Lingyan Ran

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SUPERVISOR LABORATORY

Supervised by Prof. Yanning Zhang, Dean of the school of Computer Science and Technology
From Digital Video Processing Group, Shaanxi Provincial Key Laboratory of Speech & Image Information Processing

EDUCATION

Concentration: Computer Science and Technology
Visiting student, Stevens Institute of Technology(SIT), Hoboken, USA Sep. 2013 - Sep. 2015
Northwestern Polytechnical University(NPU), Xi'an, China
Ph.D candidate, school of Computer Science and Technology Sep. 2011 - Present
Bachelor, school of Computer Science and Technology Sep. 2010 - July 2011
Bachelor, Honors College Sep. 2007 - July 2010

HONORS & AWARDS

First Level Prize of Excellent Graduate Student of NPU 2011
First Level Prize of Excellent Graduate Paper for Bachelor Degree 2010
First Level Prize of Excellent Student of NPU 2007-2010
Outstanding Position Paper Award from the Model UN Conference, NPU 2008

ENGLISH PROFICIENCY

College English Test (CET) - Band 6

COMPUTER SKILLS

Programming Language: C/C++, Matlab, Lua, etc
Programming Tools: Microsoft Visual Studio, Matlab
Programming Library: OpenCV, Torch, MFC

PROFESSIONAL ACTIVITIES

Teaching Assistant for the Introduction to Audio, Speech & Langauge Processing Class 2012
Volunteer for the Sino-foreign-interchange Workshop on Intelligence Science and Intelligent Data Engineering (ISciDE) 2011
Volunteer for the Asia-Pacific Signal and Information Processing Association (APSIPA) 2011
Monitor of the NPU Honorable Model Class 2007-2010

RESEARCH INTERESTS

Computer Vision and Pattern Recognition
Deep Learning
Binary Feature Description
Multi-sensor Information Cooperative Processing
Camera Array Synthetic Aperture Imaging
Image Registration and Stitching

PUBLICATIONS

Lingyan Ran, Yanning Zhang, Wei Wei, and Qilin Zhang. *A Hyperspectral Image Classification Framework with Spatial Pixel Pair Features*, Sensors 2017, 17(10), 2421.

Lingyan Ran, Yanning Zhang, Qilin Zhang, Tao Yang. *Convolutional Neural Network-Based Robot Navigation Using Uncalibrated Spherical Images*, Sensors 2017, 17(6), 1341.

Lingyan Ran, Yanning Zhang, Tao Yang. *Autonomous Near Ground Quadrone Navigation with Uncalibrated Spherical Images Using Convolutional Neural Networks*, Proceedings of the 14th International Conference on Advances in Mobile Computing and Multimedia (MoMM), 2016.

Lingyan Ran, Yanning Zhang, Tao Yang, Peng Zhang. *Autonomous Wheeled Robot Navigation with Uncalibrated Spherical Images*, The 4th Chinese Conference on Intelligent Visual Surveillance (IVS), 2016.

Lingyan Ran, Yanning Zhang, Wei Wei, Tao Yang. *Bands Sensitive Convolutional Network for Hyperspectral Image Classification*, Inter. Conf. on Internet Multimedia Computing and Service, 2016.

Lingyan Ran, Yanning Zhang, Gang Hua, CANNET: Context Aware Nonlocal Convolutional Networks for Semantic Image Segmentation, International Conference on Image Processing (ICIP 2015), Quebec, Canada.

TaoYang, Jing Li, Jingyi Yu, Yanning Zhang, Wenguang Ma, Xiaomin Tong, Rui Yu, **Lingyan Ran**. Multiple-Layer Visibility Propagation-Based Synthetic Aperture Imaging through Occlusion. Sensors, 2015, 15, 18965-18984.

Tao Yang, Yanning Zhang, Jingyi Yu, Jing Li, Wenguang Ma, Xiaomin Tong, Rui Yu, **Lingyan Ran**. All-In-Focus Synthetic Aperture Imaging, ECCV 2014.

