

Pooya Khorrami

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Education

University of Illinois at Urbana Champaign

PhD Electrical and Computer Engineering

Advisor: Thomas S. Huang

Thesis Title: How Deep Learning Can Help Emotion Recognition

Urbana, IL

Jan. 2014–May 2017

University of Illinois at Urbana Champaign

MS Electrical and Computer Engineering

Advisor: Thomas S. Huang

Urbana, IL

Aug. 2011–Dec. 2013

Carnegie Mellon University

BS Electrical and Computer Engineering

Minor: Business Administration

Pittsburgh, PA

Aug. 2007– May 2011

Industry Experience

MIT Lincoln Laboratory

Technical Staff (Group 52)

- Trained deep convolutional neural networks (CNNs) to do kinship recognition on the Recognizing Families in the Wild (RFIW) dataset
- Developed software to visualize parts of the face that correspond with kinship given a pair of images
- Helped collect and curate a dataset corpus to evaluate automatic machine learning systems
- Trained a CNN to do nuclei detection in electron microscopy images

Lexington, MA

Aug. 2017–Present

MIT Lincoln Laboratory

Summer Research Intern (Group 52)

- Implemented a system for video emotion recognition which would predict the arousal/valence score of a subject using a convolutional neural network (CNN)
- Wrote software to visualize the regions of the face that excited specific neurons in the CNN

Lexington, MA

June 2015–Aug. 2015

MIT Lincoln Laboratory

Summer Research Intern (Group 52)

- Designed face recognition system that was initialized with unsupervised pre-training and subsequently fine-tuned on a smaller labeled dataset
- Improved existing algorithms used for object detection/recognition with a state-of-the-art convolutional neural network system and verified its performance

Lexington, MA

June 2014–Aug. 2014

GE Aviation Systems

EID Intern

- Worked on traceability of high-level requirements specified by Boeing to low-level GE generated requirements for 737-Flight Management System (FMS)

Grand Rapids, MI

June 2011–Aug. 2011

Technosciences Inc. (now McMurdo)

Student Intern

- Developed a Global Communicator that could function as a GPS tracker or a data transmitter when communicating across cellular networks
- Wrote Python scripts that controlled the Telit GSM Modem on the Global Communicator to send GPS coordinates or user specified data to a central server
- Implemented a multi-threaded server in Visual C#

Beltsville, MD

June 2009–Aug. 2009

Research Experience

University of Illinois

Graduate Research Assistant

Urbana, IL

Jan. 2012–May 2017

- **Video / Multi-modal Emotion Recognition:**
 - Trained a single frame CNN and a CNN+RNN network for dimensional emotion recognition (i.e predict arousal/valence score for a person) on the RECOLA dataset.
 - Combined CNN+RNN features with audio features from MIT Lincoln Laboratory and competed in the AV+EC 2016 competition
- **Visual Emotion Recognition:**
 - Trained a CNN to do emotion recognition on images using Theano
 - Showed both quantitatively and qualitatively that the features learned by the CNN corresponded with Facial Action Units (FAUs)
- **Unsupervised Deep Learning:**
 - Developed a deep deconvolutional auto-encoder with rectified linear units for unsupervised learning
 - The network was subsequently fine-tuned to do object recognition on the CIFAR10 and STL-10 datasets
- **Student Engagement Estimation:**
 - Constructed a system that uses face tracking software to estimate the position of a student's gaze on a computer screen
 - Subject would be considered disengaged if their gaze was outside the monitor dimensions for some time
- **Vehicle Detection/Tracking and Crash Prediction:**
 - Wrote MATLAB code to detect vehicles in busy intersections using Robust Principal Component Analysis and wavelet de-noising
 - Tracked the vehicles using Kalman filter and performed accident prediction and recognition
- **Wildlife Detection:**
 - Built a system in MATLAB that could detect animals from camera trap data using Robust Principal Component Analysis and Optical Flow

University of Illinois

ECE 110 Teaching Assistant

Urbana, IL

Aug. 2011–Dec. 2011

- Led a three hour weekly laboratory session
- Graded laboratory assignments and final design projects

Carnegie Mellon University

Undergraduate Research Assistant

Pittsburgh, PA

June 2010–Aug. 2010

- Developed MATLAB code to test the performance of a face recognition algorithm that matched low-resolution images to their high-resolution counterparts via linear mappings and eigenvalue decomposition

Publications

- [1] **Pooya Khorrami**, Kevin Brady, Mark Hernandez, Lars Gjestebj, Sara Nicole Burke, Damon Lamb, Matthew A. Melton, Kevin Otto, and Laura Brattain. Deep learning-based nuclei segmentation of cleared brain tissue. In *2019 IEEE High Performance Extreme Computing Conference (HPEC)*, 2019.
- [2] Richard Lippmann, Swaroop Vattam, **Pooya Khorrami**, and Cagri Dagli. A new data corpus to promote more complete autonomous machine learning pipelines. *2018 Neural Information Processing Systems Workshop (NeurIPSW)*, 2018.
- [3] Prajit Ramachandran, Tom Le Paine, **Pooya Khorrami**, Mohammad Babaeizadeh, Shiyu Chang, Yang Zhang, Mark A Hasegawa-Johnson, Roy H Campbell, and Thomas S Huang. Fast generation

