** by helping companies reduce the amount spent on paying extra salaries for recruiters, overtime, and payroll adjustments and this energy can be redirected to other more strategic operations which will be of financial benefit to the company in the future. Also, by identifying fraudulent job seekers, it could help prevent potential future losses that could have been incurred should that job seeker had been hired.

It is the best option to save money and time because it automates the process. It is the future (James Smuger)

It saves time and eliminates repetitive tasks (Victor Gnetle)

- B.

For a single job posting, recruiters receive hundreds of applications, making the screening procedure laborious and time-consuming. This FRT used in the recruitment process helps make the recruiters' jobs faster and more convenient. Recruiters do not need to sit down and conduct hundreds of interviews where this could be done automatically.

It saves time and eliminates repetitive tasks that would have taken a long time to be completed (Victor Gnetle).

- C. **Analysing Data:** In general, amongst participants, it was shown that FRTs help make the analysis of subtle and important facial responses that could help recruiters make better decisions during the recruitment process. This can be further broken down into the various ways how it helps in analyzing data. They include the following: Checks for facial expressions, Detects emotions, Analyzes behavioural characteristics, Analyses candidates' interest, Creates candidates' Profiles, Reactions to specific questions, Culture fit, Level of objectivity.

Firstly, it helps check facial expression. Every participant noted that data needed to be gathered before it could be analyzed, so FRTs need to detect these emotions and present it backend before any form of analysis begins. Some noted that facial expressions have been analyzed. Facial 'recognition technology instantly recognizes a human face using an optical sensor, such as a webcam or smartphone camera. Then, using computer vision algorithms, the face's essential traits are examined by deep learning algorithms to categorize facial expressions. The emotions associated with these expressions are then determined. Further information on how these facial expressions and emotions are checked will be highlighted in **Findings 6**.

Secondly, it detects emotions. After these facial expressions are detected, the FRT tries to understand the emotion brought about by these facial expressions. It was also noted by one participant that this process could be complicated and much attention is usually focused here.

Thirdly it analyses behavioural. Another interesting fact noted by some of the participants was that the facial expressions and emotions understood could help recruiters explain certain behaviours or responses from candidates. This also helps them make certain adjustments when reviewing the analyzed data from the facial recognition technology.

Fourthly, it analyses candidates' interest. By gathering all the data and information from the facial recognition technology, recruiters can understand certain information like a candidate's interest in the interview process, or gauge the interest level from the beginning of the interview till the end.

Also, it creates candidates' profiles. The facial recognition technology creates a candidate profile based on existing databases of successful candidates. It also generally classifies candidates on different profiles based on emotions displayed and behaviours analyzed.

It checks reactions to specific questions. it was also noted by one of the interview participants that this facial recognition used in video interviews can help track candidates' responses to specific questions. This could help recruiters reformulate

or ask the right questions. It could also help recruiters find out questions that are very engaging. For example, if a group of job candidates has been displaying certain emotions or reactions to certain questions over time, it could mean that the question is problematic or very interesting.

It checks for culture fit. A very interesting concept identified from the interview responses is that it helps to establish a relationship between the job candidate and the company. By using this facial recognition to detect emotions and behaviours, information gathered can be run against the organizational culture to ensure that the candidate is a match. Knowing if a candidate will fit into the company's cultural ecosystem is a crucial consideration for all the recruiters interviewed. The entire workforce's facial 'ticks' and expressions can be screened using advanced facial recognition technology to create an 'ideal' company face. The applicant's face might then be evaluated in order to compare it to the face of the "ideal" employee.

It has high level of objectivity. One very interesting component discovered while interviewing the participants was that some thought that the use of facial recognition removes any element of subjectivity which could have been done if a real recruiter is there. While this was an advantage to some, some saw it as a disadvantage because subjectivity sets room for making adjustments to certain situations.

It is not that bias, as it is not subjective like real recruiters who might not be fair to all candidates or judge equally (Sarah Amster)

A candidate could be experiencing some personal issues that prevent some emotions and the interview becomes negative because of this emotion and that person might be the best person for the job. Some level of subjectivity is needed here (John Diiyk)

- D. **Security:** Finally, facial recognition technology offers some security or surveillance benefits as mentioned by one of the interview participants. Some others went on to mention that this technology could help match the faces of candidates against certain databases to be sure the candidate is authentic in terms of the information supplied. Candidates usually give companies permission to use their data for security verification or other recruitment related matters.

Findings 4 – Current Challenges with the Use of Facial Recognition Technology

Most of the people being interviewed talked more about getting data and the usability by candidates as the two major challenges they currently face with the usage of the technology. They are further explained below:

- A. **Getting Data:** A recurring word amongst most interview participants was the issue of getting data. Some highlighted the issue that some facial recognition technology might be trained with a dataset that is not too diversified, especially in

an environment like Russia. Some went further to mention the issue of the languages used in training these models. As there are many different emotions that humans experience, it is challenging to compile adequate data for each emotion, which could lead to the issue of class imbalance. One respondent noted that it could be easier to find more happy faces for a gender or certain race than sad faces or typical facial expressions of certain races.

