Yizhen Lao

Resumé

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Education

2016–2019 **Ph.D**, *Université Clermont Auvergne*, Clermont-Ferrand, .
in Electronic and System

2014–2016 **M. Sc**, *University of Twente*, Enschede, *79/100*.
in Geo-information Science and Earth Observation

2010–2014 **B.Eng**, *Wuhan University*, Wuhan, *84.1/100*.
in Spatial-Informatics and Digitalized Technology

Experience

2016–2019 **Doctorant**, *Institut Pascal, UMR 6602 Université Clermont Auvergne/CNRS*, Clermont-Ferrand.
Research topic: 3D SLAM with non-global acquisition cameras

Research interests

Computer vision
Machine learning

Publications

Title **A Robust Method for Strong Rolling Shutter Effects Correction Using Lines with Automatic Feature Selection**

Yizhen Lao, Omar Ait-Aider

IEEE Conference on Computer Vision and Pattern Recognition (**CVPR**), 2018

Abstract We present a robust method which enables to compensate RS distortions in a single image using a set of image curves, basing on the knowledge that they correspond to 3D straight lines. Unlike in existing work, no a priori knowledge about the line directions (e.g. Manhattan World assumption) is required. We first formulate a parametric equation for the projection of a 3D straight line viewed by a moving rolling shutter camera under a uniform motion model. Then we propose a method which efficiently estimate ego angular velocity separately from pose parameters, basing on at least 4 image curves. Moreover, we propose for the first time a RANSAC-like strategy to select image curves which really correspond to 3D straight lines and reject those corresponding to actual curves in 3D world. A comparative experimental study with both synthetic and real data from famous benchmarks shows that the proposed method outperforms all the approaching techniques from the state-of-the-art.

Title **Robustified SfM with Rolling-Shutter Camera Using Straightness Constraint**

Yizhen Lao, Omar Ait-Aider, Helder Araujo

Abstract We propose a 3-step method for structure and motion computation from two or more images taken by a one or multiple moving rolling shutter cameras. This work is motivated by the realization that existing reconstruction methods using rolling shutter images do not give satisfactory results or even fail in many configurations due to singularities and degenerate configurations. The first contribution consists in decoupling the rotate ego motion from the remaining parameters by adding a constraint on image curves basing on the a priori knowledge that they correspond to world 3D straight lines with unknown directions. Straight lines frequently appear in man-made environments such as urban or indoor scenes. After introducing the parameterization of a curve projected from a 3D straight line observed by a moving camera using three rolling shutter projection models, we show how to linearly extract angular velocity of each camera by using detected curves. Then we develop a linear method to recover the translational velocities and the motion between the cameras using point-matches, after compensating effects of angular velocity on each image. The second contribution consists in a novel point based bundle adjustment for rolling shutter cameras (C-RSBA) which does not consider a static row index during structure and motion optimization contrarily to existing methods. This enables to refine the parameters obtained thanks to the straightness constraint by avoiding degenerate configurations, thus outperforming existing RSBA methods. The approach was evaluated on both synthetic and real data.

Title **Topology Based Classification of Mobile Laser Scanning Data with Conditional Random Fields**

Yizhen Lao

Abstract Nowadays, with the development of laser scanning technologies and improved needs for automatic object recognition technologies in many practical applications such as 3d urban street mapping, modelling and road furniture management, more and more works have been done for exploring classification of mobile laser scanning data based on different algorithms, for instance, model matching and supervised learning. The main objective of this work is to design a robust framework for classification of Mobil Laser Scanning (MLS) data which can achieve a higher classification quality both in completeness and accuracy than previous methods by using topological information. The whole framework is focus on segment-based level. the results show that topological information indeed plays an important role in improving CRF model's performance while it does not in SVM model.

Title **The Spatial Analysis of Weibo Check-in Data——The Case Study of Wuhan**

Mingye Bao, Nanhai Yang, Liang Zhou, Yizhen Lao, Yun Zhang, Yangge Tian

Geo-Informatics in Resource Management and Sustainable (**GRMSE**), 2013

Abstract With the popularization and development of mobile phones, more and more people share their spatial locations on social network, to leave their footprints. However, Studies in the patterns of the check-in data and its relation to the existing space are not enough. Using the method of the spatial analysis of the data direction distribution and hierarchical analysis, we found that the check-in data has the close contact with the real space. It is of great value for us to deeply explore spatial characteristics and extend the usage of check-in data.

Title **Spatio-temporal analysis of weibo check-in data based on spatial data warehouse**

Liang Zhou, Mingye Bao, Nanhai Yang, Yizhen Lao, Yun Zhang, Yangge Tian

Geo-Informatics in Resource Management and Sustainable (**GRMSE**), 2013

Abstract With the increasing development of the application of location services, massive check-in data is produced by social media applications on the mobile appliances, which includes characteristics of spatio-temporal information, user-emotion information, and etc. Traditional analysis techniques cannot handle check-in data well because of the complexity of spatio-temporal information. Spatial data warehouse provided a good architecture for spatial data's storage and analysis. In this research, we designed a spatial data warehouse to store and manage the check-in data, used OLAP analysis technology to analyze it, and found many interesting results. It showed spatial data warehouse and OLAP provided a good frame to analyze check-in data.

Languages

Chinese	Native proficient
English	Professional working proficient
French	Basic

Programming skills

Languages	C++, Java, Python, Matalb, R
Libraries	OpenCV, PCL, Keras, Tensorflow