Nan **Xue**

PhD candidate in Computer Vision

(+86) 1867-2958-964 | xuenan@whu.edu.cn | cherubicxn.github.io | cherubicXN

Education

PhD Student — *Wuhan University*

Structure-from-Motion, Junction detection and Deep learning — *Wuhan, China*

Sep. 2016 - present

Master Student — *Wuhan University*

Structure-from-Motion, Multiview Geometry — *Wuhan, China*

Sep. 2014 - Jun. 2016

Research Intern — *Wuhan University*

Polar-SAR Image Denoising — *Wuhan, China*

Nov. 2013 - Aug. 2014

Bachelor of Science — *Wuhan University*

Computational Mathematics — *Wuhan, China*

Sep. 2010 - Jun. 2014

Research Experience

I was started my research since Nov. 2013 under the supervision of Prof. Gui-Song Xia and Liangpei Zhang. During the research intern period, we proposed a *complex tensor diffusion* method for PolSAR image denoising. After that, I started to study the *multiview geometry*, *structure-from-motion* and some multiview stereo knowledges. In this period, I developed a small SfM system to reconstruct 3D geometry and track camera poses from images taken by UAVs. When I studied the multiview geometry, I found that existing SfM systems heavily rely on the correspondences of key-points (e.g. SIFT, Harris-Affine, etc.), which is not appropriate in indoor scenes. Different from the key-points, the junctions are more salient in indoor scenes. Motivated by this, we started to develop an algorithm for matching junctions in *indoor scenes* and we proposed a new junction model ASJ (anisotropic scale junction) and its detection algorithm based on the *a-contrario* models. Benefiting from the affine-invariant property of the proposed ASJ, we developed a method to match ASJs and outperforms all other methods in indoor scenes.

Complex Tensor Diffusion for PolSAR Images

- Proposed a mathematical model from complex tensor diffusion.
- Applied the proposed model to PolSAR image denoising.

Structure-from-Motion System

- Implemented the basic algorithms for multiview-geometry.
- Developed an incremental SfM system which can reconstruct a sparse 3D model and camera poses from photo collections or video sequences.

Dense Reconstruction for Light-reflecting Scenes (Industry Project)

- Implemented a RGB-D SLAM system for reconstructing 3D geometry and tracking camera poses in real-time.
- Implemented a surface reconstruction system to estimate the surfaces from pointclouds.
- Deployed the RGB-D SLAM in Nvidia Jetson TX1 platform.

Anisotropic-scale Junction Detection and Matching for Indoor Scene

- Proposed a new junction model (ASJ) and an *a-contrario* model to detect ASJs.
- Developed an efficient scheme for making the correspondence of anisotropic-scale junctions.
- Outperforms the state-of-the-art in indoor image matching.

Panoroma stitching for Multiple fisheye camera system (Industry Project)

- Proposed an engineering method to estimate camera poses for extremely large FOV cameras.
- Developed a program to estimate the relative camera poses between 4 fisheye cameras.
- Stitching panoroma images from 4 fisheye cameras in real-time.

Honors & Awards

2016	**Second Prize (top 10%),** Scholarship for Graduate Students	*Wuhan University*
2015	**Second Prize (top 10%),** Scholarship for Graduate Students	*Wuhan University*
2014	**Scholarship for Excellent Freshman**	*Wuhan University*
2013	**Second Prize (top 10%),** RenMin Scholarship	*Wuhan University*
2012	**Meritorious Winner (top 9%),** The American Mathematical Contest in Modeling	*American Consortium for Math. and Its Appl.*
2009	**First Prize** National Olympiad in Informatics in Provinces	*China Computer Federation (CCF)*
2008	**Second Prize** National Olympiad in Informatics in Provinces	*China Computer Federation (CCF)*

Skills

Computer

- Good at C, C++, Matlab, Python and TeX.
- Familiar with Mathematic and Maple.
- Experienced in developing algorithms at Unix/Linux with CMake, Make.

Deep Learning

- Good at *TensorFlow*, *CaffeLibrary* and *pyTorch*

Mathematics

- Calculus and Analysis, Linear Algebra and Abstract Algebra, Probability and Statistics, Differential Equations, Differential Geometry, Multiview Geometry, Variational Calculus

Informatics

- Image Processing, Computer Vision, Scientific Computing, Data Structure, Machine Learning

Language

- Mandarin Chinese (mother tongue)
- English (Fluent)

Academic Publications

[1] Fudong Wang, **Nan Xue**, Yipeng Zhang, and Gui-Song Xia. Adaptively transporting graph matching. In *submitted to European Conference on Computer Vision*, 2018.

[2] **Nan Xue**, Gui-Song Xia, Xiang Bai, Liangpei Zhang, and Weiming Shen. Anisotropic-scale junction detection and matching for indoor images. *IEEE Transactions on Image Processing*, 27(1):78–91, 2017.

[3] Bowen Xu, **Nan Xue**, Gui-Song Xia, and Liangpei Zhang. Finding edges of buildings via a junction process in high-resolution remotely sensed images. In *IEEE International Geoscience and Remote Sensing Symposium (IGARSS)*, 2015.

[4] Gui-Song Xia, **Nan Xue**, Zifeng Wang, and Liangpei Zhang. Anisotropic diffusion on complex tensor fields for polsar image filtering. *Geomatics and Information Science of Wuhan Universit (in Chinese)*, 2015.

[5] **Nan Xue**, Gui-Song Xia, and Liangpei Zhang. Anisotropic diffusion on complex tensor fields for polsar image filtering. In *IEEE International Geoscience and Remote Sensing Symposium (IGARSS)*, 2014.

[6] Gang Liu, Gui-Song Xia, Wen Yang, and **Nan Xue**. Sar image segmentation via non-local active contours. In *IEEE International Geoscience and Remote Sensing Symposium (IGARSS)*, 2014.