Boyu Liu

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GitHub: https://github.com/bliuag Homepage: https://bliuag.github.io

EDUCATION

Carnegie Mellon University **2018-present**
M.S. in Machine Learning

The Hong Kong University of Science and Technology **2014-2018**
B.S., double major in Computer Science & Mathematics | GPA: 4.164/ 4.3 | Major GPA: 4.260/4.3

Cornell University **Spring 2017**
Undergraduate Exchange Program | GPA: 4.069

Stanford University **Summer 2016**
International Honor Program (summer) | *Certificate of Intensive Study in Computer Science*

AREAS OF INTEREST

- Machine Learning
- Computer Vision

RESEARCH PROJECTS

Object tracking with Neighborhood-Component-Analysis (CV, Deep Learning) **Summer 2018**
Research Intern (with Zhirong Wu and Jifeng Dai in Microsoft Research Asia)
- Based on Siamese network for tracking, integrated background information by using neighborhood-component-analysis (NCA). NCA has a well-defined probability description of the object being the target, and provides a natural way for online updating.
- We have made a huge improvement comparing to the baseline, and expect 15% performance boost over Siamese-FC and achieves state-of-the-art. This work is still under progress and preparation for CVPR2019.

Semantic Segmentation (CV, Deep Learning) **Winter 2017**
R&D Intern (under supervision of Professor Yu-Wing Tai, Tencent Youtu Lab)
- I was in charge of projects by applying semantic segmentation to segment humans and identifying skylines, using deep learning with small networks. The models have been integrated to internal libraries.

Memory Augmented Tracking (CV, Deep Learning) **Summer & Fall 2017**
Research Assistant (under supervision of Professor Chi-Keung Tang and Yu-Wing Tai, Hong Kong University of Science and Technology)
- Inspired by Neural Turing Machine, built a system to conduct visual object tracking using deep neural network augmented with an external memory module, which was a one-shot learning method that did not need back-propagation to refine network during tracking.
- Performed better than state-of-the-art trackers in cases like occlusion, large-scale shape change, confusing backgrounds. Achieved good results in VOT2016 benchmark.

3D Face Reconstruction (CV, Deep Learning) **Summer 2017**
Research Intern (intern in SenseTime Group Limited)
- Used VGG and LSTM to reconstruct a pose-invariant, expression-invariant identity 3D face from a set of 2D photos of an individual. On-going project with a two-stage coarse-to-fine structure.
- The results using LSTM showed great improvement than just using single photo for reconstruction. Results were better than state-of-the-art in synthetic data, producing identifiable 3D face with details from real photos.

Sentiment Lexicon Induction (Machine Learning, NLP) **Spring 2017**
Research Assistant (under supervision of Professor Claire Cardie, Cornell University)
- Used semi-supervised learning to generate Sentiment Lexicon for certain domains of Chinese corpus.
- Made use of commonly used features such as word embedding, as well as unique features for Chinese like character-level and radical-level similarity between Chinese words.
- Implemented and analyzed the unsupervised learning method and features.

Sentiment and Market Prediction (Deep Learning, NLP) **Fall 2016**
Research Assistant (Undergraduate Research Opportunity Program, under supervision of Professor Qiang Yang, Hong Kong University of Science and Technology)
- Implemented a News Sentiment Analysis System on Chinese News with Convolutional Neural Network as a Deep Learning method, and used the system to predict the Stock market.
- Achieved a prediction Accuracy of 57+% on the testing stock market data.

PUBLICATIONS

MAVOT: Memory-Augmented Video Object Tracking

- Arxiv: https://arxiv.org/abs/1711.09414
- Project page: https://bliuag.github.io/MAVOT-Project-Page/

OTHER PROJECTS & IMPLEMENTATIONS

Computer Vision Related Projects(GitHub) (CV)

- Intelligent Scissors: An image processing tool like Photoshop Magnetic Lasso. (SIGGRAPH 95')
- Face Detection: Used HoG and SVM to detect faces with different sizes. (CVPR 05')
- Single-View Metrology: Reconstructed a 3D model from single image, with user guidance in GUI. (ICCV 99')
- Dense Photometric Stereo: Reconstructed 3D model from 2D pictures of different view. (CVPR 05')

CodeIT Competition– A system for Automation Stock Operation (GitHub) (Software)

- First Place in CodeIT Competition, for great result and architecture. Awarded by Credit Suisse.
- Collaborated with four students to develop a system for arbitrage within 24 hours, with an efficient architecture using parallel process and task distribution. Used NodeJS for back-end, AngularJS for front-end, and Firebase for database.

Software Engineering – Team Forming (Web and IOS) (Software)

- Leader in a group of 8 students. Built a platform for team forming in Web and IOS. Implemented with AngularJS, Firebase and Ionic, tested with Unit Testing.

COMPETITIONS

- First Place in CodeIT Suisse Coding Challenge *(held by Credit Suisse)* **2016**
- ACM-ICPC Regional Contest Shanghai Station Bronze Award **2015**
- ACM-ICPC Regional Contest Taiwan Station Ninth Place **2015**

HONORS and AWARDS

- First Class Honor *(HKUST)* **2018**
- Dean's List *(HKUST)* **2014-2018**
- Cheung On Tak Charity Foundation Scholarship **2014-2018**
- Full Recruitment Scholarship *(less than ten awardees)* **2014-2018**
- China Merchants Scholarship **2017**
- HKSAR Government Scholarship Fund - Reaching Out Award **2016**
- HKSAR Government Scholarship Fund - Talent Development Scholarship **2016**

WORK EXPERIENCE and ACTIVITIES

- Research internship (*computer vision and deep learning*) in Microsoft Research Asia **Summer 2018**
- R&D internship (*computer vision and deep learning*) in Tencent Youtu Lab **Winter 2017**
- Research internship (*computer vision and deep learning*) in SenseTime Group Limited **Summer 2017**
- Vice President of Microsoft Student Club, HKUST Chapter **Fall 2016**
- Teaching helper for Computer Science courses **Spring 2016**
- Executive Committee in China Entrepreneur Network, HKUST Chapter **2015**

SKILLS

- **Language:** C++ (GUI and OpenGL) | Java (including Android) | Python | MATLAB
- **Algorithm and Data Structure:** participated in ACM-ICPC contests | Common algorithms and data structures
- **Machine Learning:** Traditional methods (SVM, KNN, Decision-tree) | Theoretical ML knowledge
- **Deep Learning:** CNN | RNN, LSTM | NTM | GAN | Framework: Caffe, TensorFlow, Pytorch
- **Selected Course:** Computer Vision (graduate-level) | Machine Learning (Cornell) | Advanced Artificial Intelligence (graduate-level) | Computer Graphics (Stanford) | Image Processing | Honor Design and Analysis of Algorithms | Operating System | Honors Software Engineering | Linear Algebra | Probability and Random Process