- B. **Usability by Candidates:** Another problem being faced by some of these companies that use facial recognition technology is that some candidates find it difficult using the technology. Some have found it a bit complicated especially if its their first time using it. They lack the required skills to successfully navigate around the platform and end up making mistakes some times. Also, candidates find it difficult being themselves when using this technology. They sometimes do not know how to behave or what emotions to display and are usually not confident. According to one interviewee, most job candidates have complained of not understanding the system, how it works, problems with adjustments and how to properly behave, or what part of the camera to look at. This can be pinpointed from the statement below:

Some people do not have the skill to use the tool in terms of recording, and communication, older candidates will not feel comfortable and they won't behave the way they would have behaved. Because of this, the results of the interview might not be good (Sarah Amster)

- C. **Technical Problems:** Most of the participants went further to identify the technical problems that could be experienced when using the facial recognition technology. Technical factors (changing camera angles, lighting, and concealing some portions of the face) might impact how well a facial expression is caught. Also, there could be technical problems with the type of device it is been used on. These are current mistakes currently made by candidates that could impact the results of the facial recognition technology.

Findings 5 – Potential Risks with the Usage of this Technology

Despite the numerous benefits that facial recognition technology offers to companies for recruitment, most interview participants have identified several potential risks that could arise in the usage of this technology and they are centred around the following themes:

- A. Accuracy
- B. Bias
- C. Trust in the Technology
- D. Skills
- E. Loss of Resources
- F. Manipulation

- A. **Accuracy:** There are risks of errors and mistakes when detecting these emotions in job candidates. One of the participants duly pointed out that facial recognition technology is quite developed in Russia, but when it comes to recruitment, it is

still less developed for that purpose and there are risks of accuracy when fully determining the right candidate for the job. Facial recognition for merely verification or identification in terms of accuracy is quite high as pointed out by some interviewees, but for emotion detection and analysis, the accuracy level is not as high. Individual facial expressions may vary somewhat, mix together many emotional states (such as fear and rage, happiness and sadness), or fail to convey any emotion at all. However, some emotions may not be seen on someone's face, making it dangerous to draw conclusions about someone only from their facial expression. Contextual clauses (sarcasm), as well as the socio-cultural setting, can also contribute to the ambiguity of facial expressions. It was noted by one participant that these systems are complicated and require the understanding of so much data. This is shown in the comment below:

FRTs are more complicated and unpredictable as it is very risky because companies need digitally inclined team and a very complex system needs to be developed which will include a lot of aspects which will include personal behaviours, emotions, body language, speech (Victor Gnetle)

Also, with the issue of accuracy, another participant identified that the facial recognition technology could be too objective as opposed to a human recruiter who could make certain adjustments should a candidate be having issues. This participant went further to say job candidates could be having personal problems and might only be pretending to display certain emotions or even the environment where they could be using this technology could have distractions. Additionally, FRT does not explain the trigger of emotions, which may be thinking of a current or previous occurrence, therefore even in the instance of accurate emotion detection, the data may be used to draw incorrect conclusions about a person. Despite these limitations, the results of FRT are typically accepted as facts and used as input to procedures that have an impact on the lives of data subjects rather than initiating an evaluation to learn more about their circumstances in the given context. A human recruiter is more likely to make adjustments for those scenarios as opposed to artificial intelligence which is the facial recognition technology in context. An interesting statement by this interviewee is made below:

Personal experience by recruiters with candidates helps them understand candidates better. The candidates might not have certain criteria, but a real interviewer will see it in a real interview which the machine will not see (Sarah Amster)

Candidates could be encountering certain issues that prevent some emotional response or unexpected phone calls or environmental factors (Victor Gnetle)

- B. **Bias in the System:** A very important point further identified and discussed was the issue of bias in the system. This a risk that could happen in the future. This technology could be used to perpetuate some certain level of unfairness which could be known or unknown to the employer. According to one participant, this all depends on whoever trains the system. This could be used to discriminate against certain races, genders or people with certain disabilities. Also included in the technical problems as identified by the interview participants is that disabled

people or people with certain abnormalities might be at certain disadvantages when using this technology.

Trust in Technology: This is a big issue identified by most of the participants as there is no use for technology if it is not accepted.

Some of the participants were very specific about this issue of trust because it determined the adoption level of this technology for recruitment. A few of them did not fail to point out that Russians currently are not fully open to the use of this facial recognition for recruitment. They further explained that some are already open to facial recognition being used for verification and identification but not yet for recruitment. One other participant went on to say that even most Russian companies are not ready to use this technology yet due to trust from the employer's end, so it is a two-way problem, which is trust by the employer and trust by the job seeker. An interesting fact was that one of the participants identified that even though most employers look for both hard and soft skills, most often target hard skills, facial emotion technology relies heavily on soft skills.

Another issue surrounding the trust theme is the issue of privacy and personal data. All participants stated that there are Russian laws that guide the use of personal data. The current law is the one adopted by the State Duma on July 8, 2006, and approved by the Federation Council on July 14, 2006.

While some noted that these laws are in place to prevent the usage of people's data for devious means or to get this data without permission, others agreed to its existence but noted that its implementation is not as strongly upheld as in Western countries. Also, with regard to personal data, there are issues of leakage where the data of companies are breached and accessed.