Tao Yang, Yanning Zhang, Rui Yu, Xiaoqiang Zhang, Ting Chen, **Lingyan Ran**, Zhengxi Song. Simultaneous camera array focus plane estimation and occluded moving object imaging. Image and Vision Computing, 2014

Tao Yang, Xiaoqiang Zhang, **Lingyan Ran**, Rui Yu, Runping Xi, *Camera Array SLynthetic Aperture Focusing and Fusion based Hidden Object Imaging,* Sino-foreign-interchange Workshop on Intelligence Science and Intelligent Data Engineering (ISciDE 2011), Xian, China.

RESEARCH EXPERIENCE

Invariant Feature Based Automatic Video Stitching in Wide Aerial Surveillance (Feb. 2012 - Sep. 2012), NPU

Project Description: Algorithms for aligning images and stitching them into seamless photo-mosaics are among the oldest and most widely used in computer vision. Image stitching algorithms create the highresolution photo-mosaics used to produce todays digital maps and satellite photos. They also come bundled with most digital cameras currently being sold, and can be used to create beautiful ultra wide-angle panoramas. Powerful methods such as autostich has been widely used. When it comes to handle the real-time video stitching problem that captured by a camera on a moving platform, those methods seems to perform too much computing. We expected to find an efficient solution for this particular task, using low cost approaches such as Minimum Spanning Tree (MST), etc to perform the relationships between video frames.

Experience:

- I presented a fast approach for real-time video sititching using the MST method,

its high efficiency was well accepted when dealing with the real-time moving platform video stitching problem.

Camera Array Synthetic Aperture Focusing and Fusion (Sep. 2011 - Jan. 2012), NPU

Project Description: Hidden object imaging is challenging problem in the fields of computer vision and image processing, and its a key step in many application fields, include intelligent video surveillance, visual tracking and scene understanding. Recently, the camera array synthetic aperture imaging has been proved to be a powerful technology for hidden object detection, and the state-of-art synthetic imaging method can focus on multiple parallel planes so as to achieve seeing hidden through severe occlusion. However, due to the depth variation of hidden objects surface, its difficult for existing methods to get a complete clear image. Our goal is to find a novel framework for high performance hidden object imaging in which we integrate the camera array synthetic aperture imaging technique with multi-resolution image fusion method together, and also developed a hidden object imaging system with AXIS network camera array.

Experience:

- Together we proposed a novel framework adopting several multiple scale image fusion methods to create high resolution and highly detailed images of occluded objects.

Real-time Vision-based Autonomous Unmanned Aerial Vehicles(UAV) Landing System (June, 2011 - Oct. 2011),NPU

Project Description: Vision-based autonomous navigation is one of the hot and difficult spots of current researches in computer vision. A vision system on board an UAV typically arguments a sensor suite that might include Global Positioning System, Inertial Navigation Sensors, laser range finders, a digital compass and sonar. The design of any real-time vision system is a daunting task: It involves a systematic integration of hardware, low level image processing, multi-view geometry and synthesis of real-time controllers. This project aims to solve the problem of vision-based autonomous landing of an UAV, particularly on the technology of ground-based autonomous landing system, without any other sensors or assistances. *Experience:*

- I accomplished part of the pre-processing system, including highly accurate calibration of camera intrinsic and extrinsic parameters in wide-area scene, detection localization and tracking of an onboard cooperative marker, etc.

Moving Object Trajectory Based Infrared and Color Videos Registration (Sep. 2010 - June , 2011), NPU

Project Description: Video surveillance has been widely used in many fields in recent years and moving target detection and tracking is an important part of it. Also tracking is the basis for further research on behavior recognition. The traditional target detection systems are limited by the sensors they use, so they cannot fulfill the demand in some long-term surveillance scenes. The visible and thermal based multi-sensor tracking system has been paid attention lately. This project focuses on the moving target detection and multi-target tracking algorithm and some other methods like shadow suppression and multi-source image fusion using visible and infrared spectrum videos.

Experience:

- I presented a method and a novel criterion to register infrared and color (visible) videos. It is a feature point-based method that uses top pixel coordinates found after foreground detection and tracking to build trajectories which are used to find the transformation matrix in both visible and infrared videos.

SELF-EVALUATION

Great team spirit
Independent technical researching ability
Full of enthusiasm in work
Great communication skills with colleagues and clients

REFEREES

[1] Yanning Zhang, Professor, Ph.D.
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[2] Gang Hua, Senior Research Manager, Ph.D.
Senior Research Manager, MSRA, Beijing, China
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Thanks for reading!