Xingjian Zhen

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RESEARCH INTERESTS

My research interest is about different structured data for medical application in Computer Vision. Since it's quite mature for Euclidean space machine learning, I would like to explore some different structured data or constrained data. For example, the Symmetric Positive Definite matrix in medical data (DTI) or covariance matrix are the data with constraint. I want to try some neural networks in Euclidean space, and extend them to the structured data, manifold data as an example, to do the classification or regression. I believe this will be useful in diagnosis from a medical perspective or analysis of the video/image information.

EDUCATION

Ph.D. Student, Department of Computer Science — August 2017 - present
UW-Madison, WI, U.S.

B.E., Department of Electronic Engineering — August 2013 - July 2017
Tsinghua University, Beijing, P.R. China.

Paper

- Liu Yang, **Xingjian Zhen***, Rudrasis Chakraborty*, Vikas Singh. "Manifold-GLOW: Extending Flow-based Generative Models to Manifolds." *In submission*
- **Xingjian Zhen***, Han Yang*, Ying Chi, Lei Zhang, Xiansheng Hua. "CPR-GCN: Conditional Partial-Residual Graph Convolutional Network in Automated Anatomical Labeling of Coronary Arteries." *In submission*
- **Xingjian Zhen***, Rudrasis Chakraborty*, Nicholas Vogt, Barbara B. Bendlin, Vikas Singh. "Dilated Convolutional Neural Networks for Sequential Manifold-valued Data." *IEEE International Conference on Computer Vision (ICCV), 2019*
- **Xingjian Zhen**, Rudrasis Chakraborty, Nicholas Vogt, Seong Jae Hwang, Sterling C. Johnson, Barbara B. Bendlin, Vikas Singh. "Sequential Deep Learning Algorithms Show Structural Connectivity Differences By Amyloid Status." *Alzheimer's Association International Conference (AAIC), 2019*
- Rudrasis Chakraborty, **Xingjian Zhen***, Chun-Hao Yang*, Monami Banerjee, Derek Archer, David Vaillancourt, Vikas Singh, Baba C. Vemuri. "A Statistical Recurrent Model on the Manifold of Symmetric Positive Definite Matrices." In *Thirty-second Annual Conference on Neural Information Processing Systems (NeurIPS), 2018*

[1] https://zhenxingjian.github.io/homepage/
[2] https://github.com/zhenxingjian

RESEARCH EXPERIENCES

Flow-based generative model for non-Euclidean data, manifold 03/2019-09/2019

- Introduced three invertible layers whose determinant of Jacobian is simple
- Built the two-stream version of GLOW that can transfer information from one manifold to another
- Showed the ability to transfer DTI to corresponding ODF, and vice versa

Group Analysis for PiB Status with Seqential Deep Learning Model on DTI 01/2019-03/2019

- Used Ants as registration tool to warp information from template space into subject space
- Extracted voxels along each fiber bundles in DTI to fit the sequential model
- With PiB status as group, found 2 fiber bundles satisfying significance level

Dilated CNN in Group Analysis of Alzheimer's Disease 08/2018-12/2018

- Applied SPD/ODF Manifold into Dilated CNN model to directly extract information from DTI/ ODF
- Speed up the training and testing model with competitive number of parameters with the state of the art
- With CSF and APOE biomarkers, got statistically significant results on several fiber bundles

Statistical Recurrent Model on the Manifold 01/2018-05/2018

- Defined the operator in the manifold space
- Applied SPD manifold into statistical recurrent model
- Significantly reduced the number of parameters of the video classification model
- Used this model to achieve the state of art of accuraccy in UCF11 dataset

Correlationship for Image-Text Pair in Latent Space 09/2017-01/2018

- Applied the pre-trained CNN as the feature extractor from image side
- Applied the word2vec method on text as the representive of sentence
- Used t-SNE to minimum the KL divergence between latent space and the Image-Text pair
- Got meaningful result for the local dataset

INTERN EXPERIENCES

DAMO Academy, Alibaba 05/2019-09/2019

- Research intern in DAMO Academy Medical AI Algorithm Research, Alibaba
- Developed an automated anatomical labeling of coronary arteries via CPR-GCN
- Used 3D-CNN with BiLSTM to extract the features from the CT images along branches
- Used both image domain and position information with the partial-residual connection to achieve 95.8% mean recall

COMPUTER SKILLS

Deep learning framework: PyTorch, TensorFlow
Languages: Python, C++, Matlab
Softwares: Visual Studio, Matlab