Some noteworthy comments by interview participants are:

There are issues about the usage of personal data, especially the body and it's a big problem in Russia. But if there is good documentation, this would not be a problem and people are to be informed that they will be using their face for recognition and emotions (Jene Hulits)

One risk is personal data, because it works with face and personal information of people and this could leak and developers should take it into mind (Sean Carpem)

- D. **Skills:** one strong point that all respondents agreed to was the issue of skills in the development and usage of this facial recognition technology for recruitment. From the standpoint of the employers, getting the right set of software professionals, data engineers, or recruiters that could use this technology might be a problem. If people with the right skill set are not employed to use this technology, it could cause some errors and mistakes that could be detrimental to the organization. There could also be issues of brain drain in the future which could lead to employers not having the right skills needed to use these technologies.
- E. **Loss of Resources:** Many interviewees highlighted the importance of a company's resources when deciding to go along with any type of artificial

intelligence, and with facial recognition, it is the same. The major resources that were discussed were financial and human resources.

Further deep into these interviews, some noted the fact that facial recognition technologies in general are quite expensive, and if companies would want to implement these technologies, they do a cost-benefit analysis to be sure that the money invested in such technology would not go to waste. A big challenge which is financial loss is when the company implements this facial recognition for recruitment and it does not do what it is meant to do or some challenges previously mentioned occur and is discontinued. This problem has been encountered by some of the respondents and they have had to re-modify operations. This is a huge financial risk to most firms. Moving on to the loss of human resources, some interviewees fear that facial recognition in combination with other artificial intelligence in recruitment will cause massive job loss for most people in the Human Resources department or some other department whose jobs are attached to the use of this technology.

- F. **Manipulation:** A surprising fact that arose in the course of these interviews was the fear of manipulative tendencies by some respondents. It was stated that people could pretend to fake certain emotions just to bypass this facial recognition technology. One respondent went as far as saying that there could be tendencies in the future that children could be trained to bypass such systems before they reach that stage where they look for jobs. This could be a major challenge to determining the emotions of future job seekers should they decide to venture on such paths.

Finding 6 – Ways to Curb these Risks

As the challenges has been previously highlighted, interviewees were later asked possible ways these risks could be reduced or eliminated as well as current practices been done to minimize these challenges with the use of facial recognition technology. The themes around which these challenges could be reduced are listed below:

- A. Building Trust
- B. Training
- C. Developing Regulations
- D. Combine with Physical Interviews
- E. Technical Development and Improvement
- F. Regular Technical Audits

- A. **Building Trust:** The first notable point about using this technology as highlighted by most of the participants was about informing the public. Some Russians are aware of the usage of facial recognition in some aspects of Russia, but few are quite aware of its usage for recruitment in Russia. Getting people to know about this technology, its usage, and its effects could help improve the acceptance level. It was noted by one of the participants that people fear or don't trust what they do not know about. Another point highlighted to enhance trust is by enabling a transparent and clear process which helps people to know how this technology is being used. Also, when informing the public, how it benefits them should be

stated. People will trust more if it is being done in their interest and not just the interest of the company.

The technology should be used clearly and transparently. People should know that this technology is used now and it should be used in the interest of the candidates, but if people see that the interest is in that of the company, they won't trust it and will reject it (John Diiyk).

- B. Training:** Here, experience accumulation was pinpointed. They meant that the more people use this facial recognition technology, the better they become. For recruiters who are mostly at the fore point of using this technology, the more they use it, the better they become and this reduces the challenge of unskilled labour with the usage of this technology. Also, companies could conduct training sessions for employees to make sure their skill levels are up to date with the usage of this technology. As for job seekers, they could be offered short training sessions before they are interviewed on this platform, highlighting the dos and don'ts of using it. By guiding candidates through the interview and explaining what to expect before, during, and after, you can make them feel more at ease. Also, test runs could be organized with employees to test the usability before rolling it out to the general public. This could help companies see the possible errors and problems before rolling out the original version for recruitment.
- C. Developing Regulations:** Some of the interviewees brought out an interesting aspect of regulations and explained that regulations specifically for recruitment with Artificial intelligence could be implemented by the Government. These regulations could ban the illegal manipulation of training models or data at the expense of candidates. The regulations could even state that companies should not rely fully on the feedback of artificial intelligence or facial recognition for determining the acceptance of candidates and should contain some kind of human input to make the process more transparent. Also, regulations on how long these video recordings made by candidates should be stored could also be developed. This could help reduce the fear of candidates' exposure to their data. Businesses that engage in discrimination or whose FRT produces skewed results ought to be held responsible for those problems. If they employ facial recognition software improperly or with racial bias, they should be liable to serious sanctions.
- D. Combine with Physical Interviews:** In order to build transparency in the recruitment process, these automated interviews with facial recognition could be combined with physical interviews. Some respondents noted that despite its usage for recruitment, job candidates were still invited for further interviews to understand some aspects that were not detected while using this artificial intelligence including facial recognition.
- E. Technical Development:** To sum up the ways to curb the risks, the remaining interviewees stated that the technical challenges with the use of facial recognition technology need to be reduced too. In their companies, they strive to constantly strengthen their cybersecurity systems to prevent attacks. Also, they try to make the training data used as diversified as possible.

- F. Regular Technical Audits:** External bodies could be sent annually or bi-annually to audit this technology which is being used for recruitment to ensure it is used accordingly and properly by most companies.

