

GeoSim 2020 Workshop Report

The 3rd ACM SIGSPATIAL International Workshop on Geospatial Simulation

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Space has long been acknowledged by researchers as a fundamental constraint which shapes our world. As technological changes have transformed the very concept of distance, the relative location and connectivity of geospatial phenomena have remained stubbornly significant in how systems function. At the same time, however, technology has advanced the science of geospatial simulation to bear on our understanding of how such systems work. While previous generations of scientists and practitioners were unable to gather spatial data or to incorporate it into models at any meaningful scale, new methodologies and data sources are becoming increasingly available to researchers, developers, users, and practitioners. These developments present new research opportunities for geospatial simulation.

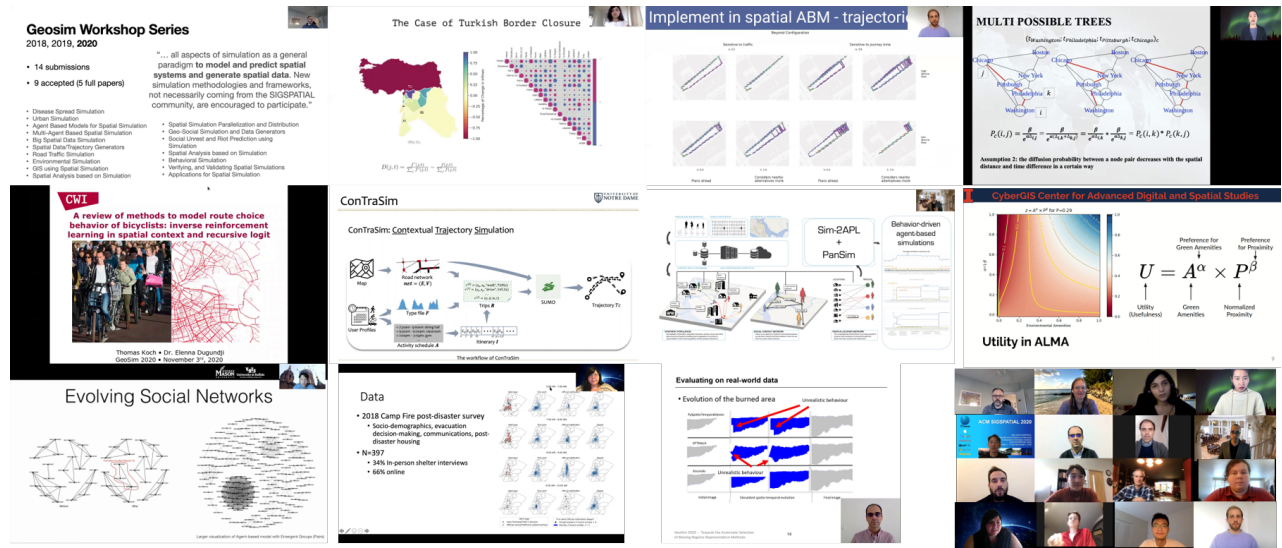


Figure 1: GeoSim 2020 presentations and attendees

The 3rd ACM SIGSPATIAL International Workshop on Geospatial Simulation (GeoSim) was held in conjunction with the 28th ACM SIGSPATIAL International Conference on Advances in Geographic Information Systems. The purpose of GeoSim 2020 was to bring together researchers and practitioners from a range of disciplines to disseminate their cutting-edge research in geospatial simulation. Specifically, the aim of the workshop was to showcase all aspects of simulation as a general paradigm to model and predict the behavior of spatial systems and generate spatial data. Due to the COVID-19 pandemic, unlike GeoSim 2018-19 [6, 7], GeoSim 2020 was organized as a virtual workshop with 39 participants. This was among the top participation numbers

across all workshops at the ACM SIGSPATIAL 2020 conference. The workshop was attended by researchers from both academia (e.g., University of Maryland, University College London, Pennsylvania State University, Centrum Wiskunde en Informatica, Vrije Universiteit Amsterdam, University of Illinois at Urbana-Champaign, University of Notre Dame, George Mason University, University of Aveiro, University at Buffalo, and University of Virginia) and industry (e.g., Ford Motor Company and Esri).

GeoSim 2020 was organized as a half-day workshop comprising of two sessions. In all, the workshop featured one keynote and nine oral presentations. On behalf of the Steering Committee, Dr. Dieter Pfoser kicked off GeoSim 2020 with the welcome and opening remarks. Dr. Carola Wenk chaired the first session of oral presentations which had five full papers. Zahra Jafari from University College London (UCL) gave the first presentation of the day on “*Spatial Analysis Of Border Closure Intervention Scheme In Conflict-Induced Displacement*”, which examined the effect of border control policies using a data-driven agent-based model for refugee flows from Syria [3]. Obi Thompson Sargoni from UCL presented a paper titled, “*A Sequential Sampling Model of Pedestrian Road Crossing Choice*” [10] by demonstrating how an agent-based model could represent the gradual process of deliberation between discrete road crossing choice alternatives to select a crossing location. Fangcao Xu from Pennsylvania State University presented her work “*STAND: A Spatio-Temporal Algorithm for Network Diffusion Simulation*” including both time and geographic distance as explanatory variables to simulate the diffusion process over two different network structures [11]. Thomas Koch from Centrum Wiskunde en Informatica presented “*A review of methods to model route choice behavior of bicyclists: inverse reinforcement learning in spatial context and recursive logit*,” highlighting some of the challenges with using recursive logit, a form of inverse reinforcement learning for modeling bicycle route choice [8]. Jian Yang from University of Notre Dame gave a presentation of his research “*Generating Contextual Trajectories From User Profiles*” about creating more realistic representations of mobility patterns of traffic participants based on the Simulation of Urban MObility (SUMO) traffic simulator [12].

