Workshop Proposal: 5th ACM SIGSPATIAL International Workshop on Spatial Computing for Epidemiology (SpatialEpi' 24)

1 Introduction

Across the globe Epidemiologists have been investigating how to model the spread of infectious, to better understand and educate about the science of virus transmission, and to support effective policy interventions to address this global challenge and work towards future pandemic prevention and preparedness. This workshop was created in 2020 in response to the coronavirus disease 2019 (COVID-19), which was mainly transmitted by airborne droplets. But to prepare for future epidemics and pandemics, we must also improve our understand of the spatiotemporal ecology of vector-borne, sexually-transmitted, animal-to-human transmitted, and other infectious disease pathways. For this purpose, the SIGSPATIAL community is in a unique position to tackle this challenge, given our experience in managing, modeling, querying, and mining spatial and spatio-temporal data for more than three decades.

Many open research questions remain for this research community enabled by advanced computing power and very large spatio-temporal datasets that capture disease evolution, population characteristics, health behavior, social networks, and mobility. How can we better explain the spread of future pandemics? How can we improve disease spread predictions? Which social distancing measures have worked well and what optimal policies can we advise to minimize disease spread while minimizing socio-economic impact?

A particular opportunity for SpatialEpi at SIGSPATIAL'24 is the proximity of the conference venue in Atlanta to the Centers for Disease Control and Prevention (CDC), the national public health agency of the United States. The CDC funds many university-led research efforts to improve modeling and analytic capacity. A specific example is CDC's Insight Net [2] which "has awarded more than $100 million to partners who are technologically advancing the use of outbreak data to control infectious disease spread" in 2023. Organizers Lau and Züfle are part of Insight Net and will advertise SpatialEpi across Insight Net as a venue to share and publish their research.

2 Focus of the Workshop

This workshop will focus on all aspects of modeling, simulating, mining, and understanding the spatial processes and patterns of the spread of COVID-19 and other infectious diseases. This workshop will be a central hub for interdisciplinary discussions and publications related to on-going research on COVID-19 and other infectious diseases. The workshop seeks high-quality full (8-10 pages) and short (4 pages) papers that have not been published in other academic outlets and are not concurrently under peer review. Once accepted, at least one author is required to register for the workshop and the ACM SIGSPATIAL conference, as well as attend the workshop to present the accepted work which will then appear in the ACM Digital Library.

Tentative List of Topics of Interest

- Contact Tracing
- COVID-19 Data Cleaning and Wrangling
- COVID-19 Data Mining
- COVID-19 Data Query Processing
- COVID-19 Effects on Human Mobility
- COVID-19 Hotspot Detection
- COVID-19 Simulation and Modeling
- COVID-19 and Social Media
- COVID-19 Tracking and Data Collection
- Disease Spread Simulation
- Managing Uncertainty in COVID-19 Data
- Mapping and Visual Analytics of COVID-19
- Prescriptive Analytics for COVID-19
- Socioeconomic Impact of COVID-19
- Spatial Analysis of COVID-19
- Spatially Explicit COVID-19 Prediction Models

Intended Audience

This cross-disciplinary workshop is a forum to bring together researchers in the SIGSPATIAL community as well as researchers in epidemiology. Also, this workshop is of interest to everyone who works with infectious disease data and models (not necessarily COVID-19). In addition to paper presentations, this workshop will feature invited speakers keynotes from experts across the SIGSPATIAL community and epidemiology such as from the Centers for Disease Control and Prevention (CDC).

3 Previous Meetings

COVID-19'20

The 1st ACM SIGSPATIAL International Workshop on Modeling and Understanding the Spread of COVID-19 (COVID'2020, `https://jiayuasu.github.io/covid19-workshop/`) was held virtually in conjunction with the 28th ACM SIGSPATIAL International Conference on Advances in Geographic Information Systems in Seattle, Washington, USA on November 3rd, 2020. Details on this workshop can be found in the COVID-19'2020 Workshop Report [1]. The workshop had a total of twelve submissions. A total of eight quality submissions were selected for presentation and final publication for an acceptance rate of 66%.

The workshop program included two keynote presentations by Drs. Nicholas Reich and Jeffrey Shaman, well-known experts in Epidmiology, eight paper presentations which featured contributions submitted in response to the workshop's call for papers and eight invited talks which featured contributions submitted to the ACM SIGSPATIAL Special Issues: Volume 12, Number 1 & 2: Modeling and Understanding the Spread of COVID-19 (`SIGSPATIALSpecial`,`https://www.sigspatial.org/publications/newsletter/`). During these 18 presentations we had an average of 40 people in the Zoom room, peaking at 80 people during the first keynote by Dr. Reich. According to Zoom statistics, we had a total of 340 unique participants attend the workshop during the 18 presentations. More details on individual presentations can be found in our COVID-19 2020 Workshop report [1].

