

PredictGIS 2019 Workshop Report

Held in conjunction with ACM SIGSPATIAL 2019

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Abstract

This report provides a summary of the 2019 edition of the International Workshop on Prediction of Human Mobility (PredictGIS 2019), which was held in conjunction with ACM SIGSPATIAL 2019, in Chicago, IL on November 5th, 2019.

1 Aim of the workshop

The prediction of human mobility is becoming an attracting field. This topic attracts researchers from a broad range of disciplines from the behavioral sciences, where understanding the complexity of the human behavior is one of the hot topics, to the industrial fields, where such results are applied for many beneficial applications. Recent progress for sensing human mobility via smartphones is boosting this trend. However, due to the complexity and context-dependence of human behavior and the incompleteness and noise of geospatial data collected from various sensors, the prediction of human mobility is still far from solved. This workshop aimed at collecting contributions on the cutting-edge studies in human mobility analysis and modeling which can advance the human mobility prediction research. Potential topics included, but were not limited to:

- Next place prediction of individual mobility
- Modeling crowd or population dynamics
- Predicting human mobility patterns during emergencies and rare events
- Modeling the dynamics of commute flow and migration flow
- Traffic congestion, road usage forecast and optimal vehicle routing
- Social event forecast using geospatial data
- Novel agent based mobility simulators
- Case studies of mobility prediction in academia and industry

Both full papers (10 pages) and short papers (4 pages) that describe timely research contributions in PredictGIS's areas of interest were solicited. This included papers reporting on initial results as well as papers discussing mature research projects or case studies of deployed systems are sought out. Submissions describing big ideas that may have significant impact and could lead to interesting discussions at the workshop were also encouraged.

2 Review Process and Attendance

The 3rd PredictGIS workshop was held on 5th November 2019 at the ACM SIGSPATIAL conference in Chicago, USA¹. PredictGIS 2019, included 12 presentations, of which 7 were full papers, 3 were short papers, and 2 were keynote presentations. The reviewing process was competitive at an unprecedented level this year, with an acceptance rate of 55%, which was lowest among all 3 editions of PredictGIS. A total of 18 papers were submitted to the workshop, and only 10 were accepted for publication and presentation. Every paper was reviewed by at least 2 members from the technical committee, which was composed of over 15 members with expertise in relevant fields such as spatio-temporal data analysis, machine learning, and artificial intelligence. The acceptance/reject decision was made by the program chairs, by selecting the top 10 papers based on the average review scores weighted by the reviewers' level of confidence.

The average number of attendees were around 25 throughout the day, with a maximum of around 30. Attendees gathered from various countries around the world, for example from Brazil, Germany, India, Singapore, South Korea, Japan, China, and the United States (Figure 1). Overall, the workshop attracted papers with various topics, methods, and datasets. The variety of papers increased the number of topics covered in the workshop, and triggered an intense discussion between attendees on the current trends, issues, and also future research opportunities related to the prediction of human mobility.



Figure 1: Attendants of PredictGIS workshop

3 Highlights of the workshop

The first keynote talk was given by Professor Stanislav Sobolevsky of New York University titled “Big data for predictive modeling of urban mobility and forecasting impacts of urban solutions”. He discussed the applications of novel large scale data for understanding urban mobility and review some common approaches for its descriptive and predictive modeling. Further, several specific case studies, including the prediction and anomaly detection of the for-hire-vehicle ridership originating at major transportation hubs in New York City and predicting the mode-shift resulting from transportation innovations and policy change in order to assess their economic, social and environmental impacts were introduced. The second keynote talk was given by

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Professor Satish Ukkusuri of Purdue University titled “Mobility Analytics in an Era of Accelerated Technological Change”. His talk covered his recent research in the areas of: (1) smart mobility in information rich transportation environments; (2) innovations in connected/autonomous vehicles and (3) resilience of coupled socio-technical networks. Open questions and insights from these research areas were be discussed, and ignited an active discussion following the talk.

The contributed talks all focused on the analysis and prediction using spatio-temporal data, but were diverse in the application domains ranging from crime detection [2], traffic accident prediction [8], bike reallocation prediction [5], to next place prediction of human mobility [9, 6]. We saw an increase in the number of the studies that utilized deep neural network architectures, including the paper on clustering spatio-temporal data, which was selected as the best paper of the workshop [1], as well as papers that used network science insights for the analysis of spatio-temporal data [4]. We were able to see a large variety in the data used for the research, including mobile phone location data [7, 10, 3], crime log data [2], bike trajectory data [5], and social network data [9, 4].

As a whole, this workshop had very fruitful discussions along with very interesting and cutting-edge talks from the presenters and the keynote speakers. We would like to thank the presenters and attendees of the workshop for making it a huge success, and also the organizing members of ACM SIGSPATIAL 2019 for giving us an opportunity to hold this workshop.

4 Awards

4.1 Best Paper Award

“Spatio-Temporal Clustering of Traffic Data with Deep Embedded Clustering” by Reza Asadi (University of California, Irvine) and Amelia Regan (University of California, Irvine)

4.2 Runner-up Award

“Grab-Posisi: An Extensive Real-Life GPS Trajectory Dataset in Southeast Asia” by Xiaocheng Huang (Grab-taxi Holdings), Yifang Yin (National University of Singapore), Simon Lim (Grabtaxi Holdings), Guanfeng Wang (Grabtaxi Research and Development Centre), Bo Hu (Grabtaxi Holdings), Jagannadan Varadarajan (Grabtaxi Holdings), Shaolin Zheng (Grabtaxi Holdings), Roger Zimmermann (National University of Singapore)

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