Aryan Mobiny

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SUMMARY

- I am a Ph.D. student skilled in Machine Learning, Deep Learning and Reinforcement Learning with applications in Computer Vision, Natural Language Processing. I published 9 research papers in MICCAI, IEEE-TMI etc. My achievements include an article featured as great innovative idea in NSF funded Computing Community Consortium, fellowship at Center for Advanced Computing and Data Systems (CACDS), creating and maintaining an open-source library and tutorial, **Easy-TensorFlow** with more than 2.5k followers.

TECHNICAL SKILLS

- **Core skills**: Python (5 years), Machine Learning (6 years), Deep learning (2 years), TensorFlow (2 years), Matlab (7 years), Shell (3 years), Git (2 years)
- **Libraries (2+ year)**: Keras, OpenCV, Pandas, Scikit-Learn, Matplotlib, Pytorch, Numpy, Scipy, Theano, Flask, Caffe, TensorFlow, Theano, CNTK
- **Other skills**: C/C++, R, HTML, CSS, SQL, OpenAI Universe, OpenAI Gym

EXPERIENCES

- **Machine Learning Researcher,** HULA lab at University of Houston, TX *(Jan. 2017 - Present)*
  - Designed an adaptive computer-aided diagnosis (CAD) system using a Memory-Augmented Recurrent Network capable of incorporating expert domain knowledge in real-time to improve its decision function and adapt almost perfectly for the lung nodule detection task.
  - Created a Bayesian Densely-Connected Convolutional Network to model the prediction uncertainty in the organ segmentation task from CT images.
  - Introduced "Consistent Dynamic Routing" as the voting mechanism in Capsule Network that makes the model scalable to large 3D image data and results in 3×speedup of Capsule Network.
  - Constructed a novel fully denesly connected 3D convolutional network, outperforming the state-of-the-art architectures (such as VNet, DenseNet, Tiramisu) in Semantic Segmentation of the cellular and vascular structure in the mouse brain, and CamVid data.
  - Designed a pipeline to detect target and effector cells using Faster RCNN, and a mixture of Capsule Network and Bidirectional LSTM for liveness detection of each type of cell. We developed ideas called "Transformation Matrix Sharing", "Locally-constrained Routing", and "Consistent Voting" to enhance the routing mechanism of the capsule network, make it scalable to larger images and improve its convergence.
  - Collaborated in development of a Generative Adversarial Model to generate chest radiographs for radiology toolkit.
  - Implemented a convolutional generative model on the driving scenes from a video game GTA-V to convert clear day images to nine different weather patterns supported in game and integrated the whole process in a pipeline for self-driving car project.
- **Machine Learning Researcher,** Brain-Computer Interface Laboratory *(Sep. 2015 - Dec. 2016)*
  - Designed a pipeline for analyzing the neural and head movement responses associated with creative video-game play in children to quantify, describe and understand the role of naturally occurring neural variability in the developing brain using acombination of Kernel K-means and Hierarchical clustering.
- **Machine Learning Researcher**, Robotics and Machine Intelligence Laboratory *(Sep. 2012 - Sep. 2014)*
  - Designed and implemented a novel 12 class mental-task-based BCI, from feature extraction, conditioning and reduction to classification using nonlinear SVM and neural network.
  - Performed environment setup, data collection and pre-processing pipeline of human neural data for a brain-computer interface project which is aimed to help people with severe disabilities (e.g. ALS) to have more control over their body and environment.

OPEN SOURCE PROJECTS

- **Easy-TensorFlow,** https://www.easy-tensorflow.com *(Aug'17 - Present)*
  - Open source project aimed to provide simple and ready-to-use tutorials for TensorFlow.
  - Selected as GitHub trending repository of the month
- **PyDL** (ongoing project)
  - Deep learning toolkit written in python, on top of TensorFlow. It is developed to enable fast prototyping with a low entry threshold and ensure reproducibility in various data analysis applications.

