

Aryan Mobiny

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SUMMARY

- I am a Ph.D. candidate skilled in Machine Learning and Deep Learning with applications in Computer Vision and Medical Imaging. I have published 15 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 2.8K followers.

TECHNICAL SKILLS

- **Core skills:** Python (5 years), Machine Learning (7 years), Deep learning (4 years), TensorFlow (3 years), Keras (3 years), PyTorch (3 years), Matlab (7 years), Shell (3 years), Git (3 years)
- **Libraries (2+ year):** OpenCV, Pandas, Scikit-Learn, Matplotlib, Numpy, Scipy, Theano, Flask, Caffe, CNTK
- **Other skills:** C/C++, CUDA, R, HTML, CSS, OpenAI Universe, OpenAI Gym.

PROFESSIONAL EXPERIENCE

- **SIEMENS Healthineers, Princeton, NJ** (May. 2019 - Sep. 2019)
Machine Learning Research Intern, advised by Dr. Tommaso Mansi and Dr. Ali Kamen
 - Developed PointReg, a hierarchical point-cloud-based architecture for non-rigid MRI-Ultrasound registration of prostate, improving the prediction error of the baseline voxel-based networks by 4 times.
- **EigenControl, Houston, TX** (Sep. 2019 - Dec. 2019)
Machine Learning Intern
 - Conducted research on real-time prediction of the temporal evolution of chaotic systems in an oil refinery with Transformer neural network, improving the prior baseline accuracy by ~12%.
- **HULA lab at University of Houston, TX** (Jan. 2017 - Present)
Research Assistant, advised by Hien Van Nguyen
 - Developed Detail-oriented Capsule Networks (DECAPS) which mimics the complex behavior of human experts in visual recognition, and achieves state-of-the-art performance in classification (increasing AUROC more than 5.5% on the CheXpert dataset) and weakly-supervised detection of pathologies (increasing average precision from 41.7% to 80% for the RSNA Pneumonia detection dataset) from X-ray and CT scans.
 - Proposed MC-DropConnect to approximate variational inference and estimate epistemic uncertainty in deep neural networks, as well as three metrics to quantitatively evaluate and compare model uncertainty estimation methods in classification and semantic segmentation tasks.
 - Implemented techniques to improve the training time, convergence, scalability and interpretability of capsule networks in response to high-dimensional, complex medical and natural scene images.
 - Developed Memory-augmented Capsule Network (MEMCAP) a model-based meta-learning approach for efficient domain adaptation in lung cancer screening via CT imaging.
- **Brain-Computer Interface Laboratory** (Sep. 2015 - Dec. 2016)
Research Assistant, advised by Jose Luis Contreras Vidal
 - Research on quantifying the naturally occurring neural variability in the developing brain by analyzing the neural and head movement responses via a novel spatio-temporal convolutional neural network.
- **Machine Intelligence and Perception Laboratory** (Sep. 2012 - Sep. 2014)
Machine Learning Researcher
 - Developed an imagery-mental-task-based BCI using a deep neural network with SVM classifier, achieving 98% prediction accuracy in the 12 class setting (Master Thesis).

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 (May 2018).
- **PyDL** (ongoing project)
 - Deep learning toolkit written in python, on top of PyTorch. It is developed to enable fast prototyping with a low entry threshold and ensure reproducibility in various data analysis applications.

SELECTED PUBLICATIONS

1. **Aryan Mobiny**, P. Yuan, P. Cicalese, and H. Nguyen. Decaps: Detail-oriented capsule networks. In *International Conference on Medical Image Computing and Computer-Assisted Intervention (MICCAI)*. Springer, 2020
2. P. Yuan, **Aryan Mobiny**, P. Cicalese, and H. Nguyen. Few is enough: Task-augmented active meta-learning for brain cell classification. In *MICCAI*, 2020
3. P. Cicalese, **Aryan Mobiny**, P. Yuan, and H. Nguyen. Stypath: Style-transfer data augmentation for robust histology image classification. In *MICCAI*, 2020
4. **Aryan Mobiny**, H. Lu, H. V. Nguyen, B. Roysam, and N. Varadarajan. Automated classification of apoptosis in phase contrast microscopy using capsule network. *IEEE transactions on medical imaging*, 39(1):1–10, 2019
5. **Aryan Mobiny** and Hien Van Nguyen. Fast capsnet for lung cancer screening. In *International Conference on Medical Image Computing and Computer-Assisted Intervention (MICCAI)*, pages 741–749. Springer, 2018.
6. **Aryan Mobiny**, Aditi Singh, and Hien V Nguyen. Risk-aware machine learning classifier for skin lesion diagnosis. *Journal of clinical medicine*, 8(8):1159, 2019.
7. A. Ravindran, **Aryan Mobiny**, J. Cruz-Garza, A. Paek, A. Kopteva, and J. Vidal. Assaying neural activity of children during video game play in public spaces: a deep learning approach. *Journal of neural engineering*, 16(3):036028, 2019
8. F. Wang, **Aryan Mobiny**, H. V. Nguyen, and G. Song. If structure can exclaim: a novel robotic-assisted percussion method for spatial bolt-ball joint looseness detection. *Structural Health Monitoring*, 2020
9. **Aryan Mobiny** and M. Najarian. Text-independent speaker verification using long short-term memory networks. *arXiv preprint arXiv:1805.00604*, 2018
10. **Aryan Mobiny**, Hien V Nguyen, Supratik Moulik, Naveen Garg, and Carol C Wu. Dropconnect is effective in modeling uncertainty of bayesian deep networks. *arXiv preprint arXiv:1906.04569*, 2019
11. **Aryan Mobiny**, P. A. Cicalese, S. Zare, P. Yuan, Abavisani, C. Wu, J. Ahuja, and and H. V. Nguyen P. de Groot. Radiologist-level covid-19 detection using ct scans with detail-oriented capsule networks. *arXiv preprint arXiv:2004.07407*, 2020
12. L. Saadatfard, **Aryan Mobiny**, P. Govyadinov, H. Nguyen, and D. Mayerich. Dvnet: A memory-efficient three-dimensional cnn for large-scale neurovascular reconstruction. *arXiv preprint arXiv:2002.01568*, 2020
13. **Aryan Mobiny**, Supratik Moulik, and Hien Van Nguyen. Lung cancer screening using adaptive memory-augmented recurrent networks. *arXiv preprint arXiv:1710.05719*, 2017

ACTIVITIES

• Invited Talks & Workshops

- "Medical Image Learning with Less Labels and Imperfect Data" workshop in MICCAI '19 and '20.
- Presented "Bayesian Deep Learning" Tutorial in MICCAI '19.
- "Applications of Deep Learning in Biomedical Science", IEEE EMBS Houston Chapter
- "TensorFlow in Deep Learning Research Workshop", UH Mathematics department
- "Deep Learning with TensorFlow Workshop", Center for advanced computing and data science

• Teaching

- Introduction to Deep Learning (Fall 2017, 2018, and 2019)
- Pattern Recognition (Fall 2013)

• Professional Services

- Reviewer for several conferences including CVPR, MICCAI, ICIP, ISBI, and ICASSP.
- Reviewer for IEEE Transactions on Medical Imaging (TMI), and Medical Image Analysis (MIA).

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 2nd 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