

Spatial Gems 2020 Workshop Report

The 2nd ACM SIGSPATIAL International Workshop on Spatial Gems

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1 Introduction to Spatial Gems

Researchers and practitioners working with spatial data often develop fundamental new techniques they would like to share with their community. These are not necessarily new research results, not yet in any textbook, but they are interesting, self-contained techniques for doing something useful in the domain of spatial data. We call these techniques “spatial gems”.

The goal of this workshop is to publish several spatial gems contributed by the participants. While a gem may have already been published as a small part of a paper, extracting it into a gem makes it much more likely to be found and used by others. Good gems will stay relevant for a long time. Each gem will be two to ten pages long. Where appropriate, a good gem will include numerical examples so programmers can verify their implementations, but it should not be a research paper with results on multiple test cases. Spatial gems should be reproducible and usable. Thus, we encourage authors to provide implementation details and code whenever possible. Code can be included in short blocks of code in the paper, or longer code can be shared in an open source repository with a pointer in the paper. Different from a research paper, a spatial gem should not focus on describing “Look at what I can do!” but rather, a Spatial Gems paper should instead say: “Look at what you can do!”. At the workshop, participants work together to edit all the accepted submissions for clarity and utility, with the goal of creating a reference archive of spatial techniques.

2 Spatial Gems 2020 Submissions

The 2nd ACM SIGSPATIAL International Workshop on Spatial Gems (Spatial Gems 2020, <https://www.spatialgems.net>) was held virtually in conjunction with the 27th ACM SIGSPATIAL International Conference on Advances in Geographic Information Systems in Seattle, Washington, USA. The workshop had ten paper submissions which were reviewed by eight program committee members. Each paper was assigned to three reviewers and all papers received at least two reviews. While the number of submissions was low, the quality of the submissions was high. Among the seven accepted papers, reviewers recommended 2 Strong Accepts, 7 Accepts, two Weak Accepts, and two Neutrals.

3 Spatial Gems 2020 Workshop Program

Spatial Gems puts the “work” back in “workshop”. Therefore, the goal of this workshop is not only to present research, but also for workshop attendees to team up and to hands-on work on each others papers in L^AT_EX during the workshop. For this purpose, the workshop was split into three parts:

1. Paper Presentations
2. Editing Session I
3. Editing Session II and Best Paper Award Announcement

All sessions were held virtually on Zoom.

3.1 Paper Presentations

After a short introduction by the chairs at 2 PM PST, the workshop kicked off by having ten-minute presentation for each accepted spatial gem:

- The first paper, presented by Seshagiri Cherukuri from Microsoft, explained how to lay out an optimized network, such as fiber optic cable, that follows an existing road network [6]. ([“A Practical Network Layout Planning System Using Geospatial Data”](#))
- John Krumm presented the second paper on how to use the Brownian Bridge for making probabilistic interpolations of the location of moving objects between measurements [1]. ([“The Brownian Bridge for Space-Time Interpolation”](#))
- The third paper was from the Singapore company GrabTaxi, and it discussed how to efficiently find the k nearest neighbors on a road network in real time [7]. ([“A Scalable In-Memory Solution for Real-Time K Nearest Search on Road Network”](#))
- Salles V. G. de Magalhães, from Brazil, presented the fourth paper on using GPUs to accelerate geometric predicates for 3D queries, such as the orientation of four 3D points [2]. ([“Employing GPUs to Accelerate Exact Geometric Predicates for 3D Geospatial Processing”](#))
- The next paper came from Yuanyuan Pao of Lyft, explaining an innovative way to represent the locations of objects on a road network by their fractional distance along road segments [3]. ([“Using Segment Fraction For Road-Network Locations”](#))
- The sixth paper, presented by Samriddhi Singla, described a technique for computing multidimensional approximate histograms with a single pass over the data, which is useful for incremental and streaming applications [4]. ([“Flexible Computation of Multidimensional Histograms ”](#))
- The presentations concluded with a talk from Goce Trajcevski on how to compute with triangulated irregular networks that are evolving in time [5]. ([“TINET: Triangulated Irregular Networks Evolving in Time”](#))

During the presentations, we had about 30 people in the virtual room.

3.2 Editing Session I

After a short break, workshop attendees were paired to work hands-on the \LaTeX source code of each others papers in two editing sessions starting at 3:45 PM PST. The pairing was done arbitrarily using Paper IDs. Since the workshop had an odd number of seven papers, non-author workshop chairs joined the unmatched teams. Paired teams were moved into breakout rooms for collaboration. Each team had 30 minutes to read each others paper to provide constructive feedback. Authors were instructed to focus on improving readability and ease of understanding, to improve the impact and usability of each others spatial gem. After this reading phase, teams had 30 minutes to discuss changes and another 30 minutes to implement changes in the \LaTeX source code. For this purpose, all workshop papers were required to share their code in Overleaf to work concurrently on their papers. Changes of the papers included minor edits related to grammar and typos, but also major changes to clarity such as adding examples, adding motivation, or removing unnecessary sections for brevity.

During the nature of hands-on working on each others papers, the editing sessions had no attendees other than authors and organizers working on the papers. Each of the four breakout rooms had two to four people, including authors of two respective papers.

3.3 Editing Session II

After a 15 minute break, authors were assigned to new teams and met in breakout rooms for another 90minutes to read, discuss, and edit each others papers from 5:15-6:45 PM PST.

At the end of Editing Session II the organizers announced the Best Paper Award of Spatial Gems 2020 which was awarded to the paper titled “Employing GPUs to Accelerate Exact Geometric Predicates for 3D Geospatial Processing” by Marcelo Menezes, Salles V. G. de Magalhães, and others. Congratulations!

References

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