SpatialEpi' 21-23

The 2nd ACM SIGSPATIAL International Workshop on Spatial Computing for Epidemiology (SpatialEpi' 21, `https://dataoceanlab.github.io/spatial-epi-2021/`) was held virtually in conjunction with the 29th ACM SIGSPATIAL International Conference on Advances in Geographic Information Systems (ACM SIGSPATIAL 2021) in Beijing, China, USA on November 2nd, 2021. The workshop had a total of seven submissions. A total of three quality submissions were selected for presentation and final publication for an acceptance rate of 43%. There were a total of three paper presentations. During the presentations there were on average 15 people in the room with a minimum of 14 and a maximum of 17.

The 3rd ACM SIGSPATIAL International Workshop on Spatial Computing for Epidemiology (SpatialEpi' 22, `https://dataoceanlab.github.io/spatial-epi-2022/`) was held in-person in Seattle, WA, USA. The workshop had six paper submissions out of which five papers we accepted. We note that the low

quantity of submissions was offset by a high quality of submissions. Out of the five accepted papers, the individuals reviewers were: Accept (x7), Weak Accept (x8), Neutral (x2), with no rejects or weak rejects. The half-day workshop, which also featured a keynote by Epidemiologist Dr. Matthew Scotch had between 12-25 participants at any time.

The 4th ACM SIGSPATIAL International Workshop on Spatial Computing for Epidemiology (SpatialEpi' 23, `https://azufle.github.io/spatial-epi-2023/`) was held in-person in Hamburg, Germany. We only received two submissions. These two submissions, however, were very high quality: Each paper received four reviews including a total of 1 Strong Accept, 6 Accepts, 0 Weak Accepts, 1 Neutral, and no weak rejects or rejects. We note that researchers in the United States working in Epidemiology usually publish in journals and do not budget for international travel. The quarter-day workshop featured a keynote by Dr. Max Lau, a Biostatistician and Epidemiologist who now joined the SpatialEpi'24 organizing team.

We hope that the workshop venue in Atlanta, GA, will attract many more submissions by allowing authors not only to present their work but also meet their program managers at the CDC.

4 Format of the Workshop and Expected Number of Participants

For SpatialEpi' 24 we expect having 5-8 paper presentations (for accepted papers to appear in the workshop proceedings) and one keynote. We want to advertise the workshop more broadly not only across the SIGSPATIAL Community but also across Epidemiology and CDC Communities. We estimate 15-30 submissions and 30-40 workshop participants. We will advertise the workshop aggressively (e.g., via social media, contacts and mailing lists, contacts) to meet those objectives. We are expecting to fill a *half-day* workshop with this program. If accepted, all five organizers plan to attend the workshop in Atlanta.

5 Organizing Committee

(Names in **bold** are confirmed at the time of submitting this proposal)

Program Co-Chairs (alphabetical order)

- **Taylor Anderson**, George Mason University, tander6@gmu.edu
- **Joon-Seok Kim**, Oak Ridge National Laboratory, kimj1@ornl.gov,
- **Max Lau**, Emory University, msy.lau@emory.edu
- **Amira Roess**, George Mason University, aroess@gmu.edu
- **Andreas Züfle**, Emory University, azufle@gmu.edu

6 Program Committee

- **Michael Desjardins**, Johns Hopkins Bloomberg School of Public Health
- **Zipei Fan**, The University of Tokyo
- **Song Gao**, University of Wisconsin-Madison
- **Alexander Hohl**, The University of Utah
- **Hamdi Kavak**, George Mason University,
- **Ignacio Segovia-Dominguez**, University of Texas at Dallas
- Lance Waller, Emory University,
- **Yiqun Xie**, University of Maryland
- **Di Yang**, University of Wyoming
- **Jia Yu**, Washington State University

References

[1] T. Anderson, J. Yu, and A. Züfle. The 1st ACM SIGSPATIAL International Workshop on Modeling and Understanding the Spread of COVID-19 . *SIGSPATIAL Special*, 12(3):35–40, Jan. 2021 (https://doi.org/10.1145/3447994.3448007).

[2] Centers for Disease Control and Prevention. CDC Insight Net(`https://www.cdc.gov/insight-net/php/about/index.html`).