PUBLICATIONS

1. **Aryan Mobiny**, Hengyang Lu, Hien Van Nguyen, Badri Roysam, and Navin Varadarajan. Automated Apoptosis Classification in Phase Contrast Microscopy Using Deep Capsule Network. IEEE Transactions on Biomedical Imaging, 2018 (under review)
2. **Aryan Mobiny** and Hien Van Nguyen. Fast capsnet for lung cancer screening. In *International Conference on Medical Image Computing and Computer-Assisted Intervention*, pages 741–749. Springer, 2018.
3. **Aryan Mobiny**, Hien Van Nguyen, Supratik K. Moulik, Naveen Garg and Carol C. Wu. Radiologist-Friendly and Automatic Lung Cancer Screening Using Memory Recurrent Networks. IEEE Transactions on Biomedical Imaging, 2018 (under review)
4. Leila Saadatifard, **Aryan Mobiny**, Pavel Govyadinov, Hien Van Nguyen and David Mayerich. A Deep Fully Convolutional Network to Model the Cellular and Vascular structure in the Mouse Brain, (In preparation).
5. **Aryan Mobiny**, Supratik Moulik, and Hien Van Nguyen. Lung cancer screening using adaptive memory-augmented recurrent networks. *arXiv preprint arXiv:1710.05719*, 2017
6. **Aryan Mobiny**, Akshay Sujatha Ravindran, Jesus G Cruz-Garza, Andrew Paek,Anastasiya Kopteva and Jose L Contreras Vidal. Assaying neural patterns using scalp EEG from children during anaturally engaging unconstrained video gameplaying experience. (Submitted to Nature Scientific Reports), 2018.
7. Jose Luis Contreras-Vidal, Akshay Sujatha Ravindran, Jesus G. Cruz-Garza, Anastasiya Kopteva, Andrew Paek, **Aryan Mobiny** and Zachery R. Hernandez. Multi-modal mobile brain-body imaging (MoBI) dataset for assaying neural and head movement responses associated with creative video game play in children. IEEE Dataport, 2017
8. **Aryan Mobiny**, Ehsan Arbabi and Tooraj Abbasian Najafabadi. EEG-Based Brain-Computer Interface: A Novel Design Using Twelve Motor and Non-Motor Related Mental Tasks, 2016.
9. **Aryan Mobiny**, Ehsan Arbabi and Tooraj Abbasian. A ten-channel brain-computer interface system based on six mental tasks. The 6th Iranian Conference on E-Health and ICT Application in Medical Science, 2014.
10. **Aryan Mobiny**, Ehsan Arbabi and Tooraj Abbasian Najafabadi, Feature selection for brain-computer interface with six motor imagery Tasks Using Orthogonal Forward Selection. The 5th Iranian Conference on Bioinformatics, 2014.

ACTIVITIES

- **Invited Talks & Workshops**
  - "Applications of deep learning in biomedical science", IEEE EMBS Houston Chapter
  - "TensorFlow in Deep Learning Research Workshop", UH Mathematics department
  - "Deep Learning in TensorFlow Workshop", Center for advanced computing and data science
- **Teaching**
  - Introduction to Deep Learning (Fall 2017 and Fall 2018)
  - Pattern Recognition (Fall 2013)
- **Professional Services**
  - Reviewer of conference on Medical Image Computing and Computer-Assisted Intervention (MICCAI)
  - Reviewer of IEEE International Symposium on Biomedical Imaging (ISBI)

HONORS & AWARDS

- Featured as "great innovative idea" in NSF funded Computing Community Consortium for our research on "Physician-Friendly Machine Learning Algorithms for Medical Diagnosis".
- Fellow of Center for Advanced Computing and Data Systems at University of Houston.
- Presidential Fellowship, University of Houston, Cullen College of Engineering
- Ranked 2^{nd} among M.Sc. control and machine intelligence major student, UT, Tehran
- Ranked top 1% in nationwide electrical engineering graduate entrance exam in Iran

EDUCATION

Ph.D. in Electrical and Computer Engineering	*University of Houston*	2015 - Present
MS in Electrical and Computer Engineering	*University of Tehran*	2011 - 2014
BS in in Electrical and Computer Engineering	*University of Science and Technology*	2006 - 2011

REFERENCES

- Dr. Hien Van Nguyen, ECE Assistant Professor, hvnguy35@central.uh.edu
- Prof. Robert Azencot, Professor of Mathematics, razencot@math.uh.edu
- Dr. David Mayerich, ECE Assistant Professor, mayerich@uh.edu