PENGYU(BEN) YUAN

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SUMMARY

- I am a Ph.D. candidate skilled in Machine Learning and Deep Learning with applications in Medical and Seismic Image Analysis. I have published 16 research papers in conferences (MICCAI, SEG) and journals: (IEEE-TMI, Geophysics), etc. I have a wealth of practical problem handling experience due to my 3 internships during my Ph.D. and published 2 patents. My career interests are bringing advanced and mysterious AI techniques to solve real-world problems.

SOFTWARE SKILLS

- **Computer programming**: Python, MATLAB, C/C++, CUDA, Shell
- **Machine Learning**: Pytorch, TensorFlow, Keras, Theano, SciKit-Learn
- **Numerical Analysis**: MATLAB, NumPy, SciPy, Pandas

WORK EXPERIENCE

- **Dataminr** *New York, NY* *May 2021 - Aug. 2021*
  Research Intern, advised by Dr. Svebor Karaman and Dr. Mahdi Abavisani
  - Studied and compared different SOTA methods on few shot object detection (FSOD) problem.
  - Proposed a meta-learning based FSOD approach using dual spatial feature enhancement and sparse representation learning which improves 0.15 average precision (AP) on COCO benchmark.
- **Sensia (Schlumberger)** *Houston, TX* *Jun. 2019 – Aug. 2019*
  Data Scientist Intern, advised by Dr. Nam Nguyen and Dr. Jonathan Chong
  - Worked on ESP (Electric Submersible Pump) close loop control for artificial lift. Used reinforcement learning to automatically respond to the alerts from Auto Events Detector (AED) and constructed a well simulator to collect training data for the model.
  - Published patent: Event driven control schemas for artificial lift.
- **Schlumberger** *Houston, TX* *Jun. 2018 – Aug. 2018*
  Data Scientist Intern, advised by Dr. Nam Nguyen and Dr. Jonathan Chong
  - Applied deep neural network model to identifying critical events of ESP (Electric Submersible Pump) under the well.
  - Established an automated complete local optimization workflow for target wells.
  - Published patent: System and method for managing wellsite event detection.
- **HULA Lab at University of Houston** *Houston, TX* *Aug. 2017 – Present*
  Research Assistant, advised by Dr. Hien Van Nguyen and Dr. Jiefu Chen
  - Developed algorithms in meta-learning, few-shot learning, Bayesian learning and applied to classification/detection/segmentation problems in different areas (e.g. medical image and seismic image).
  - Published 16 research papers, featured on MICCAI/SEG conferences and IEEE TMI journal.

ACADEMIC PROJECTS

- **Unsupervised Seismic Data Deblending and Interpolation** *Sep. 2020 – Jul. 2021*
  - Proposed the blend-trace network to modify receptive field for unsupervised seismic data reconstruction task.
  - Proposed two regularization techniques (automatic spectrum suppression and mix training) for anti-aliasing seismic interpolation.
  - Submitted patent: *Method for Reconstructing at Least One Trace in a Seismic Image*.
- **Brain Cell Type Classification with Few Training Samples** *Sep. 2019 – Nov. 2021*
  - Proposed the AGILE framework which combines the strengths of data-augmentation, active learning, and meta-learning and can outperform the meta-learning baseline when the number of training tasks is limited.
  - Introduce the optimal transport for data augmentation for new task and use the Bayesian Neural Network to select the most informative samples.
  - With only **1%** of training data (8 cells), the model can achieve **90%** accuracy on the classification of unseen cell types. With **3%** as training samples, it can achieve the upper bound.
- **First Break Picking on Seismic Shot Gather Image** *Jul. 2018 – Mar. 2020*
  - Established a segmentation plus picking workflow for first arrival picking problem. Used U-net based deep convolutional networks for segmentation and proposed different picking strategies. The CNN plus RNN model shows the least absolute error on both synthetic and field data.
  - Applied modified model-agnostic meta-learning (MAML) model for fast adaption.
- **Lung Nodule Detection and Cancer Screening** *Oct. 2017 – Present*
  - Established an incidental lung nodule dataset (Regular-dose CT images) from Houston Methodist Research Institute.
  - Developed the meta-learning lung cancer classification model that can be adapted from public dataset (LUNA16) to lung screening dataset from another institute and incidental lung nodule dataset, which achieved clinically relevant performance (**0.925** and **0.891** AUC-ROC respectively) with **30** new labeled samples.