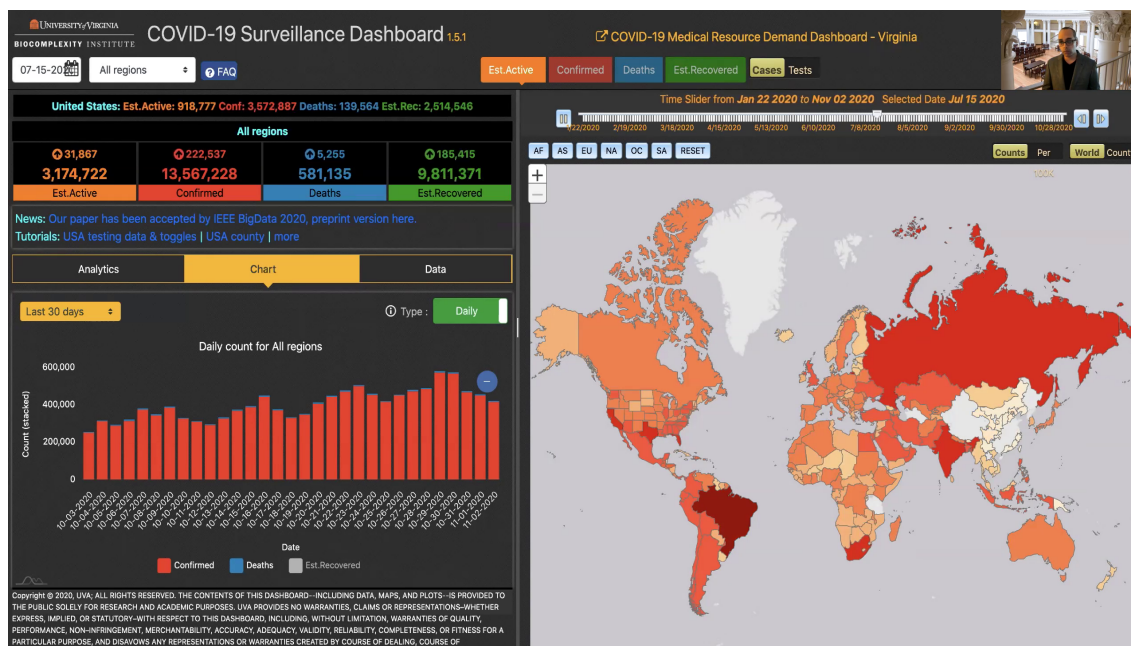


Figure 2: Dr. Samarth Swarup giving his invited talk titled “*Mobility and Behavior Modeling for COVID-19*”.

The second session chaired by Dr. Joon-Seok Kim consisted of the keynote talk and oral presentations of four short papers. Dr. Samarth Swarup, who is a Research Associate Professor in the Biocomplexity Institute at the University of Virginia, gave the keynote titled “*Mobility and Behavior Modeling for COVID-19*”. The

talk was in line with the special topic for GeoSim 2020 which sought to bring current trends in disease spread simulations, their practicality in predictive and prescriptive analytics, and the challenges practitioners face in their use. In his talk, Dr. Swarup explained how to use high-resolution mobility data for COVID-19 forecasting, and described how to build models of normative reasoning behavior for large-scale simulations. He presented the challenges of scale, realism, and complexity and shared his experiences and ongoing work to address these issues (Figure 2). Following the keynote, Alexander Michels from University of Illinois at Urbana-Champaign presented the paper, “*An Exploration of the Effect of Buyer Preference and Market Composition on the Rent Gradient using the ALMA Framework*” on extending the ALMA (Agent-based Land Market) framework with two new parameters - heterogeneity and stochasticity, to explore how buyers with diverse preferences and a range of market compositions affect the rent gradient [9]. Na Jiang from George Mason University made a presentation on “*Integrating Social Networks into Large-scale Urban Simulations for Disaster Responses*” by demonstrating how social networks could be incorporated for better decision making and for creating a variety of new application areas where network structures matter in urban settings [4]. Sarah A. Grajdura from University of California Davis presented her research findings “*Agent-Based Wildfire Evacuation with Spatial Simulation: A Case Study*,” by introducing an agent-based model that enables the development of behavioral models for nearest shelter evacuations using origin information, environment, and the spatiotemporal wildfire dynamics [2]. Dr. Rog  io Lu  s C. Costa from University of Aveiro presented his work “*Towards the Automatic Selection of Moving Regions Representation Methods*” by proposing the steps towards building a system that could suggest methods and configurations to generate representations fitting the requirements of any application [1].

We thank all the authors and the attendees for their active participation in GeoSim 2020. We truly appreciate the commitment of the program committee in the peer-review process which helped us create a high-quality program. We hope that the GeoSim’20 proceedings [5] will provide references and representative research trends in geospatial simulation to researchers and professionals beyond the SIGSPATIAL community.

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