

NATIONAL UNIVERSITY OF SINGAPORE

School of Computing

C S S E M I N A R

Title: Photometric/Geometric Constraints in A Priori Models for Computer Vision Applications

Speaker: Sylvie Chambon
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Date/Time: 25 January 2016, Monday, 10:00 AM to 11:30 AM

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Chaired by: Dr Ooi Wei Tsang, Associate Professor, School of Computing
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Abstract:

In image understanding, computer vision tools are more and more combined with a priori knowledge. Classical computer vision methods provide many interesting results for solving matching, 3D reconstruction or object recognition, however, these approaches, solely based on pinhole model, have reached their limits. In a certain way, this is why recent methods have intensively introduced: learning, a priori constraints, or context modelling, in order to propose computer vision tools adapted to human applications.

This presentation will focus on how a priori knowledge can be used in different computer vision problems: matching, detection/shape recognition and segmentation. The introduction of photometric and/or geometric constraints will be mostly discussed, although, one of the ultimate goal of my work is to investigate context modelling in computer vision.

The first part of the talk will be about matching approaches based on robust statistics and combination of different correlation measures. This research covers the investigations made since the Ph.D thesis about how occlusions can be taken into account and how the matching process can be improved. This work is based only on photometric constraints.

The second part will show how photometric and geometric constraints can be combined in order to solve a difficult problem of shape recognition and/or binary segmentation: the detection of thin objects in a high textured environment, i.e. road cracks. A Markovian segmentation and an approach using minimal path estimation are the two main methods that will be presented.

In the last part, the research about the analysis of urban scenes will be presented. The first topic is about how we combine geometric (planar surfaces) and photometric a priori for

segmenting the scenes in different planar patches. The second aspect presented will concern the matching of 2D images and 3D models for object recognition in urban scenes.

Biodata:

Sylvie Chambon received her Ph.D. in Computer Science from the University of Toulouse, France, in 2005. The thesis was about correlation-based methods in the context of binocular stereo matching. Her main contributions deal with colour-based correlation and the problem due to occlusions.

From 2006 to 2007, she was a postdoctoral researcher at Telecom Paris, France. The objective was to propose a reliable localisation and a precise tracking of pulmonary tumours in order to refine radiotherapy treatment.

From 2007 to 2011, she has been a permanent researcher at IFSTTAR (French Research Laboratory in Civil Engineering), Nantes, France. Her research concerned the automatic detection of defaults, and particularly, cracks, in road images. The main proposed methods are based on segmentation by markovian modelling, and points of interest detection introduced in geodesic contours.

Since September 2011, she is an assistant professor at INPT (Institut National Polytechnique de Toulouse) and a member of the IRIT (Research laboratory in the field on computer sciences). In particular, she works in the VORTEX team (Visual Objets from Reality To EXpression). Her research interests still concern matching in stereo-vision, segmentation for various applications in the field of roads and bridges, but also in the field of urban scenes.