S²UCRE Scientific Exchange Meeting

Date and Time	Monday 21 Jan 2019, 13:30 - 18:00
Venue	Auditorium, Building 660, Paris-Sud University, rue Noetzlin, Gif-sur-Yvette
Participants	Paris Sud University/UPSUD (FR), Fraunhofer Institute of Optronics, System Technologies and Image Exploitation/IOSB (DE), IDEMIA (FR), Munich University of Applied Sciences/MUAS (DE)

Program of the Meeting

13:20-13:30	**Arrival and welcoming of participants**	**E. Aldea (UPSUD)**

Quick presentation of the S²UCRE project and introduction of the participants

13:30-14:00	**Merging Partial 3D Reconstructions**	**Thomas Pollok (IOSB)**

In this work, we tackle the Structure from Motion (SfM) model fusion problem. In particular, we fuse existing 3D models which have already been reconstructed using overlaps. In typical SfM pipelines, the most time-consuming is feature matching. Moreover, incremental triangulation and Bundle Adjustment (BA) also require much time. At present, the only way to merge existing reconstructions is to re-detect and re-match features, also re-estimate camera poses for all images. Different from this method which ignores all existing information of reconstructions, we propose an approach that can merge the reconstructions as efficiently as possible by preserving useful information. This approach is mainly divided into two steps. The first is finding the overlaps between reconstruction based on Fisher similarity lists. The second step is finding the best transformation matrix based on the previously found overlaps. We separately calculate the rotation and translation with scale. The best rotation matrix is computed by minimizing the global rotation error, while the translation and scale are found by a linear equation system of camera positions. Our experiments show that we can merge the partial 3D reconstruction with efficiency and robustness after final optimization.

14:00-14:30	**Accelerating the Optimal Steps Model (OSM)**	**Marion Gödel, Benedikt Zönnchen (MUAS)**

In this presentation, we will explain the Optimal Steps Model (OSM) which is a step-based model for simulating pedestrian motion. In addition, we will outline possible ways to accelerate the optimal steps model.

14:30-15:00	**Crowd Density Estimation**	**Thomas Golda (IOSB)**

The analysis of pedestrians using stationary cameras is an important task. This starts by analyzing the behavior of single individuals, over small groups and up to large crowds. Especially the last mentioned point gets more and more attention. In this presentation we will give an overview over existing techniques for the task of crowd counting. Existing methods can be clustered into different groups, namely counting-based, regression-based, and density-based methods. The focus here lays on the estimation of density maps, which are an intermediate way to tackle the problem of counting people, especially in very crowded scenarios.

15:00-15:30	**Bounding uncertainties in evaluating local crowd density**	**J. Vandoni (UPSUD)**

The many models of pedestrian flow developed since 2000 require accurate calibrations and validations as a preliminary step for their successful use in simulations. Videos recorded in public, overcrowded areas represent the ideal source for microscopic and macroscopic metadata and their automated extraction is notoriously difficult. Recently, there has been a resurgence of contributions for density estimation. Our presentation discusses current avenues for proposing bounds for the uncertainty of these estimators, in relation to the underlying machine learning algorithms being employed.

15:30-16:00	**Coffee break**	

16:00-16:30	**Robust Localization in Urban Environments Using Raw GNSS Data**	**S. Le Hégarat-Mascle (UPSUD)**

In Global Navigation Satellite System (GNSS) positioning, the urban environments represent an issue in particular because of multipath and Non Line Of Sight effects. Our work proposes a new approach for the detection of outliers in the pseudo-range observations. Based on two models representing the distribution of inconsistent data (naive models), two criteria are proposed to partition the data between inliers and outliers and estimate the location parameters. These criteria are then implemented in two localization algorithms. We show that the outlier detection improves the estimation of the receiver location and outperforms the classical approaches especially when the environment is constrained.

16:30-17:00	**Intra-class Variation Isolation in Conditional GANs**	**Richard Marriott (IDEMIA)**

One of the most important aspects limiting further progress in facial recognition (FR) is the lack of availability of balanced datasets. FR datasets must contain images of many identities in order that networks be able to learn mappings that generalize well to identities not present in the training dataset. They must also contain many images of each identity under a variety of conditions to allow the network to learn robustness to this intra-class variation; i.e. to factors such as pose, expression, lighting, etc. In many FR datasets the intra-class variation is not sufficient and subjects at extreme poses or under harsh lighting conditions may not be recognized. Here, we present a method of synthesizing realistic images that may be used to augment existing datasets. We use a conditional generative adversarial network (C-GAN) to generate new identities and can manipulate image attributes separately and continuously with only the weak supervision of binary attribute labels; e.g. “ambient lighting / non-ambient lighting”.

17:00-17:30	**Integrating Visual and Geometric Consistency for Pose Estimation**	**H. Chen (UPSUD)**

In this work, we tackle the problem of estimating the relative pose between two cameras in urban environments in the presence of additional information provided by low quality localization and orientation sensors. An M-estimator based approach provides an elegant solution for the fusion between inertial and vision data, but it is sensitive to the prior importance of the visual matches between the two views. In addition to using cues extracted from local visual similarity, we propose to rely at the same time on learned associations provided by the global geometrical coherence. A conservative weighting scheme for combining the two types of cues has been proposed and validated successfully on an urban dataset.

17:00-17:30	**Ending of the seminar**	**E. Aldea (UPSUD)**

Concluding remarks, final discussions and preparations to go to Paris for dinner