SELECTED PUBLICATIONS

1. **Yuan, P.**, et al. "Self-supervised learning for anti-aliasing seismic data interpolation." *First International Meeting for Applied Geoscience & Energy*. Society of Exploration Geophysicists, 2021.
2. **Yuan, P.**, et al. "A deep learning model-based lung cancer risk assessment for incidental pulmonary nodules." *AACR Annual Meeting* (2021): 2614-2614.
3. **Yuan, P.**, et al. "Few Is Enough: Task-Augmented Active Meta-Learning for Brain Cell Classification." *International Conference on Medical Image Computing and Computer-Assisted Intervention*. Springer, Cham, 2020.
4. **Yuan, P.**, et al. "Adaptive first arrival picking model with meta-learning." *SEG Technical Program Expanded Abstracts 2020*. Society of Exploration Geophysicists, 2020. 1486-1490.
5. **Yuan, P.**, et al. "A robust first-arrival picking workflow using convolutional and recurrent neural networks." *Geophysics* 85.5 (2020): U109-U119.
6. **Yuan, P.**, et al. "First arrival picking using U-net with Lovasz loss and nearest point picking method." *SEG Technical Program Expanded Abstracts 2019*. Society of Exploration Geophysicists, 2019. 2624-2628.
7. **Yuan, P.**, et al. "Phasetime: Deep learning approach to detect nuclei in time lapse phase images." *Journal of clinical medicine* 8.8 (2019): 1159.
8. Vo, Hung Q., **Yuan, P.**, He, T., Wong, S. T., & Nguyen, H. V. "Multimodal Breast Lesion Classification Using Cross-Attention Deep Networks." *2021 IEEE EMBS International Conference on Biomedical and Health Informatics (BHI)*. IEEE, 2021.
9. Mobiny, A., **Yuan, P.**, Cicalese, P. A., Moulik, S. K., Garg, N., Wu, C. C., ... & Nguyen, H. V. "Memory-Augmented Capsule Network for Adaptable Lung Nodule Classification." *IEEE Transactions on Medical Imaging* (2021).
10. Mobiny, A., **Yuan, P.**, Cicalese, P. A., & Van Nguyen, H. "DECAPS: Detail-Oriented Capsule Networks." *International Conference on Medical Image Computing and Computer-Assisted Intervention*. Springer, Cham, 2020.
11. Cicalese, P. A., Mobiny, A., **Yuan, P.**, Becker, J., Mohan, C., & Van Nguyen, H. "StyPath: Style-Transfer Data Augmentation for Robust Histology Image Classification." *International Conference on Medical Image Computing and Computer-Assisted Intervention*. Springer, Cham, 2020.
12. Padmanabhan, M., **Yuan, P.**, Chada, G., & Nguyen, H. V, "Physician-friendly machine learning: A case study with cardiovascular disease risk prediction." *Journal of clinical medicine* 8.7 (2019): 1050.
13. Mobiny, A, Cicalese, P. A., Zare, S., **Yuan, P.**, Abavisani, M., Wu, C. C., ... & Van Nguyen, H. "Radiologist-level covid-19 detection using ct scans with detail-oriented capsule networks." *arXiv preprint arXiv:2004.07407* (2020).
14. Cicalese, P. A., Rizvi, S. A., Wang, V., Patibandla, S., **Yuan, P.**, Zare, S., ... & Van Nguyen, H. "MorphSet: Improving Renal Histopathology Case Assessment Through Learned Prognostic Vectors." *International Conference on Medical Image Computing and Computer-Assisted Intervention*. Springer, Cham, 2021.

ACTIVITIES

- **Invited Tutorials & Workshops**
  - Presented the "Bayesian Meta-Learning" tutorial in MICCAI '21.
  - Presented the "Bayesian Deep Learning on Medical Image Analysis" tutorial in MICCAI '19.
  - "Data Augmentation, Labeling, and Imperfections (DALI)" workshop in MICCAI '21.
  - "Medical Image Learning with Less Labels and Imperfect Data (MIL3ID)" workshop in MICCAI '19, and '20.
- **Teaching**
  - Introduction to Machine Learning and Computer Vision (Spring 2018, 2019, and 2020)
  - Neural Networks and Deep Learning (Fall 2018, and 2019)
  - Principles of Internetworking (Fall 2017)
- **Professional Services**
  - Wrote a chapter for a book entitled "Meta-Learning with Medical Imaging and Health Informatics Applications".
  - Reviewer for several conferences including MICCAI, SEG, IMAGE, and MOBIQUITOUS.
  - Reviewer for several journals including IEEE Journal on Multiscale and Multiphysics Computational Techniques (JMMCT), Computerized Medical Imaging and Graphics, and Geophysics.
  - Reviewer for a book entitled "Meta-Learning: An Overview" in Elsevier.

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".
- Outstanding Student (The highest honor for undergraduates and only 10 students are awarded each year), University of Electronic Science and Technology of China, China.
- Honorable Mention in American Mathematical Contest in Modeling.

EDUCATION

- **University of Houston** — *Houston, Texas, USA*
  Ph.D., Electrical and Computer Engineering **GPA: 3.75/4** — Aug. 2017 – Expected: May 2022
- **University of Electronic Science and Technology of China (UESTC)** — *Chengdu, Sichuan, China*
  B.S., Electrical Engineering **GPA: 3.96/4 (Ranked 16/351)** — Sep.2013 – Jul. 2017