

Report on the 6th International Workshop on Computational Transportation Science in conjunction with the 21th ACM SIGSPATIAL conference

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The sixth International Workshop on Computational Transportation Science (IWCTS'13) was held in Orlando, Florida on 5th November in conjunction with the ACM SIGSPATIAL conference. The one day workshop was divided in four sessions with a keynote before the first session and the third. Out of 22 submissions the program committee selected 14 presentations dealing with different topics of the transportation science field of research. The workshop has been structured in four sessions each with two keynotes placed at the beginning and in the mid.



After a warm welcome by Monika Sester, one of the workshop chairs, Mubarak Shah, Trustee Chair Professor of Computer Science at the University of Central Florida (UCF) presented the first keynote talking about Camera Networks and Wide Area Scene Analysis. He described the problems of finding moving objects and motion patterns within picture series. Tracking swarms and the extraction of movement trajectories from individual objects using contextual information are the objectives in this research field. By using the demonstrated methods they achieved an object detection rate of 90%.

The first Session started with “**Multi-agent Infrastructure Assisting Navigation for First Responders**”. A feasible architecture for emergency routing has been presented by TU Delft researchers around Sisi Zlatanova. By comparing different routing algorithms, they showed their applicability for first responder routing use cases. Handling static and moving obstacles were some of the challenges that have to solve in this areas. The second presentation was held by Stephan Winter from the University of Melbourne who presented a simulation approach which enhances the decision for a collaborative public transport system. By considering the spatial distribution of trip requests, results of the simulation show, that especially this additional variable has an effect on the level of service and the cost-effectiveness of the system. The first session closed with the presentation on “**VTIS: A Volunteered Traveler Information System**” . Combining different crowd data sources for is the aim of the showed research by CS Team, University of Illinois. After an overview on related work like Smarter City, TrafficPuls, Waze, IDOT and CTA Bus Tracker Roland Varriale presented solutions how mined Twitter data as well as crowd sourced information from travelers by active inputs on their mobile devices within the VTIS app can influence the route calculation.

Subsequently, the 2nd session started with Pdraig Corcoran, who presented the collaborative work of UCD (University College Dublin) researchers on quality assessment of OpenStreetMap data, especially

on road networks generated from volunteers. In their contribution they developed a multi-granular graph based representation for street networks which allows a better and easier quality assessment of VGI road data. In his 1st presentation within the workshop “**Optimizing Landmark-Based Routing and Preprocessing**”, Alexandros Efentakis and Dieter Pfoser optimized a landmark based routing using the ALT (A* + Landmarks + Triangle equality). By improving the preprocessing time and the query phase they made the algorithm feasible for nearly real-time routing services. To get a better data set for pedestrian navigation the collaborative work of Yirci et al. demonstrate a new approach for pedestrian network generation by using computational geometry and graph theory methods on vector data sets. With this approach they are able to build up a hierarchical object model by spatial partitioning. Using a centerline technique creates a topological graph for pedestrian routing. “**Modality Classification Method Based on the Model of Vibration Generation while Vehicles are Running**” was the topic of the last presentation of session two. From the Hitachi central research lab Ohashi et al. have developed a classification method for transport modes. The team made use of the popular acceleration sensors within smartphones and obtained an accuracy of over 80% for the distinction between cars and motorbikes.

After lunch time, Paul Torrens from the Department of Geographical Sciences and Institute for Advanced Computer Studies, Univ. Maryland, held the second keynote. He showed how evacuation and disaster simulation can be improved by using real data. Getting the knowledge on a scenario he created models by using tracking data of real scenarios. To show the results of the simulation, he connected an impressive animation framework which shows the results in a very convincing way. Especially the natural motion of the agents made the simulation very realistic.

Analysis of trajectories and sensor data has been one focus of the 3rd session. Starting with “**Processing Crowd Sourced Sensor Data – From Data Acquisition to Application**”, Johannes Lauer, Nicolas Billen and Alexander Zipf of the Heidelberg GIScience chair implemented a workflow sensor data acquisition mainly from smartphones. The architecture is also able to process sensor data from further connected sensor systems. As a first application the processing of smartphone acceleration sensor data for mapping purposes has been implemented. The result is a classification of normalized acceleration data for OpenStreetMap road surface tags. “**Incremental Frequent Route Based Trajectory Prediction**” was the title of the 2nd paper. Győző Gidófalvi presented in detail the fundament of Anja Bachmann et al. work. They proposed IncCCFR as a new, incremental approach for incremental frequent route based trajectory prediction. As evaluation data set they used the samples of taxi GPS positions within Wuhan, China. An analysis of Traffic collision data has been given in “**Discovering Spatial Co-Clustering Patterns in Traffic Collision Data**” where Mario A. Nascimento presented the work of the University of Alberta and the Office of Traffic Safety, Edmonton. They developed the concept of Spatial Co-Clustering Pattern (SCCP) to combine non spatial attribute value pairs with the spatial clustering of traffic collisions. Using real data provided by the city of Edmonton their approach allows a better explanation of certain hot spots. The 4th presentation on “**Efficient Wayfinding in Complex Environments: Derivation of a continuous space shortest Path**” closed the last but one session. An efficient wayfinding approach has been presented by Inso Hong from the GeoDa Center, Arizona State University. They improved their previously developed convex path approach by considering only the relevant subset of obstacles. Hence they are able to improve the computation time and the obstacle detection.

The final session of the workshop comprised work on traffic analysis, location quality prediction and fleet management. Gautam S. Thakur from Oak Ridge National Laboratory demonstrated how

collecting and processing real time traffic data provided by public online traffic cameras can be used for traffic density estimations. Furthermore they used the data for traffic forecasts and compared six Granger networks of the investigated cities. This research contribution has been honored with the best paper award. A new way for quality of service prediction of GNSS for planned routes was presented by Hassan Karimi from the University of Pittsburgh. With their four module based method (segment sampling, point based -, tracking based - QoS prediction and iGNSS QoS segmentation), it is possible to be prepared before the GNSS positional quality is getting worse. The final session closed by the 2nd presentation of Alexandros Efentakis. In his work “**Towards a Flexible and Scalable Fleet Management Service**“, he gave a broad view on the simplefleet system. He showed their architecture from data acquisition via storing to processing and presenting for end users of Floating Car Data. A nearly real time traffic flow overlay demonstrates the system performance.

The proceedings are available via the ACM website using the following URL: <http://dl.acm.org/citation.cfm?id=2533828>.

It is planned to hold the next IWCTS at the next ACM SIGSPATIAL in 2014 in Denver, CO, USA.