- for convolutional autoregressive models. *2017 International Conference on Learning Representations (ICLRW)*, 2017.
- [4] Tom Le Paine, **Pooya Khorrami**, Shiyu Chang, Yang Zhang, Prajit Ramachandran, Mark A Hasegawa-Johnson, and Thomas S Huang. Fast wavenet generation algorithm. *arXiv preprint arXiv:1611.09482*, 2016.
- [5] Kevin Brady, Youngjune Gwon, **Pooya Khorrami**, Elizabeth Godoy, William Campbell, Charlie Dagli, and Thomas S Huang. Multi-modal audio, video and physiological sensor learning for continuous emotion prediction. In *Proceedings of the 6th International Workshop on Audio/Visual Emotion Challenge*, pages 97–104. ACM, 2016.
- [6] James R Williamson, Elizabeth Godoy, Miriam Cha, Adrienne Schwarzentruher, **Pooya Khorrami**, Youngjune Gwon, Hsiang-Tsung Kung, Charlie Dagli, and Thomas F Quatieri. Detecting depression using vocal, facial and semantic communication cues. In *Proceedings of the 6th International Workshop on Audio/Visual Emotion Challenge*, pages 11–18. ACM, 2016.
- [7] Vuong Le, **Pooya Khorrami**, Usman Tariq, Hao Tang, and Thomas Huang. *Face Processing and Applications to Distance Learning*. World Scientific, 2016.
- [8] Wei Han, **Pooya Khorrami**, Tom Le Paine, Prajit Ramachandran, Mohammad Babaeizadeh, Honghui Shi, Jianan Li, Shuicheng Yan, and Thomas S Huang. Seq-nms for video object detection. *arXiv preprint arXiv:1602.08465*, 2016.
- [9] **Pooya Khorrami**, Tom Le Paine, Kevin Brady, Charlie Dagli, and Thomas S Huang. How deep neural networks can improve emotion recognition on video data. In *2016 IEEE International Conference on Image Processing (ICIP)*, pages 619–623, 2016.
- [10] **Pooya Khorrami**, Tom Le Paine, and Thomas Huang. Do deep neural networks learn facial action units when doing expression recognition? In *Proceedings of the IEEE International Conference on Computer Vision Workshops (ICCVW)*, pages 19–27, 2015.
- [11] Tom Le Paine, **Pooya Khorrami**, Wei Han, and Thomas S Huang. An analysis of unsupervised pre-training in light of recent advances. *2015 International Conference on Learning Representations (ICLRW)*, 2015.
- [12] Kai-Hsiang Lin, **Pooya Khorrami**, Jiangping Wang, Mark Hasegawa-Johnson, and Thomas S Huang. Foreground object detection in highly dynamic scenes using saliency. In *2014 IEEE International Conference on Image Processing (ICIP)*, pages 1125–1129, 2014.
- [13] **Pooya Khorrami**, Vuong Le, John C Hart, and Thomas S Huang. A system for monitoring the engagement of remote online students using eye gaze estimation. In *2014 IEEE International Conference on Multimedia and Expo Workshops (ICMEW)*, pages 1–6, 2014.
- [14] Shiyu Chang, Wei Han, Xianming Liu, Ning Xu, **Pooya Khorrami**, and Thomas S. Huang. Multimedia classification. *Data Classification: Algorithms and Applications*, page 337, 2014.
- [15] Thomas S. Huang, Vuong Le, Thomas Paine, **Pooya Khorrami**, and Usman Tariq. Visual media: History and perspectives. *IEEE MultiMedia*, 21(2):4–10, 2014.
- [16] **Pooya Khorrami**, Jiangping Wang, and Thomas S. Huang. Multiple animal species detection using robust principal component analysis and large displacement optical flow. In *ICPR Workshop on Visual Observation and Analysis of Animal and Insect Behavior (VAIB)*, 2012.

Technical Skills

Programming Languages (Proficient): Python, MATLAB

Programming Languages (Familiar): C/C++, C#

Libraries: Tensorflow, Theano, Lasagne, Scikit-Learn, OpenCV, Caffe

Tools: git, vim, Visual Studio, LaTeX, MPLAB, CodeWarrior

Professional Activities

Program Committee Member:

- AAAI Conference on Artificial Intelligence (AAAI)
- IEEE Workshop on Analysis and Modeling of Faces and Gestures (AMFG)

Reviewer:

- ACM Multimedia RFIW Workshop (ACM MM RFIW)
- IEEE International Workshop on Faces in Multimedia (FacesMM)
- IEEE Winter Conference on Applications of Computer Vision (WACV)
- IEEE Symposium on Technologies for Homeland Security (HST)
- IEEE Transactions on Systems, Man, and Cybernetics: Systems (TSMCA)
- IEEE Transactions on Neural Networks and Learning Systems (TNNLS)
- IEEE Transactions on Multimedia (TMM)
- IEEE Transactions on Affective Computing (TAC)
- IEEE Signal Processing Letters (SPL)
- IEEE Access
- Elsevier Pattern Recognition
- Workshop on Bringing Semantic Knowledge into Vision and Text Understanding (IJCAI-TUSION)

Awards and Honors

- James Henderson Fellowship - 2012
- Andrew Carnegie Society Scholar - 2011
- Xerox Technical Minority Scholarship - 2009, 2010
- Carnegie Institute of Technology Dean's List - 2007-2012

Other Information

- U.S. Citizen