COVID'2020 Workshop Report
The 1st ACM SIGSPATIAL International Workshop on Modeling and Understanding the Spread of COVID-19

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1 COVID'2020 Workshop Overview

In response to the COVID-19 pandemic, a number of spatially-explicit models have been developed to better explain the pathways of the disease, to predict the trajectory of the disease, and to test the effect of different health guidelines and policies on the number of cases and deaths. The 1st ACM SIGSPATIAL International Workshop on Modeling and Understanding the Spread of COVID-19 workshop (COVID'2020) featured research efforts that aim to understand the spatial processes and patterns of COVID-19 spread using a variety of spatial modeling, simulation, and mining approaches. The goal of this workshop was to bring together a range of interdisciplinary researchers in the SIGSPATIAL community in the fields of computer science, spatial modeling, social sciences, and epidemiology. Also, this workshop was advertised for anyone interested in infectious disease data and modelling, including but not limited to COVID-19.

2 Workshop Submissions

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 in conjunction with the 28th ACM SIGSPATIAL International Conference on Advances in Geographic Information Systems in Seattle, Washington, USA on November 3rd, 2020. 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%. Each paper was reviewed by exactly three program committee members. Despite the high acceptance rate, the review process was highly selective. We accepted only papers that received an average rating from reviewers of at least +1.0. Among the eight accepted papers, reviewers recommended 2 Strong Accepts (+3), 11 Accepts (+2), 7 Weak Accepts (+1), 3 Neutrals (0), and one Weak Reject (-1) for an average rating of 1.42 among accepted papers.

3 Workshop Program

The workshop program included the following elements:

- **Keynote Presentations**: there were two keynote presentations by Drs. Nicholas Reich and Jeffrey Shaman.
- **Paper Presentations**: there were eight paper presentations which featured contributions submitted in response to the workshop's call for papers. The papers were reviewed by the program committee and selected based on their review by the program chairs.
- **Invited Presentations**: there were 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/).

3.1 Keynote Presentations

- After a short introduction by the chairs, the workshop kicked off at 8:10 PT with a keynote talk by **Dr. Nicholas Reich**, an Associate Professor of Biostatistics at the University of Massachusetts Amherst. Dr. Reich's team leads two international infectious disease forecasting consortia, including the FluSight Network and the COVID-19 Forecast Hub. Dr. Reich gave a talk titled *"A critical evaluation of COVID-19 pandemic forecasts"* which focused on his experience with modeling and forecasting influenza using ensemble modeling approaches and how these approaches have recently been applied to forecast COVID-19 dynamics.
- Our second keynote was given at 10:00 PT by **Dr. Jeffrey Shaman**, a Professor in the Department of Environmental Health Sciences and Director of the Climate and Health Program at the Columbia University Mailman School of Public Health. Dr. Shaman studies the survival, transmission and ecology of infectious agents, including the effects of meteorological and hydrological conditions on these processes. Dr. Shaman shared his experience developing models that forecast the flu and COVID-19 in a talk titled *"Transmission Dynamics of SARS-CoV-2: Modeling, Inference and Projection"*.

3.2 Paper Presentations and Invited Presentations

There were a total of four research sessions beginning at 9:00 PT and ending at 14:30 PT, where each research session featured on average two paper presentations and two invited presentations. During the presentations there were on average 40 people in the room.

Research Session 1

- First, **Mohamed Mokbel** introduced their vision and guidelines for the next era of contact tracing [9] ("Contact Tracing: Beyond the Apps"),
- next, **Rachit Agarwal** introduced a COVID-19 infection risk score based on human contacts [2]("Infection Risk Score: Identifying the risk of infection propagation based on human contact"),
- next, **Muhammed Imran** presented a large-scale Twitter dataset called GeoCoV19 that contains more than 524 million tweets related to COVID-19 that was collected over 90 days [11]("GeoCoV19: A Dataset of Hundreds of Millions of Multilingual COVID-19 Tweets with Location Information"),
- and finally, **Michael Desjardins** reported their analysis results of daily COVID-19 case data at the county level using the prospective spatial-temporal scan statistic [6]("Rapid detection of COVID-19 clusters in the United States using a prospective space-time scan statistic: An update").

Research Session 2

- First, **Ignacio Segovia-Dominguez** introduced their approach to modeling COVID-19 using a combination of mechanistic models and machine learning [3] ("Geospatial forecasting of COVID-19 spread and risk of reaching hospital capacity"),
- next, **Amy Magdy** proposed enhanced reporting of COVID-19 cases, particularly in underserved communities, by utilizing open data posted to the web [1]("On Improving Toll Accuracy for COVID-like Epidemics in Underserved Communities Using User-generated Data"),
- next, **Gergely Biczók** demonstrated the effect of incentives on decision-making related to actions that prevent the transmission of COVID-19 like mask use and social distancing [10]("Corona Games: Masks, Social Distancing and Mechanism Design"),
- and finally, **Mehrdad Kiamari** proposed a hybrid model and-data-driven approach to risk scoring based on an SIR model [7]("COVID-19 Risk Estimation using a Time-varying SIR-model").

