

Aoxiang Fan

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Research Interests

I am broadly interested in many topics of computer vision and graphics. 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

- Geometric Estimation via Robust Subspace Recovery**
Aoxiang Fan, Xingyu Jiang, Yang Wang, Junjun Jiang, Jiayi Ma
Proc. European Conference on Computer Vision (ECCV), 2020
- 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), 2021
- 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), 2021
- 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), 2021

Research Projects

Novel Morphing Model for Shape Matching and Registration from an Extrinsic Perspective Ongoing
Supervised by Prof. Jiayi Ma

- Background: Non-rigid shape matching and registration is a long-standing topic in computer vision and graphics, which aims to find one-to-one point correspondences between two natural shapes (typically human bodies).
- Expected Contribution: This ongoing study is intended to investigate a better morphing model to develop a potentially more accurate method for shape matching and registration.

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

- *Background:* The paradigm now for 3D geometry recovery from images has completely changed since dense and direct estimation is made possible by deep learning techniques, even in an unsupervised manner.
- *Expected 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).

Deep Learning of Feature Matching in the Perspective of Graph Matching

Supervised by Prof. Jiayi Ma

Prospective

- *Background:* In the field of image feature matching, the emergence of the SuperGlue method which uses a trained network in place of plain nearest neighbor matching, has significantly improved the capacity of many practical applications and encouraged a number of new works.
- *Expected Contribution:* Since the network of SuperGlue essentially condenses a linear assignment problem in its matching process, in this research, we intend to incorporate the graph matching (quadratic assignment) perspective to design a novel network for the task of image feature matching.

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

GRE score: 326 + 4.0

- Verbal Reasoning: 158
- Quantitative Reasoning: 168
- Analytical Writing: 4.0

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