

Advances in Social Network Analysis and Mining in the Big Data Era: Overview of the IEEE/ACM ASONAM 2021 International Conference

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Abstract—This paper contains a summary of the research program of the 2021 IEEE/ACM International Conference on Advances in Social Network Analysis and Mining (ASONAM 2021), held as virtual event during November 8-11, 2021. In addition to this, following the research contributions presented in ASONAM 2021, we provide a brief overview on future research directions in social network analysis and mining.

Index Terms—Social Network, Social Network Analysis, Social Network Mining

I. INTRODUCTION

For more than a century, social networks have been studied in a variety of disciplines including sociology, anthropology, psychology, and economics. The Internet, the social Web, and other large-scale, socio-technological infrastructures have triggered a growing interest and significant methodological advancements in social network analysis and mining. Method development in graph theory, statistics, data mining and machine learning, and statistical mechanics is inspired by new research problems and, in turn, opens up further possibilities for application. These spiraling trends have led to a rising prominence of social network analysis and mining methods and tools in academia, politics, security, and business.

The international conference series on Advances in Social Network Analysis and Mining (ASONAM) provides an interdisciplinary venue that brings together researchers and practitioners from a broad variety of fields to promote collaborations and exchange of ideas and practices. The 2021 IEEE/ACM International Conference on Advances in Social Network Analysis and Mining (ASONAM 2021), held as virtual event during November 8-11, 2021, has been intended to address important aspects with a specific focus on emerging trends and industry needs. The conference has solicited empirical, experimental, methodological, and theoretical research reporting original and unpublished results on social network analysis and mining along with applications.

This paper contains a summary of the research program of ASONAM 2021. The remaining part of this paper is organized as follows. In Section II, we provide an overview of the ASONAM 2021 scientific program. Section III focuses the

attention on future research directions in social network analysis and mining. Finally, in Section IV, we derive conclusions of our work.

II. ASONAM 2021: OVERVIEW OF THE SCIENTIFIC PROGRAM

ASONAM 2021 has determined a very exciting research program. The main topics of ASONAM 2021 have been the followings:

- techniques in social network analysis and mining;
- problems in social network analysis and mining;
- application domains in social network analysis and mining.

General areas of interest to ASONAM 2021 have included information science and mathematics, communication studies, business and organizational studies, sociology, psychology, anthropology, applied linguistics, biology and medicine.

First, ASONAM 2021 has hosted three well-known invited speakers:

- Jiawei Han, University of Illinois at Urbana-Champaign, IL, USA, who presented the talk: “*Mining Structured Knowledge from Massive Unstructured Text*”;
- Daniel A. Keim, University of Konstanz, Germany, who presented the talk: “*Visual Analytics of Network Data: Challenges and Applications*”;
- Amit Sheth, University of South Carolina, SC, USA, who presented the talk: “*Knowledge-infused NLU for Addiction and Mental Health Research*”.

Second, ASONAM 2021 has also hosted three relevant tutorials:

- “*Network Science Applications to Education in the 21st Century*” by Raluca Gera, Naval Postgraduate School, CA, USA, and Akraati Saxena, Eindhoven University of Technology, The Netherlands;
- “*Influence Learning and Maximization*” by George Panagopoulos, Ecole Polytechnique, Palaiseau, France, and Fragkiskos D. Malliaros, Université Paris-Saclay, CentraleSupélec, Inria, France;

- “Using the net.science Cyberinfrastructure in Research on Social Contact Networks and Discrete Dynamical Systems” by Golda Barrow, Chris J. Kuhlman, Dustin Machi, and S. S. Ravi, University of Virginia, VA, USA.

ASONAM 2021 has attracted the submission of 118 papers from 34 countries (including Costa Rica, Zimbabwe, Turkey). Overall, 22 papers have been accepted as full papers and 26 as short papers, thus leading to an acceptance rate equal to 18% for full papers and 22% for short papers, respectively.

The papers presented at ASONAM 2021 have been focused on several interesting topics in the wide umbrella represented by social network analysis and mining. Among these, we recall the following ones:

- *efficient analytical computation of expected frequency of motifs in uncertain networks*;
- *interpretable attention networks for churn prediction in location-based social networks*;
- *distinguishability of graphs via quantum-inspired measures*;
- *real-time privacy risk quantification in online social networks*;
- *interpretable business survival prediction*;
- *evolution of disease spread dynamics over time*;
- *graph anomaly detection in weighted directed graph databases*;
- *incorporating network-level mobility information for deep diffusion-based forecasting of COVID-19*;
- *characterizing emerging social networks*;
- *multi-view hypergraph convolution network for semantic annotation in location-based social networks*;
- *community formation and detection on GitHub collaboration networks*;
- *hyperlink-driven misbehavior detection in online security forums*.

III. FUTURE RESEARCH DIRECTIONS IN SOCIAL NETWORK ANALYSIS AND MINING

Following the research contribution presented in ASONAM 2021, we identify the following future research directions in the context of social network analysis and mining:

- **Integration with Big Data Management and Analytics:** social network analysis and mining has a tight integration with big data management and analytics (e.g., [1]) – in future years, it is expected this phenomenon will grow more and more over time, also according to similar experiences (e.g., [6], [7]);
- **Uncertain and Imprecise Social Networks:** uncertainty and imprecision still occur in modern social networks (e.g., [2]) – the issue of supporting analysis and mining of uncertain and imprecise social networks will play a critical role in future years;
- **Privacy-Preserving Social Networks:** the issue of supporting social network analysis and mining while ensuring the privacy of data (e.g., user data) is an emerging issue in active literature (e.g., [3]) – in future years, it

is expected that novel approaches, for instance based on statistical and probabilistic methods, will gain the attention of larger communities of researchers;

- **Misinformation in Social Networks:** misinformation is continuously emerging and evolving with dynamic characteristics within and across social networks (e.g., [4]); – effectively detecting, mitigating, and intervening misinformation with interdisciplinary research will be important;
- **Online Harassment:** likewise, problematic behaviors such as bullying and brigading can be enhanced by online communication tools [5], thus we need to understand how such behaviors emerge and prevent them from targeting vulnerable individuals.

IV. CONCLUSIONS

This paper has provided a summary of the research program of the 2021 IEEE/ACM International Conference on Advances in Social Network Analysis and Mining (ASONAM 2021), held as virtual event during November 8-11, 2021. In addition to this, following the research contributions presented in ASONAM 2021, we provided a brief overview on future research directions in social network analysis and mining.

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