Boyu Liu

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EDUCATION

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

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

AREAS OF INTEREST

- Machine Learning
- Computer Vision
- Artificial Intelligence
- Natural Language Processing

RESEARCH EXPERIENCE

Memory Augmented Tracking (CV, Deep Learning) **Summer & Fall 2017**
Researcher (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.
- Paper was submitted to CVPR2018.

3D Face Reconstruction (CV, Deep Learning) **Summer 2017**
Researcher (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 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**
Researcher (under supervision of Professor Claire Cardie, Cornell University)
- Used semi-supervised learning method to generate a Sentiment Lexicon for a certain domain of corpus in Chinese.
- 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. Paper in progress.

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 Stock market. Implementing next steps: adding channels and features to improve the accuracy.

PUBLICATIONS

MAVOT: Memory-Augmented Video Object Tracking
- Submitted to CVPR2018 (first author)
- Arxiv: https://arxiv.org/abs/1711.09414
- Project page: https://bliuag.github.io/MAVOT-Project-Page/

A Semi-supervised Approach for Chinese Sentiment Lexicon Induction
- in progress

SELECTED PROJECTS

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')

A Christmas Ball (YouTube) (Graphics)
- Used Skybox, Fresnel Reflection, Chromatic Aberration in OpenGL to simulate snowflakes in Christmas Ball in different patterns with a background environment.

Ultimate Tic-Tac-Toe (GitHub) (Game AI)
- Built a game AI for the game Ultimate Tic-Tac-Toe.
- Made an experimental analysis on performance of different AI algorithms.

Winograd Schema Challenge (GitHub) (AI)
- Winograd Schema Challenge is a substitution of Turing Testing, solving pronoun ambiguity with common knowledge.
- Constructed a system for solving pronoun ambiguity by a combination of Natural Language Parser, Narrative Chain and Search Engine.

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

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

WORK EXPERIENCE and ACTIVITIES

- Research internship (*computer vision and deep learning*) in Tencent Youtu **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) | JavaScript (AngularJS, FireBase, Ionic) | Python | MATLAB
- **Algorithm and Data Structure:** participated in ACM-ICPC contests | Familiar with 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
- **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