

# EM-GIS 2019 Workshop Report

## The 5th ACM SIGSPATIAL International Workshop on Safety and Resilience

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Safety is vital for people and emergency management helps keep people safe. Emergency management includes four stages: Planning and Mitigation, Preparedness, Response and Recovery. Geospatial applications (including GIS) have been extensively used in each stage of emergency management. Nowadays, on the technical side, artificial intelligence tools like deep learning could be put to good use. For example, one of the main benefits of deep learning over various machine learning algorithms is its ability to generate new features from limited series of features located in the training dataset. Therefore, deep learning algorithms can create new tasks to solve current ones. Decision-makers can utilize the geospatial information to develop planning and mitigation strategies with such advanced techniques. GIS models and simulation capabilities are used to exercise response and recovery plans during non-disaster times. They help the decision-makers sense the near real-time possibilities during an event. Once disaster occurs, GIS will take effect in real time response and recovery activities.

EM-GIS 2019 (<https://em-gis2019.github.io/CallForPaper/index.html>) was held in conjunction with the 27th ACM SIGSPATIAL International Conference on Advances in Geographic Information Systems (ACM SIGSPATIAL 2019) on November 5th, 2019 in Chicago, Illinois, USA. The purpose of the EM-GIS 2019 workshop is to provide a forum for researchers and practitioners to exchange ideas and progress in related areas. This workshop in the ACM SIGSPATIAL conference addresses the challenges of emergency management based on advanced

GIS technologies. This workshop brought together researchers and practitioners in massive spatio-temporal data management, spatial database, spatial data analysis, spatial data visualization, data integration, model integration, cloud computing, parallel algorithms, internet of things, complex event detection, optimization theory, intelligent transportation systems and social networks to support better public policy through disaster detection, response and rescue.

EM-GIS 2019 was a one-day workshop with 20 researchers and practitioners registered. Overall, 31 research papers were submitted and 18 research papers were accepted and presented (20 minutes for each paper). The presentations were divided into three sessions:

- 1) Emergency detection and prediction. In this section, authors presented their research in the risk identification of safety on campus (*Information System and Management for Campus Safety\**), Disaster recovery with GIS systems especially on the aspect of planning (*AI Planning Applied to GIS-based Disaster Response*), emergency management by using social media data (*Using Social Media to Geo-Target Emergency Management Efforts*), designing a regional evacuation path optimization method using meshing and matrixing (*Discentralized Human Movement Control and Management for Campus Safety*), emergency broadcasting transmission scheme (*Emergency Broadcasting Message Transmission Based on CDR System*) and foodborne disease forecast and visualization methods (*Risk Prediction and Assessment of Foodborne Disease Based on Big Data*).
- 2) Transportation safety. In this section, the discussion focused on finding the comfortable driving distance by fitting the changing of driving velocity of follower vehicles better (*Study on Comfortable Distance based Car-following model with Trajectory Data*), proposing an unlicensed taxi detection algorithm using pass-records data collected from surveillance cameras (*Unlicensed Taxi Detection Algorithm Based on Traffic Surveillance Data*), investigate the impact of altruistic task and self-interest task on driving behavior (*Personality Effect on Driving Behavior*) and enhancing the semantic trajectory model and a process to extract semantic from GPS and other sensors (*From Raw Sensor Data to Semantic Trajectories*).
- 3) Emergency evaluation. In this section, authors discussed topics on ensuring bridge safety by estimating bridge improvement cost (*Bridge Improvement Cost Estimation through Both Discrete and Continuous Features*), detecting the leakage signal of buried water-filled pipeline by the sensor array on the surface (*Experimental Investigation into the Acoustic Characteristics of the ground surface response due to Leakage in Buried Water-Filled Pipelines*), exit choice and path planning by developing a behavior agent model (*Path Optimization of Integrating Crowd Model and Reinforcement Learning*), studying the source searching problem in the chemical cluster by intermittent search strategy (*A Promising Searching Method 'Entrotaxis-*

*Jump' for Seeking Hazardous Gas Source in A Chemical Cluster*), gas dispersion prediction and inverse traceability issue (*Strategy of hybrid optimization algorithms for source parameters estimation of hazardous gas in field cases*), acquiring the number of charging stations by establishing a Multi-Objective programming model (*Determination of the Number and Distribution of Charging Stations for Electric Vehicles*), determining the initial deployment of multiple patrol vehicles to supervise chemical production processes (*Chemical Cluster Environmental Protection Patrolling Game Based on Cooperation Mechanism*) and studying the dispersion of dangerous chemicals in transportation by building a platform for heavy gas leakage dispersion (*Spatial and Temporal Distribution of LPG Dispersion Concentration in Small-scale Space*).

The workshop had two Best Papers and one Best Student Paper. The Best Papers are *Risk Prediction and Assessment of Foodborne Disease Based on Big Data* authored by Mingke Zhang, Danhuai Guo, Jinyong Hu and Wei Jin and *Bridge Improvement Cost Estimation through Both Discrete and Continuous Features* authored by Zhaojun Lin, Yanyun Fu, Xinzhi Wang, Yiping Zeng and Hui Zhang. And the Best Student Paper is *Discentralized Human Movement Control and Management for Campus Safety* authored by Xiaoxue Ma, Hui Zhang, Yanyun Fu, Yiping Zeng, Danhuai Guo and Yang Gao..

We would also like to appreciate the authors for publishing and discussing their papers in EM-GIS 2019 workshop, and the program committee members and external reviewers for their professional evaluation and help in the paper review process. We wish that the proceedings of EM-GIS 2019 will inspire new research ideas, and that you will benefit from reading them.