S112. Bibliometric Applications

07/09/2021, 08:15 AM – 09:45 AM

08:15 AM – 08:30 AM

Speaker(s): Frank Takes; Authors: Hanjo Boekhout; Eelke Heemskerk; Frank Takes

Talk: 10219. The community structure of global scientific collaboration [Whova Link: S112]

Description: In this work we study the structure of global scientific collaboration, in an attempt to better understand the internationalization of research. In particular, we are interested in the existence of closely collaborating scientific communities. Indeed, it is well-known that even though science knows no borders, collaboration ties are not randomly created between individual scholars. Instead, we anticipate geographical, political and cultural factors to play a crucial role in this process. In this paper we set out to empirically investigate to what extent this is the case by providing a large-scale analysis of 23 million publications from Web of Science in the period 2008—2019. To capture scientific collaboration at an interpretable level of abstraction, we model scientific collaborations as an undirected network of cities that are connected by weighted edges denoting the number of co-authored works between its researchers. City names were extracted from the address lines of publications. These were subsequently disambiguated and merged such that no two cities are within a limited radius of each other. To this data, community detection by means of modularity maximization was applied using the Leiden algorithm. The obtained static network consists of 16,843 cities linked together by 1,989,735 edges for a total weight of 47,492,294 city-city collaborations, with self-edges weighing in at 10,342,863 self-collaborations. In absolute numbers, Beijing is the most collaborative city, followed by Boston and London. A number of interesting observations can be made from the network's community structure. First, several countries such as China, India, Japan, the United States and Canada appear strongly organized along national borders, with all their cities belonging to the same national community. Second, we find that groups of countries from the same geographical region, e.g., the entirety of Latin America and Australia together with New Zealand, have all cities contained in the same community. A similar observation holds for Europe, with large parts of Northern, Central/Western and Southern Europe forming a community containing the majority of cities from these countries (see Figure 1). A third pattern appears to be that of cultural similarity, with France appearing in the same community as former French colonies in Africa where French remains the first language. Fourth, we find noteworthy 'outliers' at the level of countries, e.g.,

Israel, which as opposed to its surrounding countries belongs to the European rather than Turkish/Arabic community. At the node level, cities with for example a clear internationally oriented research infrastructure, such as Noordwijk where the European Space Agency is based, also do not associate with their geographically most proximate community. In summary, we believe that to the best of our knowledge, our study is the most comprehensive analysis of global scientific collaboration at the city level done to date in terms of data coverage, resulting in numerous insights into cultural, geographic and political factors that determine the composition of collaborative research communities.

08:30 AM – 08:45 AM

Speaker(s): Daniela Aguirre Guerrero; Authors: Daniela Aguirre Guerrero; Juan Carlos Lopez Garcia; Karen Samara Miranda Campos; Ismael A. Robles Martinez

Talk: 10275. Ranking of Latin-American scientific communities and their response to the emergency of COVID-19 [Whova Link: S112]

Description: The social network analysis has been successfully used to learn the nature and relationship of knowledge construction and scientific collaborations. In particular, the analysis of collaboration networks allows to study the arise and impact of new research trends and research groups by using algorithms for community detection and node ranking. Most of the studies in this direction focus on identifying the centrality and influence of individual scientists; however, a research group should hold a more influential position, and thus plays a more important role. Moreover, the identification and ranking of research groups is a significant component to understand how the scientific collaborations should be molded by disruptive events, such as the Coronavirus Disease 2019 (COVID-19).The COVID-19 brought numerous challenges to the global scientific community, which has impacted the scientific collaboration dynamics in different knowledge areas from social to basic sciences. The COVID-19 research landscape has been presented in studies focused on the top productive regions, i.e., North America, Europe, and China. However, the scientific community of developing regions, such as Latin-America, have their own collaboration dynamics and research interests. This study aimed to investigate the collaboration relationships and research topics of the Latin-American scientific community on COVID-19, to identify and rank research groups of different knowledge areas. The presented analysis was developed on the studies published in 2020 by authors affiliated with Latin-American institutions. First, the articles were retrieved from the Web of Science database, then an analysis of collaboration networks over time and space was performed to identify the most productive countries, authors, and their collaboration dynamics and research interests. Finally, an algorithm for community ranking is proposed and applied to identify the most influential research groups on different knowledge areas. The main contributions of this study are a novel