

Dr. Changjiang Cai

Ph.D. of Computer Science – Stevens Institute of Technology

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About

I obtained my Ph.D. degree of Computer Science from *Stevens Institute of Technology*. My research interests focus on stereo matching, depth estimation, and 3D reconstruction, in addition to human pose estimation and semantic segmentation. Being excited about leveraging my knowledge in *Computer Vision* and *Machine Learning* to solve challenging problems in research and product development, I am going to serve as a senior research engineer in 3D computer vision at *InnoPeak Technology, Inc* after June 1, 2021.

Education

- **Stevens Institute of Technology** **Hoboken, New Jersey, USA**
Doctor of Philosophy in Computer Science, in May 2021
Research Interests: Computer Vision and Machine Learning. Specifically, Stereo Vision, Depth Prediction, 3D reconstruction and Human Mesh Recovery.
Advisor: Philippos Mordohai (<https://mordohai.github.io>)
- **Stevens Institute of Technology** **Hoboken, New Jersey, USA**
Master of Engineering in Electrical Engineering, in February 2016
Concentration: Computer Vision and Machine Learning.
Advisor: Gang Hua (<http://www.ganghua.org>)
- **Xi'an Jiaotong University** **Xi'an, Shaanxi, China**
Mechanical Engineering
Research Area: Digital Image Processing. **Advisor:** Dehong Yu
- **Northwestern Polytechnical University** **Xi'an, Shaanxi, China**
B.E. in Automobile Engineering, in July 2009
Thesis: Structural Design and 3D Modeling of an Assistive Robot. **Advisor:** Renping Shao

Publications

Published.....

- **Changjiang Cai**, Philippos Mordohai. *Do End-to-end Stereo Algorithms Under-utilize Information?* In International Conference on 3D Vision (3DV), 2020.
- **Changjiang Cai**, Matteo Poggi, Stefano Mattocchia, and Philippos Mordohai, *Matching-space Stereo Networks for Cross-domain Generalization*. In International Conference on 3D Vision (3DV), 2020.

- Konstantinos Batsos, **Changjiang Cai**, Philippos Mordohai. *CBMV: A coalesced bidirectional matching volume for disparity estimation*. In CVPR 2018, Salt Lake City, Utah, June 2018.
- **Changjiang Cai**, Haipei Sun, Boxiang Dong, Bo Zhang, Ting Wang, Hui Wang. *Pairwise Ranking Aggregation by Non-interactive Crowdsourcing with Budget Constraints*. The 37th IEEE International Conference on Distributed Computing (ICDCS), June, 2017, Atlanta, GA.
- Haoxiang Li, Mohammed Kutbi, Xin Li, **Changjiang Cai**, Philippos Mordohai, Gang Hua, *An Egocentric Computer Vision based Co-Robot Wheelchair*. IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS), 2016.

Preprints/Submissions.....

- Ren Li, **Changjiang Cai**, Georgios Georgakis, Srikrishna Karanam, Terrence Chen, Ziyang Wu. *Towards Robust RGB-D Human Mesh Recovery*. arXiv:1911.07383.

Research Projects

- **[Ongoing]** *Consistent Dense Depth Estimation from Multi-view Stereo or Monocular Videos*
 - Reconstructing geometrically consistent depth for dense pixels in multi-view stereo images or a monocular video via leveraging structure-from-motion to establish geometric constraints among common pixels shared by many views.
- **[Ongoing]** *GCN based Local Expansion for End-to-end MRF Energy Optimization*
 - Integrating local α -expansion to GCN for end-to-end solution of MRF energy optimization (e.g., in stereo matching, semantic segmentation and optical flow estimation).
- **2020 Project** *Self-/Un-supervised Robust Presentation Learning*
 - Self- or un-supervised learning for a robust representation which aims to improve semantic segmentation, optical flow estimation and monocular or stereo depth estimation.
- **2020 Project** *Do End-to-end Stereo Algorithms Under-utilize Information?*
 - Incorporated content-adaptive deep filtering techniques into SOTA networks (including DispNetC, GCNet, PSMNet, and GANet) for improved stereo matching.
- **2019 Project** *Matching-space Stereo Networks for Cross-domain Generalization*
 - Proposed a novel family of architectures with domain-invariant generalization.
- **2019 Project** *Depth-Aware Human Mesh Recovery*
 - Proposed a new method using RGB-D data to estimate a parametric human mesh model
- **2018 Project** *CBMV_ ROB Entry in the Robust Vision Challenge, CVPR'18 workshop*
 - Submitted the CBMV_ROB entry in the stereo challenge, leveraging CBMV volume as in our previous work and local expansion algorithm for optimization.
- **2017 Project** *CBMV: A Coalesced Bidirectional Matching Volume for Disparity Estimation*
 - Generated a matching volume by coalescing diverse evidence from a bidirectional matching process via random forest classifiers.
- **2016 Project** **Crowdsourcing:** *Budget-conscious Ranking by Non-interactive Crowdsourcing*
 - Designed a crowdsourced ranking algorithm enabling task requester to obtain a good full ranking result from the crowdsourced pairwise comparison, with a limited budget.
- **2015 Project** **Epitome Transform Coding:** *Towards Joint Compression of Images*
 - Proposed epitome transform coding, an approach to joint compression of a set of images.

Internship Experience

- **Part-time intern** **Futurewei Technologies, Inc. Seattle, WA**
Research Intern *Sep 2020 – Dec 2020*
- **Summer intern** **Futurewei Technologies, Inc. Seattle, WA**
Research Intern *May 2020 – Aug 2020*
- **Summer intern** **UII America, Cambridge, MA**
Research Intern *May 2019 – Aug 2019*

Teaching Experience

- **CS442 - Database Management Systems** **Stevens Institute of Technology**
Teaching Assistant *Aug 2016 – Dec 2016*

Skills

- **Programming Languages:** Python, C/C++, CUDA, Python& C++ Hybrid, MATLAB
- **Deep Learning:** PyTorch, TensorFlow, Keras, Caffe
- **Machine Learning:** Numpy, Scikit-learn, Scipy, Pandas
- **Computer Vision and 3D Geometry:** OpenCV, PyTorch Geometric, TensorFlow Graphics
- **Other Library & APIs:** Matplotlib, Cython, Boost C++
- **Database:** MySQL, PostgreSQL
- **Tools:** Vim, Git, CMake, Bash, Tmux, Visual Studio Code, MeshLab, Office, Latex
- **OS Platforms:** Linux, macOS, Windows

Languages

- Chinese (native), English (proficient)

Hobbies

- Playing Basketball, Running and Biking
- Driving and Road Trip