Finding 7 – Behavioural Traits Looked for In Candidates

All interviewees highlighted that there are certain traits that they look for when using facial recognition technology and these traits are gotten from capturing certain facial expressions. These behavioural traits are

- A. Reliability:** While using this technology, reliability can be shown starting from your punctuality and early assessment to the platform. Also, reliability can be demonstrated by providing all the resources needed to use this technology efficiently and following the prescribed directions.
- B. Confidence:** Other interviewees noted that comprehensive research, practicing typical interview questions, and knowing what points you want to make are all important components of the preparation. All of these will aid applicants in reducing anxiety. They can then concentrate on speaking in a way that will appeal to recruiters. Employers search for candidates who are self-assured. They look for team members that are self-assured in their skills and are clear about what they desire. Confident employees are approachable, interesting, and have a clear (and honest) understanding of what makes them a valued contribution.
- C. Honesty:** They further went on to say that facial recognition technology is being used to also check the level of honesty of candidates. They want to know that they can count on you and trust your words. To land a job, some candidates are tempted to inflate their qualifications.
- D. Communication:** Several interviewees claim that among the most sought-after traits in job candidates is the capacity for efficient interpersonal communication and the capacity to get along with a variety of various sorts of personalities.
- E. Level of Openness:** A more recurring word amongst interviewees was the check for openness. This facial recognition technology is used to check how open a candidate will be when answering the questions. Also, they check if the candidate is willing to share information on certain questions. This they do in order to check if a candidate is easy to get along with. A candidate is easy to get along with and work with if they have a sense of humour, a relaxed attitude, and an all-around outgoing, likable disposition.
- F. Level of Organization:** This is checked for amongst candidates to see how organized they are in structuring answers as well as presenting certain information or the manner at which questions are answered.
- G. Ambition:** Also, it was mentioned that because of what it signals about the employee, ambition is a significant quality that companies seek. It indicates that they have a goal in mind and are moving in the direction of a better future for both themselves and their situation. It can assist them in remaining inspired and committed to their goals.

H. Level of Positivity: Although working can be stressful at times, individuals who are able to maintain optimism and keep their goals in mind will be successful. Positivity is a trait that is directly related to business professionalism. When a candidate is enthused about the position, it shows in the workplace and in their performance.

Finding 8 – Facial Expressions and Meaning

Deep down into the conversation with most of the interview participants, the specific facial expressions and their meanings were highlighted. This will be shown in the table below:

Table 2 – Facial Expressions and Meaning (John Diiyk)

Emotion	Facial Expression
Surprise	Jaw dropped Brows raised Wide eyes
Fear	Mouth wide open Wide eyes Brows furrowed
Sad	Brows furrowed Lip corner squeezer
Anger	Buried and lowered brows A gaze that's intense chin raised
Anxiety	Lip-biting
Stress/Discomfort	Rapid blinking
Smile	Raised mouth corners into a smile

It was explained by one of the participants that all these signs had to be analyzed together and as a whole to reach some meaningful conclusions. This is seen in the statement below:

This technology allows for the determination of almost any human emotion, provided that the image is clear enough and the neural network is sufficiently trained. It is necessary to analyze only all the signs as a whole and their combination, this is how the neural network works (Boyer Nefti).

Also, the facial expressions and emotions identified and analyzed depend on the roles being applied for and the specific personality traits that need to be accessed.

Finding 9 – Training Data Fed into the System

For facial recognition to work successfully, a lot of training data need to be fed into the system. According to Huang et al. (2019), The initial set of data needed to train machine

learning models is known as training data (or a training dataset). Machine learning algorithms are taught how to generate predictions or complete a specified task using training datasets. The following factors are incorporated when working with the training data set: *The position of the eyes and eyebrows, Mouth Position, Distinct modifications in the features of the face*

To further understand this process, the results of how these training data works is composed into three themes which are stated below: *Format of the Training Data, Source of the Training Data, Components of the Training Data*

- A. **Format of the Training Data:** the training data usually extracted are facial videos and images because different aspects of the human face need to be studied.
- B. **Source of the Training Data:** Most interviewees stated that most of the data used where gotten from YouTube videos, movies or any other platform with videos. Sometimes, data were bought or gotten from vendors or already trained neural networks. Also, field recruiters were used sometimes and recordings were made of them. This involves people acting out the various emotions in which they are being recorded. The most interesting comment was about the already trained neural network as it seemed easier. This can be seen in a statement below:

An easier way can be by picking up an already trained neural network that was already trained on very large number of images and use it to extract pictures and just modify the final layer of that network (Mats Ruooih).

- C. **Components of the Training Data:** The training data comprises faces and videos of people showing various emotions in different domains (offices, homes, or environmental settings). The training data helps with the check for skin conductivity, eyes, pupil movement, pupil width, etc.

Primarily, these datasets revolve around major emotions like Surprise, anger, fear, neutrality, disgust, happiness and sad, but most datasets have moved forward to help identify fatigue, attention, interest, confusion, distraction, etc.

According to some of the interviewees, facial expressions could be micro and macro. The micro expression are those expressions that are obvious and last longer while micro last shorter and could be involuntary or triggered unknowingly. All these are duly incorporated into the training dataset.

