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Report on the ISPRS Scientific Initiative TIC'14:
The ISPRS Tracking and Imaging Challenge 2014

Melbourne / Columbus / Hannover, 7 January 2015

Dear Christian,

Here is the final report on the ISPRS Scientific Initiative *TIC'14*, completing the project according to Appendix 9 of the ISPRS Orange Book. A separate financial report has been submitted to the Treasurer.

The ISPRS Tracking and Imaging Challenge 2014 (TIC'14) was aiming at stimulating research and creativity between various academic research communities such as computer vision, photogrammetry, spatial computing, robotics and GIScience. Due to the interdisciplinary background, it was issued by two different ISPRS Working Groups, namely WG II/8: Mobility: Tracking, Analysis and Communication and WG III/3: Image Sequence Analysis. The TIC'14 was requiring that two types of data are linked in innovative ways, namely the trajectory data as it is captured for example from mobile positioning sensors, smart cards, or e-tags, and the image data as it is captured for example from tourist photos on Flickr, smartphones, CCTV, or car mounted cameras. Only two conditions had to be met:

- The presented idea had to fundamentally require both types of data, i.e., cannot be realized with one data set alone.
- The set task had to demonstrate strong and novel benefits from integrating these two data sets.

TIC'14 had set up a website (http://www2.isprs.org/commissions/comm2/wg8/tic.html) which provided all details. An early report on the TIC'14 outcomes is here: http://www2.isprs.org/commissions/comm2/wg8/reports.html

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The objectives of TIC'14 were:

- to demonstrate novel applications or unorthodox solutions by integrating imagery data and trajectory data,
- to expose expertise within ISPRS more broadly, and collaborate and integrate with other disciplines, and
- to promote science and engineering to the public.

The call for participation in this challenge was distributed by the three chairs into their three networks. Among the addressees were ISPRS (working groups and homepage), ACM SIGSPATIAL, AGILE, ASIERA, the Computer Vision community, and individuals working in this area. The first call for participation was distributed mid of January 2014, and a second call was distributed mid of April 2014 (submission deadline was end of July).

Participants had to submit a short paper presenting the idea, explaining how the criteria were addressed and why the approach was providing novel benefits, and testing the idea in an implementation. Then, if selected, they had to present their submission at PCV 2014 in Zurich (the TC III midterm symposium), and to demonstrate their implementation during a poster session.

The selection for presentation was made by the chairs (submissions by chairs were assessed by the other chairs only). The only selection criterion at this stage was whether the submission was meeting the specifications of the challenge. Then, at PCV'14, an independent panel of senior colleagues volunteered to rank the presented submissions.

These six contributions passed the submission criteria and were selected for presentation at PCV:

1. Deepak Rajamohan, Bhavana Ganu, K. S. Rajan: Road Condition and Texture Estimation by Fusing GPS, Accelerometer and Camera Data
2. Jianzhu Huai, Alper Yilmaz, Yujia Zhang: Real-Time Large Scale 3D Reconstruction by Fusion of Kinect and IMU Sensors
3. Luke L. Bermingham, N. P. Pace: Flickr Trajsuite: Data-Mining of Flickr Photo-Taker Trajectories
4. Oliver Meynberg, F. Hillen, Bernhard Höfle: Navigation in Dense Human Crowds Using Smartphone Trajectories and Optical Aerial Imagery
5. S. Hosseiny Alamdary, Po-Lun Lai, Alper Yilmaz: Merging Images, Trajectory, and Point Clouds for 3D Object Tracking
6. Yihan Lu, Hassan A. Karimi: Real-Time Sidewalk Slope Calculation Through Integration of GPS Trajectory and Image Data to Assist People with Disabilities in Navigation

The panel ranking these submissions consisted of:

- George Vosselman, University of Twente, The Netherlands
- Christian Heipke, University of Hannover, Germany
- Yuri Vizilter, GosNIIAS, Russia

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The challenge had set out the following prizes:

- A first prize (CHF 2,500, certificate) for the most original contribution to the TIC'14 theme according to the jury's recommendations
- A second prize (CHF 500, certificate) for the follow-up

The jury selected Deepak Rajamohan, Bhavana Ganu and K. S. Rajan for the first award, and S. Hosseiny Alamdary, Po-Lun Lai and Alper Yilmaz for the follow up award. All other selected participants at the workshop received a certificate of recognition.

In addition, submitting teams were invited to contribute for a special issue of the ISPRS International Journal of Geo-Information. The call for this special issue is still open (at the time of reporting) and can be found here:
http://www.mdpi.com/journal/ijgi/special_issues/tracking_imaging

We are convinced that the idea was successful and did stimulate some work and participation of people, who else would not have been interested in ISPRS work. In this regard the objectives of the challenge have been met.

To transfer the idea to other WGs or future challenges, the following "lessons learnt" can be listed:

1. Importance of advertising of challenge
   We spread the call within our three communities, i.e., the call had large exposure, repeated times. And yet, we had relatively low submission figures. Some communities, e.g., core CV and GIScience, did not submit at all. It is not clear to us whether we did not reach deep enough into these communities, whether the condition to present at an IPSRS event was holding back people from these communities, or whether the challenge was not clear enough (see next point).
2. Clarity of description of challenge
   On the one hand, we wanted the participants to work out own, new ideas based on own data, and wanted to break boundaries of traditional thinking / traditional approaches. On the other hand, however, many people were confused about the fact that no data were made available (we received some feedback in this regard, because other challenges are typically built around a benchmark data set). We believe that a more precise and clear wording of the call in this regard would lead to a larger attraction and participation.
3. Appropriate presentation option
   In our view, this point was met by TIC'14 in an excellent way, by assigning a special session to a symposium. In this way, the project got a great attention and also was of special attraction due to its difference to conventional presentations.

Overall, the organization of TIC'14 was as much exciting as the results indicate excited participants. Even within the ISPRS community this challenge bridged between communities (and Commissions).

The organizers of TIC'14:

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