JUNTANG ZHUANG

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EDUCATION

Yale University
Ph.D. in Biomedical Engineering (Advisor: James S. Duncan) Sep 2016 - May 2021 (Expected)
M.A. in Statistics (GPA:4.0/4.0) Sep 2017 - May 2018
Tsinghua University
B.E. in Engineering Physics Sep 2012 - May 2016
Minor in Law Sep 2013 - May 2016

RESEARCH EXPERIENCE

Project 1: Accurate gradient estimation for neural ordinary differential equations and generalization to graph networks Sep - Oct 2019, Yale University

- Proposed and implemented a family of adaptive ODE solvers to tackle a fundamental problem with neural-ODE: accurate gradient estimation.

- ODE model directly modified from ResNet18 and trained with our method outperformed standard ResNet101 on image classification tasks. Improved SOTA of Neural-ODE from 81% accuracy to 95% on CIFAR10. To our knowledge, it's the first time neural-ODE acheives comparable results to SOTA discrete-layer models on benchmark classification tasks.

- Generalized ODE to graph data, achieved higher accuracy, and related over-smoothing phenomena in GCN to asymptotic behavior of ODE.

Project 2: Uncertainty guided fast semantic segmentation for pathology images June - Sep 2019

- Proposed an acceleration method for deep learning models based on model uncertainty. Achieved model-agnostic acceleration.

- Achieved 6× faster inference speed without sacrifice of accuracy on semantic segmentation task for pathological images.

Project 3: ShelfNet for real-time semantic segmentation Sep - Nov 2018, Yale University

- Proposed ShelfNet, a multi-path network with a shelf-like structure for real-time semantic segmentation.

- Achieved both faster running speed and higher mIoU than state-of-the-art real-time semantic segmentation models such as BiSeNet.

- For non real-time tasks, ShelfNet achieved 79.0% mIoU on Cityscapes Dataset, outperforming larges models with ResNet101 backbone (such as DeepLab and PSPNet).

- Paper accepted by ICCV 2019 CVRSUAD. Open-source implementation with PyTorch (**200** stars on GitHub) (Link to code)

Project 4: Invertible networks for model decision interpretation Jan - June 2019, Yale University

- Proposed a two-stage model for classification tasks, an invertible transform from input domain to feature domain, and a linear classifier in the feature domain.

- With invertible networks, we explicitly determine the decision boundary in the input domain, and calculate the projection of a point onto the decision boundary.

- The difference between a point and its projection onto the decision boundary can be viewed as the explanation for model decision.

- Paper accpeted by ICCV 2019 VXAI. Open-source implementation with PyTorch (Link to code)[oral presentation][slides]

Project 5: LadderNet for medical image segmentation   July - Sep 2018, Yale University

- Proposed LadderNet, a multi-path network for medical image segmentation
- Implemented LadderNet and achieved the Top AUC on two public datasets for retinal vessel segmentation (Achieved an AUC of **0.9793** on DRIVE, and **0.9839** on CHASE_DB1).
- Open-source implementation with PyTorch (Link to code)

WORK EXPERIENCE

1. Internship at Tencent AI Lab, Bellevue, W.A. USA, June-Sep 2019

PUBLICATIONS

1. J. Zhuang, J. Yang, "ShelfNet for fast semantic segmentation", *ICCV 2019, CVRSUAD*
2. J. Zhuang, N. C. Dvornek, et al,"Decision Explanation and Feature Importance for Invertible Networks", *ICCV 2019, XAIC*, [oral presentation] [slides]
3. J. Zhuang, N. C. Dvornek, et al, "Invertible Network for Classification and Biomarker Selection for ASD ", *MICCAI 2019*
4. J. Zhuang, N. C. Dvornek, et al,"Prediction of Pivotal response treatment outcome with task fMRI using random forest and variable selection",*ISBI 2018*
5. J. Zhuang, N. C. Dvornek,et al,"Prediction of severity and treatment outcome for ASD from fMRI",*MICCAI 2018*
6. J. Zhuang, P. Fan, et al, "An analytical model of optical photon transportation for monolithic PET detector",*NSS/MIC 2015*
7. J. Yang, N. C. Dvornek, F. Zhang, J. Zhuang et al. ,Domain-Agnostic Learning with Anatomy-Consistent Embedding for Cross-Modality Liver Segmentation, *ICCV 2019, VRMI*
8. X. Li, N.C. Dvornek, Y. Zhou, J. Zhuang et al. ,Graph Neural Network for Interpreting Task-fMRI Biomarkers, *MICCAI 2019*
9. X. Li, N. C. Dvornek, J. Zhuang, et al, "Brain Biomarker Interpretation in ASD Using Deep Learning and fMRI",*MICCAI 2018*

AWARDS & SCHOLARSHIPS

- Graduate fellowship, Yale University   2016
- Award for excellent learning performance, Tsinghua University   2015
- Meritorious award for Mathematical Contest in Modeling (top 10% teams worldwide, awarded by the Consortium for Mathematics and Its Application)   2015
- National encouragement award (for excellent learning performance), Tsinghua University   2014
- Sparks Program (Undergraduate High-tech Club) membership, Tsinghua University   2014

SKILLS

C/C++, R, Python, MATLAB, PyTorch, Keras