Finding 10 – Current Situation with The Usage Of FRT

To talk more about the current situation of usage of facial recognition for recruitment in Russian companies, the responses of most of the participants revolved around the following themes: *Usage Level, Data, Culture and Businesses*

- A. **Usage Level:** It was quite interesting to learn from the interview participants that facial recognition is a really common tool in Russian companies mostly used in different spheres, especially security, but it has not really been fully optimized in Human Resources, especially for recruitment. Most people in the public might get surprised when they hear about the technology being used for hiring as it is not a common practice in Western companies. Even when it is used in companies by

HR, it is used for attendance tracking when people walk into the company and it scans or detects their emotions. This can be seen below in an interesting comment:

FRTs are already used a lot in the Russian market but in different fields like security, and personal assessment to enter the office (just face to enter the office). It is not commonly used in personal assessment yet. Most companies are taking the first step now and Russia is trying to build on these skills to use this technology more often (Victor Gnetle).

- B. **Data:** When it comes to data, this could be quite complicated as diverse data shortage in Russia is quite an issue. Sometimes, in machine learning the data gotten could be in Russian as it's a Russian country and its official Language is Russian. Also, the datasets are usually or mostly built around Russians because of the environment. This facial recognition technology and its data are usually modified based on the environment, so in Russia it is likely the case. This is supported below by two statements made by people in the interview:

Developing with diversified data. If we develop facial recognition, we train on the dataset of Russian people which have unique sets for the Russian environment. It should be modified based on the specific characteristics of the environment. Most AI Developers modify data in line with the Russian environment. But adjustments are usually made to encompass as much diverse data as possible, but there are always lapses (Sean Carpem).

Russian environment has a lack of data as most of the machine learning is English and less in Russian. The Russian environment does not have enough data from diverse backgrounds to make it more diverse (James Smuger).

As the interview went deeper and we talked more about data, some of the participants pointed out that despite the availability of different privacy laws, there are not specific facial recognition regulations on how it is used for hiring in Russia and it shows how the regulatory body could develop in this sphere. This was carefully highlighted in the statement below:

There is a law about personal data, but there is currently no regulation on the use of facial recognition in recruitment (Sarah Amster).

- C. **Culture:** Every country has a specific culture and this is no different for Russia. So, in Russia, there are some similarities and differences in how people express emotions or how these facial expressions are interpreted. Currently in Russia, this is taken into cognizance especially when incorporating training data, interpreting emotions, or analyzing these emotions. In Russia, after facial recognition in recruitment detects certain emotions and facial expressions, data is presented, but the information gotten is analyzed with the Russian culture and depiction of emotions in mind. This can be seen in the statement below:

There are differences between people from different countries in culture, and language and language is really important in micro expressions as it tells about emotions. Articulation in a different language is different., facial expression muscles are also different in different cultures. Smile from Russians and Americans are different. Russian smiles most of the

time are genuine and Americans smile all the time, so you can't really tell when its genuine (John Diiyk).

- D. **Business:** With the current situation and companies leaving Russia, some support companies that provide extra services like the cloud have left and most of these facial recognition developers have had to switch to local producers of cloud services. Most Russian companies that have to work with this technology and need the help of 3rd parties are utilizing locally made resources.

Finding 11 – Changes to Make to Use This Technology in Russian companies

In order to get more detailed information on how to ensure this facial recognition technology is used adequately for recruitment in Russia, Interviewees were probed further to get more insights, and the results and the following ways to utilize this technology well in Russia are listed below

- A. **Combination with Physical Interviews:** This technology is still developing in this area in Russia. Russian recruiters should not rely fully on the results of facial recognition to get the right candidates or decipher their emotions. Real interviews in official and unofficial settings could be arranged to make candidates feel more at ease and express themselves openly as against looking at a computer.
- B. **Collaboration with Top Russian Recruitment Firms:** Some interviewees stated that some of their companies outsourced this function of automated emotion detection to top recruitment firms in Russia. Though they are still involved in the process, most of it is outsourced to these companies who specialize in this function
- C. **Reduced Questions and Interview Stages:** In Russia currently, the recruitment process is not as lengthy as in some other countries. The questions uploaded for the sake of recognizing these emotions could be reduced in accordance with the recruitment culture.
- D. **Constant Communication:** Most Russians are not conversant with using this technology in Russia. Most times, more timely information is sent to these candidates to ensure that they are comfortable and fully trust this system. Most times candidates do not know such technologies exist for recruitment and become surprised when used. So, constant communication with candidates will help make the process better. Candidates expect and demand transparency from organizations. Many people are tech-savvy and are already aware that many areas of their lives are monitored on a regular basis, from smart devices listening to their conversations to traffic signals with cameras. Thus, it is every company's ethical duty to let potential employees know that facial recognition software would be used to evaluate them. It can be useful to provide candidates with information on how to use modern technology to prepare for an interview. Candidates might benefit greatly from a fast checklist of what the procedure entails, how long it takes, and what information is required. Even better would be a little tutorial on how candidates can make the most of their video interviews. This can be conveyed to candidates who are uneasy as a means to improve the experience and guarantee they are matched with the appropriate employment opportunity. They should be clearly informed of the following:

- The success criteria.
 - How the tool’s score will affect the candidate’s overall evaluation.
 - How candidates might ask for fair modifications to the interview process.
 - How candidates can contact an asynchronous video interview tool to appeal or contest a hiring decision.
 - How applicants can share their experiences.
- E. Bias:** Russian companies recruiting and making use of candidate data for hiring purposes should be aware of their own prejudices and exclude them from the recruiting process. No choice should be based on a candidate’s appearance or any other distinguishing characteristic. Instead, it is ideal to let recruitment technology do its duties and offer all the information required to make the greatest choice. Since no two people experience things the same way, involving others in the process might help to minimize bias. The optimum choice for each job role can be determined by combining team hiring decisions with data from job interview tools.
- F. Well-Defined Process:** As the technology is still relatively new, some companies just starting to use the technology have to clearly formulate a defined process and this is really important for a new environment. This was explicitly stated by one of the interviewees as seen below:

You need a well-defined process and what you want to check in this process. All criteria should be clearly defined and the process should be clear (Victor Gnetle).

