

# Xingjian Zhen

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[\[Homepage\]](#)<sup>1</sup> [\[Github\]](#)<sup>2</sup>

## 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

- Rudrasis Chakraborty, Chun-Hao Yang\*, **Xingjian Zhen\***, 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*
- **Xingjian Zhen**, Rudrasis Chakraborty, Nicholas Vogt, Seong Jae Hwang, Sterling C. Johnson, Barbara B. Bendlin, Vikas Singh. "Group Analysis for PiB Status with Sequential Deep Learning Model on DTI." *Alzheimer's Association International Conference (AAIC), 2019*
- **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\***, 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*

## RESEARCH EXPERIENCES

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

<sup>1</sup><https://zhenxingjian.github.io/homepage/>

<sup>2</sup><https://github.com/zhenxingjian>

- Used Ants as registration tool to warp information from template space into subject space
- Extracted each voxel along each fiber bundles in DTI space 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

- Pre-processed the dMRI to extract the information of fiber bundles
- 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 accuracy 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 representative 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

#### **Form Line Detection in the Picture** 12/2016-06/2017

- Developed a system that detects and recognizes the form lines in pictures
- Used the bidirectional RNN method to achieve the state of the art, with MXNet as the core of the deep-learning system
- Tested in multiple databases such as the NIST Special Database 2 and got a high accuracy rate

### **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