Pooya Khorrami

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Education

University of Illinois at Urbana Champaign — **Urbana, IL**
PhD Electrical and Computer Engineering — *Jan. 2014–May 2017*
Advisor: Thomas S. Huang
Thesis Title: How Deep Learning Can Help Emotion Recognition

University of Illinois at Urbana Champaign — **Urbana, IL**
MS Electrical and Computer Engineering — *Aug. 2011–Dec. 2013*
Advisor: Thomas S. Huang

Carnegie Mellon University — **Pittsburgh, PA**
BS Electrical and Computer Engineering — *Aug. 2007–May 2011*
Minor: Business Administration

Industry Experience

MIT Lincoln Laboratory — **Lexington, MA**
Technical Staff (Group 52) — *Aug. 2017–Present*
- 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

MIT Lincoln Laboratory — **Lexington, MA**
Summer Research Intern (Group 52) — *June 2015–Aug. 2015*
- 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

MIT Lincoln Laboratory — **Lexington, MA**
Summer Research Intern (Group 52) — *June 2014–Aug. 2014*
- 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

GE Aviation Systems — **Grand Rapids, MI**
EID Intern — *June 2011–Aug. 2011*
- Worked on traceability of high-level requirements specified by Boeing to low-level GE generated requirements for 737-Flight Management System (FMS)

Technosciences Inc. — **Beltsville, MD**
Student Intern — *June 2009–Aug. 2009*
- 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#

Research Experience

University of Illinois **Urbana, IL**
Graduate Research Assistant *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

Publications

[1] Danielle Sullivan-Pao, Nicole Tian, and **Pooya Khorrami**. Lorax: Lora expandable networks for continual synthetic image attribution. In *BMVC Workshop on Media Authenticity in the Age of Artificial Intelligence (MAAAI)*, 2024.

[2] Andrew Alini, Douglas E Sturim, Kevin Brady, and **Pooya Khorrami**. Parasite networks: Transfer learning in resource-constrained domains. In *NeurIPS 2024 Workshop on Fine-Tuning in Modern Machine Learning: Principles and Scalability*, 2024.

[3] Ileana Rugina, Rumen Dangovski, Mark Veillette, **Pooya Khorrami**, Brian Cheung, Olga Simek, and Marin Soljacic. Meta-learning and self-supervised pretraining for storm event imagery translation. In *2023 IEEE High Performance Extreme Computing Conference (HPEC)*, pages 1–9. IEEE, 2023.

[4] Megan Frisella, **Pooya Khorrami**, Jason Matterer, Kendra Kratkiewicz, and Pedro Torres-Carrasquillo. Quantifying bias in a face verification system. In *Computer Sciences & Mathematics Forum*, volume 3, page 6. MDPI, 2022.

[5] **Pooya Khorrami**, Olga Simek, Brian Cheung, Mark Veillette, Rumen Dangovski, Ileana Rugina, Marin Soljacic, and Pulkit Agrawal. Adapting deep learning models to new meteorological contexts using transfer learning. In *2021 IEEE International Conference on Big Data Workshops (Big Data)*, pages 4169–4177. IEEE, 2021.

[6] Ileana Rugina, Rumen Dangovski, Mark Veillette, **Pooya Khorrami**, Brian Cheung, Olga Simek,

and Marin Soljačić. Meta-learning and self-supervised pretraining for real world image translation. *arXiv preprint arXiv:2112.11929*, 2021.

[7] Kevin Brady, **Pooya Khorrami**, Lars Gjesteby, and Laura Brattain. Instance segmentation of neuronal nuclei leveraging domain adaptation. In *2021 IEEE High Performance Extreme Computing Conference (HPEC)*, 2021.

[8] **Pooya Khorrami**, Kevin Brady, Mark Hernandez, Lars Gjesteby, 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.

[9] 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.

[10] 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.

[11] 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.

[12] 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.

[13] James R Williamson, Elizabeth Godoy, Miriam Cha, Adrianne Schwarzentruber, **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.

[14] Vuong Le, **Pooya Khorrami**, Usman Tariq, Hao Tang, and Thomas Huang. *Face Processing and Applications to Distance Learning*. World Scientific, 2016.

[15] 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.

[16] **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.

[17] **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.

[18] 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.

[19] 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.

[20] **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.

[21] Shiyu Chang, Wei Han, Xianming Liu, Ning Xu, **Pooya Khorrami**, and Thomas S. Huang. Multimedia classification. *Data Classification: Algorithms and Applications*, page 337, 2014.

[22] Thomas S. Huang, Vuong Le, Thomas Paine, **Pooya Khorrami**, and Usman Tariq. Visual media: History and perspectives. *IEEE MultiMedia*, 21(2):4–10, 2014.

[23] **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: PyTorch, Tensorflow, Scikit-Learn, Pandas, OpenCV, Theano, Lasagne, Caffe

Professional Activities

Program Committee Member:

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

Reviewer:

- AAAI Artifical Intelligence for Cybersecurity Workshop (AICS)
- ACM Multimedia RFIW Workshop (ACM MM RFIW)
- Elsevier Pattern Recognition
- IEEE Access
- IEEE/CVF Conference on Computer Vision and Pattern Recognition (CVPR)
- IEEE Conference of the Engineering in Medicine and Biology Society (EMBC)
- IEEE Journal of Translational Engineering in Health and Medicine (JTEHM)
- IEEE Symposium on Technologies for Homeland Security (HST)
- IEEE Transactions on Systems, Man, and Cybernetics: Systems (TSMCA)
- IEEE Transactions on Knowledge and Data Engineering (TKDE)
- IEEE Transactions on Neural Networks and Learning Systems (TNNLS)
- IEEE Transactions on Multimedia (TMM)
- IEEE Transactions on Image Processing (TIP)
- IEEE Transactions on Affective Computing (TAC)
- IEEE Signal Processing Letters (SPL)
- IEEE Winter Conference on Applications of Computer Vision (WACV)
- IEEE International Conference on Multimedia and Expo - FacesMM Workshop (ICMEW FacesMM)
- 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