Finding 12 – Further Recommendations to Make to Use This Technology Successfully

As the interview between the research participants got closer to ending, further recommendations were made on how to enhance its usage in Russia as the previous recommendations were based on what they currently did in their companies. These recommendations are listed below

- A. Relevance to Job:** Employers must also be mindful that the use of AI in hiring technologies must be connected to the precise specifications of each position. The tests and exercises given to the candidates must be applicable to the tasks they will eventually undertake as employees. Every candidate should be provided a thorough explanation of the rationale behind the use of facial scanning, along with the option to opt-out if they want. Offer applicants a different way to apply so they may take advantage of other features (like the video interview) and not be at a disadvantage to other applicants.
- B. Implemented Regulations:** Under the findings section about ways to curb risks, some interviewees stated very interesting points, but during the process of giving more recommendations to its usage, they highlighted more regulations to be made and enforced specifically for facial recognition in recruitment. In the future, it should be mandatory for businesses that employ AI in the recruiting process to provide thorough outsourced bias audit reports. The Equal Employment Opportunity Commission (EEOC) should also examine these systems and provide

advice on whether they are in compliance with the Russians with Disabilities Act. Employers must take into account the applicable risk, the desired result, and the requirement of this invasive strategy when planning and implementing FRT. Excessive, unsuitable, or superfluous FRT applications are likely to be penalized by employment courts and national data protection authorities.

Finding 13 – Further Areas Where Facial Recognition Technology Could Be Used in Recruitment

Though this research focused on how facial recognition is being adapted to suit the recruitment process in Russia as well as the benefits and challenges it poses to Russian companies, it was only beneficial to get information on further areas where facial recognition could be used for recruitment. These areas are: *Pre-Emotion Check for Job Candidates, Screening Images on CVs, Game-based Assessments*

- A. Pre-Emotion Check for Job Candidates:** Facial recognition technology could also be used when candidates are invited for physical interviews. Recruiters can access their emotions before they get into the office as it will help set the mood for the recruitment process. For example, a candidate could be sad when coming for an interview and might pretend to be happy when meeting the interviewer. When this technology is used, recruiters might be able to detect prior emotions which will help them assess the candidate better.
- B. Screening Images on CVs:** This could be done to check the background of the candidate to be sure he or she has not been blacklisted.
- C. Game-based Assessments:** This can be used in game-based assessments where candidates are asked to play certain games to determine some skills. As the candidate is playing the game, these assessments use facial recognition technology to examine features that are said to show the applicant's "cognitive capacity," "psychological attributes," "emotional intelligence," and "social aptitudes," rather than to identify the specific job applicant. These video game-based tests are designed to gauge character qualities and professional competence. It might be used in conjunction with facial recognition to detect expressions and emotions brought on by particular game responses.

In summary, facial recognition technology which recognizes and analyses candidates' emotions offers a lot of benefits like resource saving, faster and efficient processes, but it is not without challenges and risks. These risks which includes reduced accuracy, bias, lesser trust, loss of resources and lack of skills are not without potential solutions. It depends on these companies to make a decision to curb these risks by building trusts, training and investing in the development of this technology. As they invest in reducing these risks, companies could further explore other areas where facial recognition technology could be used for recruitment.

14. DISCUSSIONS AND CONCLUSION

In the Russian environment, facial recognition has been adapted by Russian employers through different strategies.

1. **Solely for Interviews:** In Russia, this technology is used solely for interviews in the recruitment process. In some other countries, as highlighted in our literature review, it goes further by scanning a candidate's face against certain databases to ensure he or she has not been blacklisted or involved in some sort of fraudulent activity. Also, some companies in these other countries have gone as far as possible to use it in game-based assessments where candidates are recorded while playing certain game-based aptitude tests.
2. **Reduced Questions:** Russian companies currently using this technology ask very few questions in comparison to other countries. Also, the recruitment process in Russia is shorter compared to some companies in other countries.
3. **Combined with Physical Interviews:** Unlike some companies in other countries (UK, USA, Canada, etc) where this technology has been utilized to a great extent, Companies in Russia are relatively new in using this technology for recruitment. Due to this, the recruitment process in Russia still includes lots of physical interviews despite its usage unlike in these major countries where a candidate could use this technology and won't get to meet a real recruiter until the final stage of the recruitment.
4. **Specific Behavioural Traits:** Currently, when recruiters in Russia are assessing candidates after the facial recognition supplies data on the candidates, the interpretation of the emotions of candidates varies compared to other countries. For example, if a candidate might smile less often in Russia or maintains a steady gaze, that does not automatically mean he is less open as compared to the other candidate who is always smiling. In Western culture, this might be interpreted differently. They interpret the data a little bit differently and try not to focus on just smiling or eye gaze as a source of an open emotion.

As regards the benefit of using this technology, the benefits highlighted in the findings chapter align with the benefits identified in the literature review. To summarize, they include: Checking for facial expressions in order to detect emotions, analyzing emotions to get info on some personality traits, analyzing candidates' interests, creating candidates' profiles, reactions to specific questions, checking for culture fit, and finally more Objectivity.

