LocalRec 2020 Workshop Report

The Fourth ACM SIGSPATIAL Workshop on Location-based Recommendations, Geosocial Networks and Geoadvertising

Online event — November 3, 2020

Panagiotis Bouros
Johannes Gutenberg University Mainz
Germany
bouros@uni-mainz.de

Tamraparni Dasu
AT&T Labs–Research
USA
tamr@research.att.com

Yaron Kanza
AT&T Labs–Research
USA
kanza@research.att.com

Matthias Renz
Christian-Albrechts-Universität zu Kiel
Germany
mr@informatik.uni-kiel.de

Dimitris Sacharidis
Technische Universität Wien
Austria
dimitris@ec.tuwien.ac.at

The amount of publicly available geo-referenced data has seen a dramatic increase over the last years. Many user activities generate data that are annotated with location and contextual information. Moreover, it has become easier to collect and combine rich and diverse location information. In the context of geoadvertising, the use of geosocial data for targeted marketing is receiving significant attention from a wide spectrum of companies and organizations. With the advent of smartphones and online social networks, a multi-billion dollar industry that utilizes geosocial data for advertising and marketing has emerged. Geotagged social-media posts, GPS traces, data from cellular antennas and WiFi access points are used widely to directly access people for advertising, recommendations, marketing, and group purchases. Exploiting this torrent of geo-referenced data provides a tremendous potential to materially improve existing recommendation services and offer novel ones, with numerous applications in many domains, including social networks, marketing, and tourism.

Realizing the full potential of geo-referenced data requires new technologies to collect, store, analyze and use the data. It also raises issues in the area of responsibility, accountability, transparency, fairness, adequacy (e.g., avoiding ads in improper places) and preventing misconduct. This in turn means addressing many core challenges and combining ideas and techniques from various research communities, such as recommender systems, data management, geographic information systems, social network analytics, and text mining. By bringing together researchers and practitioners from these communities, the LocalRec workshop provides a unique forum for in-depth discussion about challenges, opportunities, novel techniques and applications related to location-based recommendation, geosocial networks and geoadvertising. LocalRec 2020 is the fourth occurrence of the conference, following the success of previous gatherings [1].

Due to the COVID-19 pandemic, LocalRec 2020 was a virtual workshop (`https://localrec2020.github.io`) on Zoom. It was a full-day workshop in conjunction with the ACM SIGSPATIAL 2020 conference. The program committee received and evaluated 5 submissions, out of which 3 papers were accepted

Figure 1: Collage of some of LocalRec 2020 participants.

as full, 1 paper as short, and 1 as a demo. In most of the sessions there were around 20 participants, with 30 attendees at peak time. Figure 1 shows a collage of all participants that had their cameras on.

There were two keynote talks and two research sessions in the workshop. Both keynote talks gained a lot of attention and led to fruitful discussions.

Francesco Ricci from Free University of Bozen-Bolzano, Italy, gave a keynote about *Computing Effective Recommendations for Tourists*. The talk started with contrasting *preferences*, which determine what people ideally want and is hard to model, with *choices*, which is what people actually choose and is easy to observe. It then analyzed the criteria with which tourists make choices. A next point of discussion was about what a recommender system should optimize for: the *expected utility* based on choices, or the *experienced utility* based on user feedback. Ideally, a system should optimize for experienced utility, and try to align expected utility with experienced utility. The talk concluded with presenting a novel Point of Interest (POI) recommender system that is based on reinforcement learning techniques.

Brennan Lake, Senior Director of Research Partnerships & Data For Good of Cuebiq, USA, gave a keynote on *Location Intelligence for COVID-19 Response – Building Data Collaboratives for COVID-19 Research and Public Policy*. Cuebiq is a location intelligence company that curates, creates and analyzes high quality location data from application SDKs (software development kits) of opted-in users in an anonymized fashion. While there are numerous adtech applications for location data, the talk focused on the use of location intelligence for studying human mobility patterns during the COVID-19 pandemic, and how they could be used to inform response strategies. Cuebiq data has been used by the CDC, UNICEF, World Bank, University of Oxford, Johns Hopkins University and New York City among others. For example, Cuebiq data helped measure changes in mobility patterns during pandemic related lockdowns, highlighting income disparities (richer white-collar neigh-borhoods worked at home and had low mobility while poorer neighborhoods that required physical presence at work displayed high mobility) and visitations to points of interest in defiance of "shelter in place" directives. These patterns were then used by institutions like the CDC to refine guidelines, create PSAs (public service an-nouncements) regarding safety measures such as social distancing and wearing face masks during the pandemic. The presentation concluded with a lively Q&A session.

