

# APPLICATIONS OF TECHNO-SOCIAL SYSTEMS IN ECONOMY AND GOVERNANCE

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## **Abstract**

In this lecture, we outline the architecture and algorithms of several projects, conducted by the lecturer at IBM and Russian Academy for National Economy and Public Administration, including projects in natural language processing, mining of customs declarations for commercial goods, detecting the structure of massive social networks. Technical topics considered in this talk are data modelling, data mining, graph-based methods with infusion of ideas from cellular automata, fuzzy-logic and the use of  $L^p$  norm.

Nowadays, most of the digital content is generated within public and enterprise techno-social systems like Facebook, Twitter, blogs, wiki systems, and other web-based collaboration and hosting tools, office suites, and project management tools. Enterprises use software tools for social collaboration and team collaboration, such as Microsoft SharePoint, IBM Lotus Notes and others. These applications have transformed the collaboration environment from a mere document collection into a highly interconnected social space, where documents are actively exchanged, filtered, organized, discussed and edited collaboratively. In techno-social systems infrastructures are composed of many layers (such as Internet communication protocols, markup languages, meta-data models, knowledge representation languages which have spanned over two decades) and interoperate within a social and organizational context that drives their everyday use and development. Techno-social systems and various proprietary data bases are primary generators of Big Data about actors and various artifacts, and the relations between actors and the thing they create and do. In these techno-social systems everything is deeply intertwined using the term coined by the pioneer of information technologies Ted Nelson (Nelson, 1974): people are connected to other people and to non-human agents such as documents, datasets, analytic tools and concepts. These networks become

increasingly multidimensional, providing rich context for understanding the role of particular nodes that represent both people and abstract concepts.

Techno-social systems bear most of the general characteristics of Big Data; for instance, in these systems frequently it is easier to predict agents actions than to explain them. Mining of techno-social systems constitutes a new distinctive branch of Business Information Systems. Techno-social systems should be considered as a core part of Big Data and Digital transform paradigms. In the forward to the book, or in a dedicated chapter of this book, the editors will corroborate this claim along the following lines. Mining of techno-social systems constitutes a new distinctive branch of Business Information Systems.

Prerequisites

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No specific knowledge on advanced topics is needed. The basic knowledge of social network analysis will help a lot to students. We recommend the first half of online resource Hanneman, Robert A. and Mark Riddle. (2005). Introduction to social network methods. Riverside, CA: University of California, Riverside published in digital form at <http://faculty.ucr.edu/~hanneman/>: Preface, Chapters from 1 (social network data) to 10 (Centrality and power)

Recommended reading

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Maruev, S, Stefanovsky, D., Frolov. A., Troussov. A., Curry, J. (2014a). Deep Mining of Customs Declarations for Commercial Goods. *Procedia Economics and Finance*, Vol. 12, pp. 397402, ISSN: 2212-5671, Elsevier 2014.

Maruev, S., Stefanovsky, D., Troussov, A. "Semantics of Techno-Social Spaces", in the "Modern Computational Models of Semantic Discovery in Natural Language", J.Zizka and F.Darena (eds) IGI Global, 2015

Troussov, A., Levner. E., Bogdan, C., Judge, J., and Botvich, D. (2009). Spreading Activation Methods. In Shawkat A., Xiang, Y. (eds). *Dynamic and Advanced Data Mining for Progressing Technological Development*, IGI Global, USA, 2009.

Troussov, A., Judge, J., Sogrin, M., Bogdan, C., Edlund, H., & Sundblad, Y. (2008b). Navigating Networked Data using Polycentric Fuzzy Queries and the Pile UI Metaphor Navigation. *Proceedings of the International SoNet Workshop*, 5-12.