For the challenges and problems of using this technology, some similar problems were identified, but some were not. Similar challenges revolved around technical problems, usability by candidates and getting data, but it was noticed that discriminatory data or systems were not as pronounced as in the previous research in these Western countries. Bias and discrimination were not major problems currently being experienced with the use of facial recognition for recruitment in Russia.

There was also the mention of potential risks which are:

1. **Russian's Trust in The Technology:** If people do not trust the technology in the long run, it will be difficult for employers to continue using it for their recruitment activities. It can be seen from the literature review from countries like UK who used such technology and has found it difficult to gain high trust levels especially after certain reports that this technology has been used to perpetuate certain crimes in recruitment. Unlike Russia that is still at its early stage and has not really used the technology to perpetuate any problem that will destroy the current trust level, there could be a potential for it to happen in the future if people discover that the technology is not being fair or is not transparent. As the technology still has majorly positive reviews in Russia, it is easier to build trust in the long run through transparency, but if there are constant negative reviews with this technology, there could be a reduced trust level which will affect the usage of the technology in the future.
2. **Accuracy of These Systems:** Though there are claims that the facial recognition technology is accurate to a high extent, there is still a high likely that mistakes and errors could be made which will impact the recruitment decision resulting in the loss of candidates.
3. **Right Skills and Loss of Resources:** There could be a potential for brain drain or a problem in the future which could lead to the loss of people with the right skills to use this technology. Also, there could be people or employees who do not possess the right skills using this technology for recruitment which will then lead to wrong recruitment decisions. There is also the fear that this automated process would replace the human recruiters in the future leading to loss of jobs.
4. **Bias:** Though Russia currently does not really have issues of bias in the use of facial recognition in recruitment, it is a possibility that could happen in the future. There is the risk that these systems could be used to discriminate against males and females or against different races. This could be done knowingly by companies who have this intention or unknowingly by using the same criteria for every candidate from different culture and not taking cognisance of their cultural background and how it might affect their recruitment inputs.
5. **Manipulation:** There is also the possibility that people might start preparing to bypass this technology by pretending to display certain facial expressions and behaviours.

To explain further and summarize, more sections and how they compare to usage by companies in other countries where the facial recognition technology has been developed is shown below:

Table 3 – Summary Conclusion

S/N		Companies in Russia	Companies(UK, USA, Canada, etc)
1	Stage Used	Entry level, Graduate, Management Trainee, Internship	Entry level, Graduate, Management Trainee, Internship
2	Usage Level	Low	High
3	Regulations	Law on Personal Data	GDPR (General Data Protection Regulation), Artificial Intelligence and Data Act, Employment Standards Act
4	Discrimination	Low	A problem
5	Skills to Use	Lesser than the Western	Available

1. In terms of the roles and the stage used in the recruitment process, both Russia and these other countries use it for entry-level, graduate, programs for the young and it is usually the first step after application.

2. In Russia, the usage of facial recognition technology for recruitment is quite low as most companies have not adopted it yet. Even companies that have adopted it have not fully utilized it as it is still under development. For other countries, it has become a huge part of the recruitment process of most companies, and people within those countries are already used to being tested by this technology.

3. In the literature review, it was stated that in Western countries, there are laws for automated interviews which is stated in the GDPR. It was shown that if you only use automated decision-making methods with legal or other serious consequences, you must let people know. This holds true whether you got the information directly from the people in question or from another source. The rationale at play and the likely human repercussions must also be explained in detail. People may not be aware of this type of processing, therefore in situations where it could have a big impact on them, you need to make sure they are aware of what is going on, why you are using these techniques, and what the likely outcomes are. In Russia, there is the Personal Data Law, which strictly focuses on the transfer, usage, and informing the people before using their data. With regards to automation for job interviews, it is not as pronounced as the GDPR.

4. As for discriminatory systems in the usage of facial recognition technology, it was quite high in the Western countries because there have been issues and media problems as well as problems from candidates, but this is not the case in Russia. In Russia, there have not been much issues with discriminatory problems regarding facial recognition for recruitment.

5. In terms of skill usage from the job seeker, it is better developed in these other countries. Russia is still developing and a lot of people are yet to accept this technology,

so it is only normal that most people have a lot of problems when invited to use this technology during job recruitment.

The empirical evidence of the use of face recognition in Russia, as well as the advantages and difficulties of the technology, are the two main outputs of this study, which is descriptive in character.

Limitations and Further Research

The results of this study have an impact on facial recognition technologies. The limits of this qualitative study, however, and the requirement for additional research must be addressed.

Some restrictions apply to this working paper. First off, not all the information was acquired through interviews, which was the primary method of data collection. Researchers conducting similar studies in the future should think about testing the facial recognition system itself and having it reviewed by a third party in addition to conducting interviews. This could offer additional insights. The interview topic is a second restriction. While the individuals provided as much information as they could, certain fields remained unfilled. Interviews on different subjects, such as applicants, should be undertaken in the future to obtain specific data from their perspective.

