Elham Saraee

Department of Computer Science · · · Phone: 6176155771
Boston University · · · Email: esaraee@bu.edu
Boston, MA, USA · · · **http://cs-people.bu.edu/esaraee**

EDUCATION

Boston University, Boston, MA (Fall 2013 - present)
PhD in Electrical and Computer Engineering, Expected graduation date: May 2019.
Advisor: Margrit Betke

Boston University, Boston, MA (Sept. 2013 - Dec. 2015)
Master of Science in Electrical and Computer Engineering · · · GPA: 3.94

Sharif University of Technology, Tehran, Iran (Sept. 2008 - June 2013)
Bachelor of Science, Electrical Engineering · · · GPA: 3.70

RESEARCH INTERESTS

Deep Learning
Computer vision
Applied Machine Learning
Artificial Intelligence
Human Computer Interaction

WORK EXPERIENCE

Adhark Incorporation (Sept 2017 - Present):
Role: Data Scientist
Project: Image analysis with deep learning, to evaluate the visual preferences of different audience groups
Deep learning platform: Tensorflow, Programming Language: Python

RECENT PROJECTS

Unsupervised Deep Feature Extraction for Visual Complexity Analysis:
In this work, we propose a new direction in unsupervised information extraction from *intermediate* convolutional layers of deep neural networks. We focus on *visual complexity*, an image attribute that humans can subjectively evaluate based on the level of detail in the image. We derive an activation energy (AE) metric that combines convolutional layer activations to quantify visual complexity. In addition, we introduce SAVOIAS, a visual complexity dataset that compromises of more than 1,400 images from seven diverse image categories.

Affective Image Analysis:
In this project, we propose a method to analyze the affective state of images and categorize them based on the eight emotions, namely amusement, awe, contentment, excitement, anger, disgust, fear and sadness. We extract low level features such as color and edges and aggregate them with mid level and high level features extracted using various layers of a deep neural network in order to understand the features driving such emotions.

Facial Expression Analysis and emotion Detection:
We develop a vision-based system that evaluates the engagement of students while interacting with an online tutoring system. We extract facial expression features from deep neural network to train a model that can infer the level of engagement in the students.

Dynamic Adjustment of Physical Exercises Using Reinforcement Learning:
In this project, we propose a system for difficulty adjustment of exercises in physical therapy. We use pattern recognition algorithms (Dynamic Time Warping and Spectral Arc Length), to extract performance measures; then we design our online reinforcement learning algorithm to dynamically adjusts the difficulty configuration of exercises based on the users performance.

Posture Modeling for Exercise Assessment:
We propose a method to capture and model the postures of a user for during a physical therapy exercise. We capture the skeletal data using the Microsoft Kinect, extract features and train a Gaussian Mixture Model (GMM) to represent postures of the user during an exercise. Our model enables autonomous detection of incorrect postures during an exercise.

COMPUTER SKILLS

Languages: Python, Matlab, C, C++, Java, Verilog.
Deep Learning, ML and CV tools: Tensorflow, Pytorch, Keras, Slim, OPENCV, Scipy, Scikit-learn.
Applications: Eclipse, Visual Studio, SPICE, Altium Designer, OPNET, NS2, NS3.
Web Development: HTML, JavaScript.
Parallel Programming: Cuda, MPI, OPENMP.

TEACHING EXPERIENCE

Boston University: Graduate Teaching Fellow, Image and Video Computing, Fall 2016 (Programming language: C++ using OPENCV libraries) Graduate Teaching Fellow, Introduction to Electronics, Fall 2015. Graduate Teaching Fellow, Introduction to Logic circuits, Spring 2014. Graduate Teaching Fellow, Introduction to Logic circuits, Fall 2013.

Sharif University of Technology: Coordinator and Lab TA, Principals of Electrical Engineering, Fall 2012. Lab TA, Principals of Electronics, Fall 2012. Lab TA, Analog Circuits, Spring 2010. Lab TA, Principals of Electronics, Fall 2010. Lab TA, Principals of Electronics, Fall 2010.

