Yunfan Liu

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EDUCATION

University of Michigan Ann Arbor, MI
M. S., Electrical Engineering: Systems **GPA: 3.80/4.00** April 2017
Coursework: Computer Vision, Statistical Machine Learning, Random Process, Robot Modeling and Control

Tsinghua University Beijing, China
B. Eng., Electronic Information Science and Technology **GPA: 3.60/4.00** August 2015
Dissertation: *Vision based Micro Facial Expression Analysis* Prof. Jiansheng Chen(Advisor), Prof. Weibei Do (Chair)
Coursework: Data structure and Algorithm, Linear Algebra, Auditory-visual System, Image Processing

The University of Hong Kong Hong Kong
Exchange Semester, Electronic Engineering **GPA: 3.83/4.00** January 2014 – June 2014
Coursework: Computer Networks, Digital Signal Processing

RESEARCH EXPERIENCE

Vision & Learning Lab University of Michigan, Ann Arbor, MI
Learning to Detect Human-Object Interactions January 2016 – Current
Research Advisor: Prof. Jia Deng

- Implemented a multi-streamed deep neural network using Python and Torch to detect and recognize human-object interactions (HOI) in static images and achieved state-of-the-art performance
- Developed an input channel characterizing spatial relations between human and objects to manage spatial configuration variation of input data and boosted the mean average precision of HOI classification by 26.50%
- Conducted experiments to setup baseline evaluation for the Extended Human Interacting with Common Objects (HICO-DET) database as a reference for further research on this dataset

Video Analysis of Surgical Skill and Technique May 2016 – September 2016
Research Advisor: Prof. Khurshid Ghani, Prof Jia Deng

- Established objective and scalable criteria for technical skill assessment of robotic surgery by introducing computer vision and machine learning method
- Initiated a surgical tool analysis system to detect and track operation instrument movement, and proposed an evaluation mechanism to evaluate the surgeon's technical skill using this instrument
- Collected annotation data for surgery videos by setting up tasks on Amazon Mechanical Turk and proposed a quality control strategy to guarantee accurate data acquisition

Institute of Information Cognition and Intelligent System Tsinghua University, Beijing, China
Vision based Micro Facial Expression Analysis September 2014 – May 2015
Research Advisor: Prof. Jiansheng Chen

- Researched and resolved the problem of micro facial expression detection, classification, and enhancement under relative large and unrestricted head movement condition
- Derived an algorithm to decompose the integrated movement by in-plane, out-plane head movement and micro facial expression using Robust PCA and Optical Flow method for classification and enhancement
- Designed and conducted experiments using ideas borrowed from psychological literature to collect raw video data with high frame rate to capture subtle facial movement, and established a dataset with annotations

Facial Expression Recognition using Machine Learning Method March 2013 – December 2013

Research Advisor: Prof. Jiansheng Chen

- Performed stacked Sparse Autoencoder (stacked SAE) as well as Optical Flow method using Matlab with 91.3% classification accuracy fitting Extended Cohn-Kanade dataset in the final model
- Extended the functionally of stacked SAE to facial expression manipulation, including transformation and purification, by taking advantage of the feature extraction and input reconstruction capability of stacked SAE

Carl E. Ravin Advanced Imaging Laboratories Duke University, Durham, NC

Semi-automatic Brain Tumor MRI image Segmentation July 2014 – September 2014

Research Advisor: Prof. Maciej Mazurowski

- Optimized an existing automatic MRI image segmentation algorithm by incorporating users' input, such as mouse clicks and strokes, to help resolve ambiguous segmentation decisions
- Applied classical automatic and interactive image segmentation algorithms to MRI image segmentation problem and compared the results in order to conclude the most efficient approach to utilize users' input
- Assisted Department of Radiology faculties on inter-disciplinary issues to acquire insight on Brain Tumor MRI imaging and analysis from medical perspective to help extract representative features

PUBLICATIONS

Y. Liu, X. Hou, J. Chen, C. Yang, G. Su and W. Dou, "Facial Expression Recognition and Generation using Sparse Autoencoder", *Smart Computing (SMARTCOMP), 2014 International Conference on*, Hong Kong, 2014, pp. 125-130. November 2014

K.R. Ghani, **Y. Liu**, H. Law, D. He, D.C. Miller, J. Montie, J. Deng, "Video Analysis of Skill and Technique (VAST): Machine Learning to Assess the Technical Skill of Surgeons Performing Robotic Prostatectomy" (AUA 2017) November 2016

Yu-Wei Chao, **Yunfan Liu**, Xieyang Liu, Jia Deng, "Learning to Detect Human-Object Interactions". (arXiv: 1702.05448) November 2016

PRESENTATIONS

Oral:

"Facial Expression Recognition and Generation using Sparse Autoencoder", *Smart Computing (SMARTCOMP), 2014 International Conference on*, Hong Kong November 2014

Poster:

"Deep Learning based Facial Expression Recognition and Reconstruction", *"Challenge Cup" Academic Design Expo*, Tsinghua University, Beijing, China April 2014

HONORS AND AWARDS

- Graduate Student Research Assistantship, University of Michigan, Ann Arbor, Michigan June 2016
- 3rd Prize, 32nd "Challenge Cup" Academic Competition, Tsinghua University, Beijing, China May 2014
- Winner, National Training Programs of Innovation for Undergraduates, Beijing, China March 2013
- Academic Progress Scholarship, Tsinghua University, Beijing, China October 2012

TECHNICAL SKILLS

- Programming languages: C, C++, Matlab, Python, HTML/JavaScript, MySQL, Verilog, Assembly language
- Specialty related to research work: Caffe, Torch, Theano, Git, Bash script
- Other: Latex, Markdown, Linux OS, Processing

LANGUAGES

- Chinese (Mandarin): native speaker
- English: fluent
  - TOFEL iBT: 114 (Reading 29 + Listening 30 + Speaking 28 + Writing 27)
  - GRE General: 331 + 3.5 (V: 161/88% | Q: 170/97% | AW: 3.5/42%)

PERSONAL WEBSITE

- https://yunfan0621.github.io/

REFERENCES

Jia Deng, Assistant Professor
Computer Science and Engineering
University of Michigan – Ann Arbor
(734) 764–8517, jiadeng@umich.edu

Khurshid R. Ghani, Assistant Professor
Department of Urology
University of Michigan – Ann Arbor, Health System
(734) 936-7030, kghani@med.umich.edu

Maciej, Mazurowski, Assistant Professor
Department of Electrical and Computer Engineering, Radiology
Duke University
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