THE HONG KONG POLYTECHNIC UNIVERSITY
香港理工大學

DEPARTMENT OF LAND SURVEYING AND GEO-INFORMATICS
土地測量及地理資訊學系

LSGI Distinguished Lecture Series

"3D Indoor Models based on Sparse Data for Smart Cities"

Overview

It was our pleasure to invite Prof. Dr. Lutz Plümer, Dean of the Faculty of Geosciences and Environmental Engineering, South West Jiaotang University, China, Professor Emeritus, University of Bonn, Germany, to deliver a seminar of the LSGI Distinguished Lecture Series on 6 Jun 2019.

Biography

Prof. Dr. Lutz Plümer is Dean of the Faculty of Geosciences and Environmental Engineering, South West Jiaotang University, China and Professor emeritus University of Bonn, Germany. Grant of the German Academic Scholarship Foundation, Germany's largest, oldest and most prestigious scholarship foundation (1984 – 1986). Grants of the German Research Foundation (Deutsche Forschungsgemeinschaft DFG) for several research projects between 1997 and 2018; Award of the International Society of Photogrammetry and Remote Sensing (ISPRS) for the best paper in the ISPRS Journal in the year 2012 (CityGML – Interoperable semantic 3D city models). Best Paper Award of the IEEE International Geoscience and Remote Sensing Symposium (IGARSS) 2015 (Landcover classification with self-taught learning on archetypal dictionaries)

3D Indoor Models based on Sparse Data for Smart Cities

Semantic 3D Building Models with a high level of Detail make a significant contribution to Smart Cities. Indoor Models build a bridge between city and landscape models such as CityGML and Builidng information model. Semantic reconstruction of the interior of building models however is time consuming and expensive. We present a novel approach which is based on sparse data and graphical models. Graphical models are probabilistic networks which have widely been used as means of deriving probabilistic hypotheses from noisy data. We adapt and general a special case, namely conditional linear Gaussian (CLG) networks, in order to derive 3D indoor Models from sparse data. We use as input only the floor plan of the building, and the area, the numbers and the type of use of the individual rooms and beyond that the position of the windows. Such data are widely available, and the presentation will show how it is possible to derive reasonable hypotheses with high accuracies and probabilities from such data. The point is that we exploit the regular structure of buildings and a priori knowledge, that is distributions of the essential model parameters such as width and depth of rooms. We use methods from the field of combinatorics, namely constraint propagation, and adjustment theory, namely Gauß Markov models, Kalman filters, mixed Gaussian distributions.