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]   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.

[2]   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.

[3]   **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.

[4]   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.

[5]   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.

[6] 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.

[7] 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.

[8] 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.

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

[10] 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.

[11] **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.

[12] **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.

[13] 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.

[14] 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.

[15] **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.

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

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

[18] **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, PyTorch, Scikit-Learn, Pandas, OpenCV, Theano, Lasagne, Caffe

Professional Activities

Program Committee Member:
o AAAI Conference on Artificial Intelligence (AAAI)

o International Joint Conference on Artificial Intelligence (IJCAI)

o IEEE Workshop on Analysis and Modeling of Faces and Gestures (AMFG)

Reviewer:
o ACM Multimedia RFIW Workshop (ACM MM RFIW)

o Elsevier Pattern Recognition

o IEEE Access

o IEEE Journal of Translational Engineering in Health and Medicine (JTEHM)

o IEEE Symposium on Technologies for Homeland Security (HST)

o IEEE Transactions on Systems, Man, and Cybernetics: Systems (TSMCA)

o IEEE Transactions on Knowledge and Data Engineering (TKDE)

o IEEE Transactions on Neural Networks and Learning Systems (TNNLS)

o IEEE Transactions on Multimedia (TMM)

o IEEE Transactions on Image Processing (TIP)

o IEEE Transactions on Affective Computing (TAC)

o IEEE Signal Processing Letters (SPL)

o IEEE Winter Conference on Applications of Computer Vision (WACV)

o IEEE International Conference on Multimedia and Expo - FacesMM Workshop (ICMEW FacesMM)

o Workshop on Bringing Semantic Knowledge into Vision and Text Understanding (IJCAI-TUSION)

Awards and Honors

o James Henderson Fellowship - 2012

o Andrew Carnegie Society Scholar - 2011

o Xerox Technical Minority Scholarship - 2009, 2010

o Carnegie Institute of Technology Dean's List - 2007-2012

Other Information

o U.S. Citizen