Cong Ma (马聪)

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Current address： Loughborough Drive, Merced, California, U.S.

Education

University of California, Merced, Merced, California, U.S. (2017 -- Present)
CSC Visiting scholar (Computer Vision), ending in Dec. 2018

Beijing Jiaotong University, Beijing (2013 -- Present)
Ph.D. Candidate (Information and Signal Processing), to graduate in Jul. 2019

Beijing Jiaotong University, Beijing (2009 -- 2013)
Bachelor (Biomedical Engineering)

Research Experiences

Study on Human Activity Prediction based on Hidden Information (2017.12 – Present)

Description: Research on long-term human activities in intelligent video surveillance and analysis, including object tracking, anomaly detection, activity recognition, and activity forecasting.

Contribution: I worked on anomaly detection in multiple object trajectories and proposed a trajectory distance metric based on recurrent autoencoders. Compared with other distance metrics, our method is sensitive to abnormal trajectory patterns. Anomaly detection based on the proposed method shows a higher detection rate and fewer false alarms. (ACCV 2018)

Research on Visual Attention Mechanism in Multi-Object Tracking (2015.1 -- 2017.7)

Description: Research on target initialization and maintenance in multi-object tracking and enhance target model based on visual attention mechanism.

Contribution: (1) For single object tracking, I proposed a saliency prior model based on visual saliency method and low-level features to improve the spatio-temporal context tracking model. Our method achieved lower central location errors while running at a real-time speed. (ICIP 2016, TMM 2017)
(2) For multiple object tracking, I proposed a new cost function for data association using a spatial constraint and a motion constraint based on optical flow vectors. Our method performed favorably in MOT Challenge 2015 with the lowest false alarm rate. (ACPR 2017)

Semantic Analysis and Information Integration for Networked Visual Media (2014.3 -- 2015.7)

Description: Research on the multi-level association, recognition, and tracking of moving targets in visual media, modeling visual information across multi-cameras under spatio-temporal constraints, and event analysis in multiple scenes.

Contribution: I participated in the part of person re-identification of this project. I proposed to improve the object appearance model with visual attention methods and thus achieve a better performance on re-identification. Experiments showed that the preprocessing based on saliency can improve the Rank-1 accuracy of person re-identification. (ICASSP 2016)

Publications

Detecting Anomalous Trajectories via Recurrent Neural Networks ACCV, 2018

- Trajectory anomaly detection
- Propose a trajectory distance metric based on recurrent autoencoders
- Anomaly detection shows a higher detection rate and fewer false alarms

Motion Vector Based Data Association for On-line Multi-Object Tracking ACPR, 2017

- On-line multi-object tracking
- Propose a cost function for data association using a new motion constraint
- Suppress false detections and lower the false alarm rate of tracking

A Saliency Prior Context Model for Real-Time Object Tracking TMM, 2017

- Real-time object tracking
- Model the prior distribution of target location based on spectral saliency feature
- Achieve a better balance between the tracking accuracy and speed

Saliency Prior Context Model for Visual Tracking ICIP, 2016

- Real-time object tracking
- Enhance the spatial model of tracking target based on visual attention mechanism
- Significantly reduce the tracking central location error

Saliency Preprocessing for Person Re-Identification Images ICASSP, 2016

- Person re-identification
- Improve the appearance model based on a saliency pre-processing step
- Achieve a higher Rank-1 accuracy for person re-identification

Saliency Weighted Spatial Pyramid Representation for Object Recognition ICWMMN, 2015

- Object recognition
- Incorporate saliency to the spatial pyramid model for a better feature

Skills

- Language: Python > C++ > C
- Platform: Linux, MacOS
- Toolbox: OpenCV, MATLAB, PyTorch

Honors & Awards

- The National Scholarship for Ph.D. students. (2017.10)
- The Excellent Prize of the National Graduate Contest on Smart-City Technology and Creative Design. (2014.08)