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APPENDIX

Appendix One – Interview Questions

- What is your name and job role?
- How is it like working in this field?
- What are the benefits of face recognition technology for recruitment process?
- Is this application benefit similar to other countries or specific to Russia?
- What kind of training data is fed into this software?
- How accurate do you think the on-demand video interview is, in analysing candidates' looks, languages, gestures, speaking style?
- At what stages of the recruitment could this software be used?
- What are the risks encountered when using this tool in Russia?
- What do you think are the potential ways to curb these risks?
- What are the behavioural traits you look for in candidates to successfully pass while using this tool in Russia?
- How does the Russian environment affect the way this technology is used?
- Are there specific changes that are made to successfully use this tool in Russia?
- If yes, what are these changes?

Appendix Two – Abbreviations

FRT – Facial Recognition Technology

HR – Human Resources

AI – Artificial Intelligence

FER – Facial Emotion Recognition

IT – Information Technology

FL – Facial Landmarks

FAU – Facial Action Units

FACS – Facial Action Coding System

BE – Basic Emotions

CE – Compound Emotions

ME – Micro Expressions

GDP – Gross Domestic Product

AVI – Asynchronous Video Interview

CNNs - Convolutional Neural Networks

IQ – Intelligence Quotient

CFMT - Cambridge Face Memory Test

Appendix Three

Participant Information Sheet

1. RESEARCH TOPIC

Facial Recognition Technology for Recruitment in the Russian Workplace

2. RESEARCH PURPOSE

This is a study to determine how FRT is adapted by Russian employers to suit the recruitment process in Russia as well as understanding the opportunities and risks it poses. This is done to fulfil the requirements for my Masters degree in Management (Governance of Science, Technology and Innovation), at the National Research Higher School of Economics.

3. WHY HAVE I BEEN CHOSEN?

You were chosen because you have worked in a face recognition software development/recruitment/data role or have used or worked as part of teams/companies that developed any of the on-demand-asynchronous/facial recognition video interview software in the recruitment market.

4. DO I HAVE TO TAKE PART?

No, you are free to decline participation in this study at any time. A copy of the information provided here is yours and to keep along with the consent form if you decide to take part. You can, at any time during the interview withdraw if you change your mind.

5. WHAT WOULD PARTICIPATION INVOLVE?

If you decide to take part, you will be asked to confirm your consent. You will also be asked a few questions in a 15 to 20-minute interview on Zoom.

6. WHAT ARE THE BENEFITS OF TAKING PART?

This study will provide information on the following:

- For Russian companies who want to move from the traditional recruitment process to the use of facial recognition technology for asynchronous video interviews, it will serve as a guide on how to easily adopt this technology in the Russian environment.
- For foreign companies that use facial recognition technology for recruitment and want to move into Russia, it will help serve as a guide on how to modify their already existing recruitment process

7. USE, DISSEMINATION AND STORAGE OF RESEARCH DATA

All data collected during the research are for the primary purpose of gaining a master's degree. I also have plans for future publishing, archiving and re-use of the data for

academic purposes only. All data in the publication of reports will be anonymized. So, all names (where used) will be changed to pseudonyms, all identifiable places will be swapped/ changed/ omitted where it is evident the participant is the only one of their kind. No identifiable data will be used in the final publication. The report will use some verbatim quotes from the interviews which will be made available to you if you wish and can be shared with you separately. All responses will be kept confidential and securely on the university computer and the researcher's personal laptop with password protection. And no one else other than the researcher will have access to the same. No personal information apart from the Name and email ID used for the consent form and Zoom interview invite respectively will be collected. All responses and transcripts will be kept until the publication of the report to enable further publications. Then they will be destroyed after two years from the date of gaining the certification.

8. WHAT WILL HAPPEN TO THE RESULTS OF THE RESEARCH PROJECT?

All the contact information that we collect about you during the research will be kept strictly confidential and will be stored separately from the research data. Given the importance of research data for the future, the data collected during the project might be used for additional or subsequent research. Please note you may wish to withdraw from any future research publications in which case you will need to inform the researcher as such immediately. If in such time the article/book/ conference presentation is already under publication or published it may not be possible to withhold the publication for that edition but may be withdrawn from future versions/ editions.

9. WILL I BE RECORDED, AND HOW WILL THE RECORDED MEDIA BE USED?

The interview will be recorded on Zoom and will be used for analysis purposes only. No other use will be made of them without your written permission, and no one outside the project will be allowed access to the original recordings.

10. CONTACT FOR FURTHER INFORMATION

Please note for any further information you may contact

- The researcher MARYANN Asemota at masemota@edu.hse.ru

Finally, ...

Please note as a participant you are free to keep a copy of the information sheet and, if you feel appropriate, please sign this sheet as consent for your participation in the research. I would again like to thank you for taking the time to read through the information and for all your support during and after the research.

Sincere regards,

Maryann Asemota

Participant Consent Form

Working Paper Title:

Facial Recognition Technology for Recruitment in the Russian Workplace

Participant Consent: I agree to participate voluntarily in this interview where I confirm the

following (add **YES** or a **tick** in **all** the boxes):

1. I confirm that I have read and understood the information sheet for the above study and have had the opportunity to ask questions.

2. I understand that my participation is voluntary and that I am free to withdraw at any time without giving a reason.

3. I am happy to be recorded during the interview to be used for research purposes only.

4. I agree to take part in the above study

Interviewee Name Signature & Date

Please note that you can use an e-signature or sign manually.

PLEASE SEND this consent form back before the scheduled interview date to my email

masemota@edu.hse.ru or asemotamary@gmail.com

Many Thanks