PUBLICATIONS

E. Saraee, Mona Jalal, M. Betke. "Unsupervised Deep Feature Extraction for Visual Complexity Analysis". Under review (CVPR 2019).

E. Saraee, Mona Jalal, Margrit Betke. "SAVOIAS: A Diverse, Multi-Category Visual Complexity Dataset". (arXiv:1810.01771)

E.Saraee, S.Singh, K. Hendron, M. Zheng, A. Joshi, T. Ellis and M. Betke. "ExerciseCheck: Remote Monitoring and Evaluation Platform for Home Based Physical Therapy". Accepted for Oral presentation at the 10th Annual International Conference on Pervasive Technologies Related to Assistive Environments (PETRA 2017).

E. Saraee, S. Singh, and M. Betke. "PostureCheck with the Kinect: Posture Modeling for Exercise Assessment." Accepted for Poster Presentation at International Conference on Virtual Rehabilitation (ICVR 2017).

E. Saraee and M. Betke. "Therapeutic Robotic System for the Upper Body Based on the Proficio Robotic Arm". Accepted for Poster Presentation at International Conference on Virtual Rehabilitation (ICVR 2017).

M. Gentil, M. Sameki, D. Gurari, **E. Saraee**, E. Hasenberg, J. Y. Wong, and M. Betke. "Interactive Tracking of Cells in Microscopy Image Sequences". 3rd Interactive Medical Image Computation Workshop (IMIC) held in conjunction with MICCAI 2016.

M. Sameki, M. Gentil, D. Gurari, **E. Saraee**, E. Hasenberg, J. Y. Wong, and M. Betke, "CrowdTrack: Interactive Tracking of Cells in Microscopy Image Sequences with Crowdsourcing Support", The Workshop on Human Computation for Image and Video Analysis(GroupSight), in conjunction with AAAI Conference on Human Computation and Crowdsourcing (HCOMP 2016). (Best Paper Runner-up Award)

Elham Saraee, Kratesh Ramrakhyani, Ashutosh Sanan, Saurabh Singh and Margrit Betke, "The Kinect Versus The Proficio: Measuring Hand Position During Exercise Monitoring". 9th Annual International Conference on Pervasive Technologies Related

to Assistive Environments (PETRA'2016).

Elham Saraee and M. Betke. "Dynamic adjustment of physical exercises based on performance using the Proficio robotic arm." 9th Annual International Conference on Pervasive Technologies Related to Assistive Environments (PETRA' 2016).

HONORS AND RESPONISIBILI-TIES

NSF PETRA Conference Doctoral Consortium award, 2016.
GHC Scholarship for Grace Hopper Celebration of Women in Computing, 2016.
Research and Teaching Fellowship from Boston University Graduate School of Engineering, 2013.
Member of National Elite Foundation in Iran, 2011.
Vice-Chair of The First Iranian Conference on Smart Grid held in October 2010, Tehran, Iran.
Ranked 55 among nearly 300,000 participants in national university entrance examination from all over Iran, June 2008.

PROFESSIONAL ACTIVITIES

Mentoring:
Kratesh Ramrakhyani, Ashutosh Sanan, Saurabh Singh (Master Students): Mentored to apply the Kinect for gesture recognition in physical therapy (Spring 2016).

Technical Presentations:
Dynamic adjustment of physical exercises based on performance using the Proficio robotic arm. Paper Presentation, (PETRA'16), Corfu, Greece, June 2016.
ExerciseCheck: Remote Monitoring and Evaluation Platform for Home Based Physical Therapy. Paper Presentation, (PETRA'17), Corfu, Greece, June 2016.
Back-Pressure-Based Packet-by-Packet Adaptive Routing in Communication Networks. (Qualification exam), May 2014.

REFERENCES Available upon request.