Aryan Mobiny

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TECHNICAL SKILLS

- **Core skills**: Large Language Models (LLMs), Machine Learning, Deep learning, Python, Pytorch, TensorFlow, Keras
- **Libraries**: ONNX, TensorRT, OpenCV, Pandas, Scikit-Learn, Matplotlib, Numpy, Scipy, Theano, Caffe
- **Other skills**: C/C++, CUDA, R, HTML, CSS, OpenAI Universe, OpenAI Gym, Matlab, Shell, Git.

PROFESSIONAL EXPERIENCE

- **Amazon AWS, Palo Alto, CA** *(May 2020 - Present)*
  Applied Scientist II, Just Walk Out Technology
  - Conduct research, design, and implement cutting-edge multi-modal (time-series and video) deep neural network models to enable accurate and efficient customer tracking, item identification, and receipt generation with a high precision in Amazon Go retail stores.
  - Optimize model performance to achieve real-time receipt generation, minimizing latency while maintaining high accuracy to prevent overcharging or undercharging customers.
  - Collaborate with cross-functional teams to deploy and integrate deep learning models into Amazon Go's production systems, ensuring seamless integration and efficient operation on edge devices.

- **Ambarella Inc., Santa Clara, CA** *(Nov. 2020 - Feb. 2022)*
  Senior Computer Vision Algorithm Engineer, Algorithm Team
  - Designed and implemented deep learning models to perform visual recognition tasks, such as video object segmentation and detection, 2D/3D multi-object tracking, multi-sensor fusion, that advance the state of the art in perception and control for autonomous driving
  - Conducted research to improve the performance of Transformer models in the downstream recognition tasks using methods such as self-supervised learning with momentum contrast and knowledge distillation
  - Developed a flexible, attention-based few-shot object detection framework, adaptable to multiple conventional object detection networks. The model is successfully exploited to automatically detect rare objects, events, and driving scenarios by quickly processing millions of images of road scenes.
  - Worked with downstream engineers to optimize the inference speed of deep neural networks (and the associated pre/post-processing codes), and deploy the ML models to run efficiently on our CV chip

- **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.
  - 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 $\sim$12%.

- **HULA lab at the University of Houston, TX** *(Jan. 2017 - Oct. 2020)*
  Research Assistant, advised by Hien Van Nguyen
  - Developed TransCaps, a Transformer Capsule network with self-attention routing mechanism which reliably scales to complex and large-scale image datasets (e.g. ImageNet) and yields a dramatic improvement over its competitors when presented with novel viewpoints (i.e. 5.77% and 3.25% improvement on the SmallNorb Dataset)
  - Developed Memory-augmented Capsule Network (MEMCAP) a model-based meta-learning approach for efficient domain adaptation in lung cancer screening via CT imaging.
  - 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, and three novel evaluation metrics to quantitatively compare various uncertainty estimation methods in classification and semantic segmentation tasks.

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).

SELECTED PUBLICATIONS

1. **Aryan Mobiny**, Pengyu Yuan, Pietro A Cicalese, Supratik K Moulik, Naveen Garg, Carol C Wu, Kelvin Wong, Stephen T Wong, Tian Cheng He, and Hien V Nguyen. Memory-augmented capsule network for adaptable lung nodule classification. *IEEE Transactions on Medical Imaging*, 2021
2. **Aryan Mobiny**, Pietro Antonio Cicalese, and Hien Van Nguyen. Trans-caps: Transformer capsule networks with self-attention routing. 2020
3. **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
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. P. Yuan, **Aryan Mobiny**, P. Cicalese, and H. Nguyen. Few is enough: Task-augmented active meta-learning for brain cell classification. In *MICCAI*, 2020
7. P. Cicalese, **Aryan Mobiny**, P. Yuan, and H. Nguyen. Stypath: Style-transfer data augmentation for robust histology image classification. In *MICCAI*, 2020
8. **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.
9. 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
10. 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
11. **Aryan Mobiny** and M. Najarian. Text-independent speaker verification using long short-term memory networks. *arXiv preprint arXiv:1805.00604*, 2018
12. **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
13. **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
14. L. Saadatifard, **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
15. **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.
  - "Bayesian Deep Learning" tutorial presentation 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 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 AI and Machine Learning	*University of Houston*	Sep. 2015 - Oct. 2020
MS in AI and Machine Learning	*University of Tehran*	Sep. 2011 - Jun. 2014
BS in Electrical and Computer Engineering	*University of Science and Technology*	Sep. 2006 - Sep. 2011