Research Session 3

- First, **Li Xiong** and **Cyrus Shahabi** jointly presented REACT, a real time contact tracing application that has enhanced privacy features [16] ("REACT: Real-Time Contact Tracing and Risk Monitoring using Privacy-Enhanced Mobile Tracking"),
- next, **Zhongying Wang** presented their results for their sensitivity analysis which tests the sensitivity of COVID-19 model parameters on time to peak number of cases [14]("Sensitivity Analysis for COVID-19 Epidemiological Models within a Geographic Framework"),
- and finally, **Zhu Wang** conducted a large scale study on the effect of COVID-19 on education using geotagged Twitter data [15]("Analysis of the Impact of COVID-19 on Education Based on Geotagged Twitter").

Research Session 4

- First, **Hanan Samet** introduced their data visualization application CoronaViz that can be used to visualize dynamic variables such as COVID-19 cases, recoveries, and deaths [12] ("Using Animation to Visualize Spatio-Temporal Varying COVID-19 Data"),
- next, **Zipei Fan** presents a simulation platform that aims to find patients that have not yet been diagnosed with COVID-19 by following the chain of transmission [4]("Human Mobility based Individual-level Epidemic Simulation Platform"),
- next, **Gautam Thakur** developed a situational awareness platform that can process multi-source data for better decision making related to disease spread [13]("COVID-19 Joint Pandemic Modeling and Analysis Platform"),
- next, **Song Gao** presented a web-based interactive mapping platform to show how people in different counties and states reacted to COVID-19 social distancing guidelines [5]("Mapping county-level mobility pattern changes in the United States in response to COVID-19"),
- and finally, **Hamdi Kavak** proposed an ensemble modeling approach using representing clustering to predict COVID-19 deaths [8]("COVID-19 Ensemble Models Using Representative Clustering").

4 Special Event: Zoom Bombing

The workshop had an unexpected event. About 20 Minutes after the workshop started, during the beginning of the first keynote, the workshop got "Zoom-Bombed". A group of 20 participants with generic names such as "Anne" and "Mike" joined the workshop. All at the same time, they started disrupting the keynote presentation by 1) screaming minor profanity, 2) using their camera to show pornographic material, 3) writing minor profanity in chat, and 4) using the screen annotation tool to draw lines across the screen.

The three workshop organizers collaboratively removed the Zoom Bombers from the meeting. Fortunately, we were assisted by George Mason University undergraduate student Justin Elarde who volunteered to help monitoring the meeting, for example, to mute participants who forgot to mute themselves. What made it easy to identify the Zoom bombers, was that they were all using the "raise hand" function to move themselves to the top of the participant list. However, as we removed bombers, new ones kept joining, which forced us to enable a waiting room.

In total, it took about six minutes until the storm was over and all Zoom bombers had been removed from the meeting. New Zoom bombers were continuously joining, but they were held in the waiting room. We decided the restart the first keynote by Dr. Reich. Since the keynote had already run for 20 minutes, we ran a total of 30 minutes late. We compensated this delay by moving the presentations of Dr. Hamdi Kavak to the very end of the workshop with his permission. After restarting the keynote presentation, there were no further disruptions.

While the keynote continued, the Zoom bombing attacks continued and Zoom bombers joined the waiting room. The Zoom bombers had adapted, and used the names of real participants (which they had learned when they were in the meeting) and they even copied the profile pictures of real attendees. To avoid further disruptions, General Chair Dr. Züfle required each participant in the waiting room to verify their ACM SIGSPATIAL Registration Number. Conveniently, Dr. Züfle was an ACM SIGSPATIAL Registration co-chairs, such that he had access to the registration system for verification. After about 5 minutes of verifying participants, the Zoom bombers left and did not return.

Unfortunately, during the removal of Zoom-bombers from the meeting, we also removed two false positives, meaning we removed two regular/authentic participants. One participant was classified as a false positive due to having raised their hand during the attack. The other participant only used their first-name and thus matched the pattern of generic names. Participants who were removed were no longer able to join the same room and were locked out permanently. While Zoom does have an option to allow removed users to rejoin, enabling this option did not help retroactively. To allow the two participants to re-join the workshop, we created a new room after the first session and asked all participants to move to the new room. We immediately updated the Zoom link on the workshop website and the SIGSPATIAL general and web chairs were lightning fast to update the links on the conference website.

In the new room, we continued to enable a waiting room to authenticate participants. But during the six hours this room was used, there was no more sign of any Zoom bombing.

Lessons Learned

We deliberately chose to use a Zoom meeting (versus a Zoom webinar) to host the workshop. While a Zoom webinar would have prevented Zoom bombing, a Zoom meeting allows participants to see each other, to share their video, ask questions (using audio), send private messages, and to enable break-out rooms for participants to have conversions in small groups. We think these features are important for an interactive workshop.

For future workshops, we would still use a Zoom meeting with the same room settings, sacrificing security to enable social interactions. But what we would do differently is 1) not to disclose the Zoom link until (a few minutes before) the workshop starts, and 2) not to embed the room password in the link. This way, there will not be enough time for Zoom bombers to crawl the link from the web and organize an attack. And even if they'd crawl it, they wouldn't have the password.

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