Aoxiang Fan

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Research Interests

I am broadly interested in computer vision and geometry processing. Previously I have been focused on the matching problem in computer vision (related fields: image matching, graph matching. point cloud registration, shape matching, etc). Currently I am working on 3D deformable shape matching and 3D geometry learning with deep learning and optimization techniques.

Education

Wuhan University (WHU), Multi-Spectral Vision Processing Lab **2018-2021**
M.Sc. in Information and Communication Engineering, advised by Prof. ***Jiayi Ma*** *GPA:3.91/4.00*
Master Thesis (in Chinese): A Study of Robust Algorithms in Image Matching and Its Applications

Wuhan University (WHU), Electronic Information School **2014-2018**
B.Sc. in Electronic Information Science and Technology *GPA:3.50/4.00*

Publications

1. **Geometric Estimation via Robust Subspace Recovery**
Aoxiang Fan, *Xingyu Jiang, Yang Wang, Junjun Jiang, Jiayi Ma*
Proc. European Conference on Computer Vision (ECCV), published in 2020

2. **Image matching from handcrafted to deep features: A survey**
Jiayi Ma, Xingyu Jiang, ***Aoxiang Fan****, Junjun Jiang, Junchi Yan*
International Journal of Computer Vision (IJCV), published in 2021

3. **Smoothness-Driven Consensus Based on Compact Representation for Robust Feature Matching**
Aoxiang Fan, *Xingyu Jiang, Yong Ma, Xiaoguang Mei, Jiayi Ma*
IEEE Transactions on Neural Networks and Learning Systems (TNNLS),
under second-round review

4. **Efficient Deterministic Search with Robust Loss Functions for Geometric Model Fitting**
Aoxiang Fan, *Jiayi Ma, Xingyu Jiang, Haibin Ling*
IEEE Transactions on Pattern Analysis and Machine Intelligence (TPAMI),
under review after a Minor Revision Decision

Research Projects

Accurate Shape Matching with an Extrinsic Perspective
Supervised by Prof. ***Jiayi Ma*** *Paper in preparation*

- **Background:** Shape matching is a long-standing topic in computer vision and graphics, which aims to find one-to-one point correspondences between two natural shapes (such as human bodies).
- **Contribution:** This study is intended to develop an extrinsic method guided by intrinsic information to optimally align natural shapes.

Robust Point Matching via Smoothness-Driven Consensus
Supervised by Prof. ***Jiayi Ma*** *Paper in submission*

- **Background:** In many point matching problems, a smoothness constraint is required to regularize the potential function, conventionally tackled by the well known regularization theory.
- **Contribution:** In this project, we propose a novel method for multivariate regression and point matching, which exploits the sparsity structure of smooth functions to achieve high efficiency without sacrificing accuracy.

Deep robust and unsupervised depth estimation and visual odometry from monocular videos
Supervised by Dr. ***Ji Zhao*** *Ongoing*

- **Background:** The paradigm now for 3D geometry recovery from images has completely changed since dense and direct estimation is made possible by deep leaning techniques, even in an unsupervised manner.
- **Contribution:** In this research, we try to develop an outlier-resilient scheme for robust learning, to deal with the imperfect self-supervised signals in monocular videos (caused by illumination changes, moving objects, etc).

Research Internship

TuSimple-Autonomous Trucking Technology, Beijing
*Supervised by Dr. **Ji Zhao** and Dr. **Naiyan Wang*** *November 2020-March 2021*

- Improved the localization accuracy of the autonomous vehicle by developing an outlier-resilient method for landmark-based 2D-image to 3D-point-cloud alignment.

English Level

TOEFL score: 108

- **Reading: 29**
- **Listening: 28**
- **Speaking: 26**
- **Writing: 25**

Technical Strengths

- **Programming Skills:** Python, C/C++, MATLAB, LaTeX
- **Operating Systems:** Windows, Linux
- **Deep Learning Framework:** PyTorch

Awards

- **Second Prize Winner of the 17th China Post-Graduate Mathematical Contest in Modeling in 2020**
- **Recipient of National Encouragement Scholarship of China in 2017**