Changjiang Cai

Ph.D. Candidate – Department of Computer Science
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About

Being excited about leveraging my knowledge in *Computer Vision* and *Machine Learning* to solve practical and challenging problems in production oriented research and development, I am actively seeking a full-time applied scientist or research engineer role in the area of computer vision. My research interests focus on stereo matching, depth prediction, and 3D reconstruction, in addition to in-depth research experience in semantic segmentation, human pose estimation, and self-supervised and/or unsupervised representation learning.

Education

- **Stevens Institute of Technology** **Hoboken, New Jersey, USA**
  Doctor of Philosophy in Computer Science, anticipated in June 2021
  Research Interests: Computer Vision and Machine Learning. Specifically, Stereo Matching, Semantic Segmentation and Human Pose Estimation.
  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 Mattoccia, 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, Ziyan Wu. *Towards Robust RGB-D Human Mesh Recovery.* arXiv:1911.07383.

Research Projects

- **[Ongoing]** *GNN based Local Expansion for End-to-end MRF Energy Optimization*
  - Integrating local α-expansion to GNN for end-to-end solution of MRF energy optimization (e.g., in stereo matching, semantic segmentation and optical flow estimation).
- **[Ongoing]** *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 **C**oalesced **B**idirectional **M**atching **V**olume 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.

Intern 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

- **Deep Learning:** PyTorch, TensorFlow, Keras, Caffe, CUDA
- **Programming Languages:** Python, C/C++, Python& C++ Hybrid, Matlab
- **Library & APIs:** OpenCV, Numpy, Scikit-learn, Cython, Boost C++
- **Database:** MySQL, PostgreSQL
- **Tools:** Vim, Git, CMake, Bash, Tmux, Visual Studio Code
- **OS Platforms:** Linux, macOS, Windows

Languages

- Chinese (native), English (proficient)

Hobbies

- Playing Basketball, Running and Biking
- Driving and Road Trip
- Playing Guitar for singing but often noise