The research papers were organized into two sessions. The first session focused on *Spatial Embedding and Mobility Modeling* and included two full research papers and one vision paper. In [7], the authors investigated how to model POI data using concepts from Machine Learning (ML) and Natural Language Processing (NLP). A hierarchical, density-based and self-adjusting clustering approach was proposed which addresses the inability of the Place2Vec model to consider the spatial heterogeneity among different urban regions. In the same spirit, Paper [4] considered the use of word embeddings for representing geospatial ontologies. For this purpose,
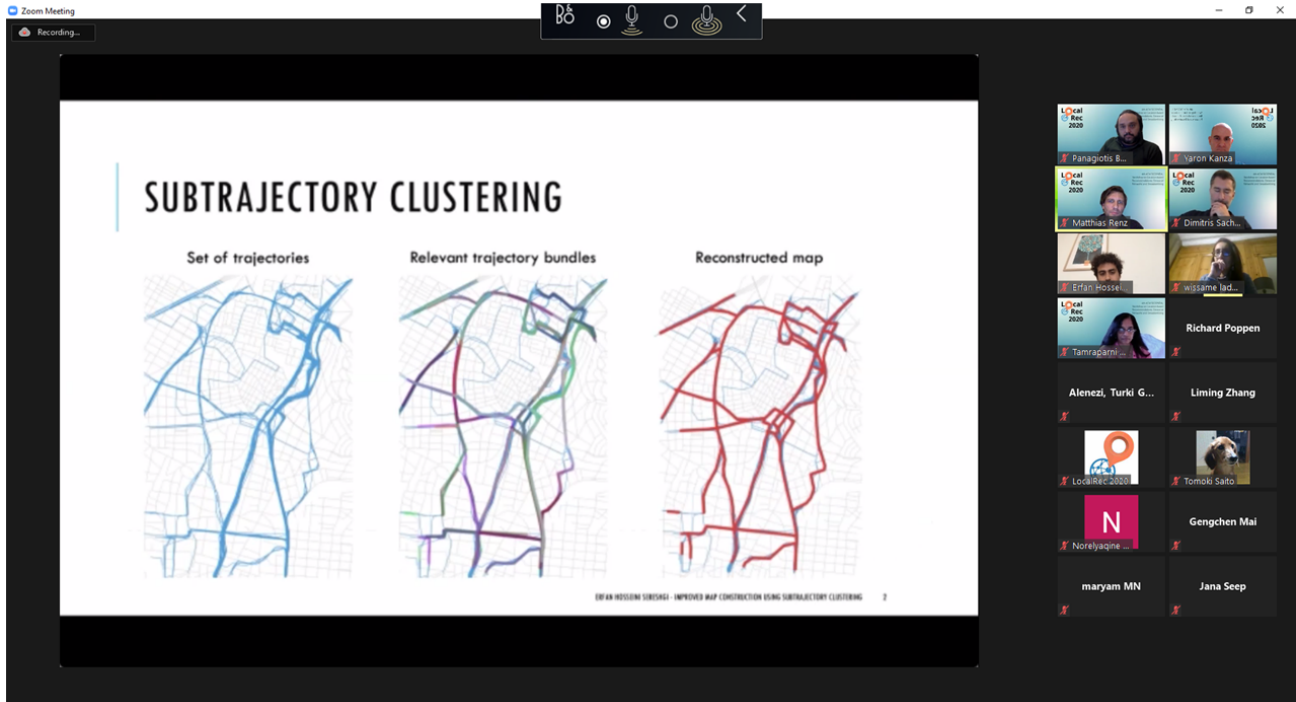
Figure 2: A view of the screen during a talk.

the authors presented an analysis that evaluates the effectiveness of a particular family of embeddings called hyperbolic embeddings. The proliferation of mobile devices has resulted in an unprecedented opportunity for modeling human behavior. The authors of Paper [6] presented their vision on how to incorporate location-based event detection and activity characterization in order to model both accurate and realistic mobility patterns.

The second session focused on *Map Construction and Spatial Recommendation*, and included one full paper and one demo. The authors of the full paper [5] presented an ontological model called NAREO (Neighborhood And Real Estate Ontology), which aims at providing neighborhood and real estate recommendations by means of SPARQL queries. In their presentation, they introduced the concepts and relationships contained in the ontology as well as the rules that enable reasoning and add some more semantics. In the second presentation, the authors of the demo paper [3] showed how sub-trajectory clustering could be used in order to advance reconstruction of travel networks by means of trajectory records. The authors showcased the principal challenges and issues and the gain of their approach over state-of-the-art based on real-world illustrations.

The research papers and the keynote talks emphasized the many facets of location recommendations and geoadvertising. They illustrated the potential of recommendation systems to help users find the geospatial information they need, whether it is points of interest, routes or recommended venues. They described methods for advertisers and marketing people to reach out to potential customers with high precision based on location information, and they also emphasized the need for awareness of privacy and fairness issues.

We thank the authors for publishing and presenting their papers in LocalRec 2020, and the program committee for their professional evaluation and help in the peer-review process. We hope that the proceedings [2] will inspire new research ideas and will help promoting the area of location-recommendations and geoadvertising.

References

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