# Dr.Saurabh J. Shigwan

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ASSISTANT PROFESSOR, COMPUTER SCIENCE AND ENGINEERING, SHIV NADAR IOE DELHI-NCR

## PROFESSIONAL SUMMARY

**Shiv Nadar Institute of Eminence Delhi-NCR**
*Designation: Assistant Professor, CSE department*          *Jan '21 - Present*

**Psychiatry Neuroimaging Laboratory, HMS, Boston**
*Designation: Pre-doctoral Fellow*          *Aug '19 - Mar '20*

## COMPUTER SKILLS

**Languages**: Python, MATLAB, Cython, C/C++
**Platforms/Libraries**: SciPy-NumPy, Pytorch, PyG, Tensorflow, Keras, DiPy
**Research Tools**: Slicer, ITK-SNAP, VTK

## ONGOING RESEARCH PROJECTS

**Open Set Recognition using Neural Collapse**
*Students: Arnav Aditya, Vishal Chaudhary*          *Sept '24 - Present*
*Collaborator: Dr. Nitin Kumar(SNU)*

- Understanding Neural Collapse phenomenon
- Designing unique loss function to improve open world classification
- Implementation is in **Python-PyTorch**

**Unsupervised Classification using Graph Neural Networks for Healthcare datasets**
*Students: Tejaswi Abburi*          *Sept '24 - Present*
*Collaborators: Dr. Nitin Kumar(SNU)*

- Designed a SOTA method for unsupervised classification using GNN and Modularity loss
- Experimental results on ADNI and NIFD datasets.
- Compared result with SOTA methods.

**Tractography using Deep Neural Nets**
*Student: Tejaswi Abburi*          *May '24 - Present*
*Collaborators: Prof. Yogesh Rathi(Harvard Medical School)*

- Understanding traditional diffusion tractography using **unscented Kalman filter**
- Finding correlation between DMRI input and Fibre Bundle positions
- Estimating Fibre directions from DMRI with state of the art Deep Neural Nets
- Implementation is in **Python-Keras-TensorFlow** and **Cython**

## RESEARCH INTERESTS

Statistical Modeling and Inference, Medical Image Processing, Bayesian Analysis, Machine Learning, Computer Vision, Deep Learning, Convolution network, Graph convolutional network, Shape analysis.

## AWARDS & ACHIEVEMENTS

1) Secured **Research Funding of $16000 from Mass General Brigham** to do research at Harvard Medical lab on **Brain Tractography using Diffusion-MRI**.
2) Dr. Abhishek Tiwari has been graduated under my co-supervision along with Prof. Rajeev Kuamr in 2024.

**PUBLICATIONS**

A. Mudit Adityaja, **Saurabh J. Shigwan**, and Nitin Kumar, "UnSegMedGAT: Unsupervised Medical Image Segmentation using Graph Attention Networks Clustering", 22nd IEEE International Symposium on Biomedical Imaging (ISBI), 2025

Kovvuri Sai Gopal Reddy, Bodduluri Saran, A. Mudit Adityaja, **Saurabh J. Shigwan**, Nitin Kumar, and Snehasis Mukharjee, "UnSeGArmaNet: Unsupervised Image Segmentation using Graph Neural Networks with Convolutional ARMA Filters", 35th British Machine Vision Conference (BMVC), 2024

Abhishek Tiwari, Rajeev Kumar Singh and **Saurabh J. Shigwan**, "SwinDTI: swin transformer-based generalized fast estimation of diffusion tensor parameters from sparse data" Neural Computing and Applications, Springer, 2023

Abhishek Tiwari, Ananya Singhal, **Saurabh J. Shigwan**, Rajeev Kumar Singh, "Early Diagnosis of Alzheimer through Swin-Transformer-Based Deep Learning Framework using Sparse Diffusion Measures" The 15th Asian Conference on Machine Learning (ACML 2023)

Abhishek Tiwari, Ananya Singhal, **Saurabh J. Shigwan**, Rajeev Kumar Singh, "Deep Learning Framework using Sparse Diffusion MRI for Diagnosis of Frontotemporal Dementia", IEEE/CVF International Conference on Computer Vision, BioImage Computing Workshop, ICCV 2023

Abhishek Tiwari, **Saurabh J. Shigwan** and Rajeev Kumar Singh, "Validation of Deep Learning techniques for quality augmentation in diffusion MRI for clinical studies" Elsevier NeuroImage: Clinical Q1 SCI Journal Impact Factor = 4.2

**Saurabh J. Shigwan**, Akshya Gailkwad, Suyash P. Awate, "Object Segmentation With Deep Neural Nets Coupled with a Shape Prior, When Learning from a Training Set of Limited Quality and Small Size" to appear in *International Symposium on Biomedical Imaging* (ISBI-2020), Iowa City, USA

**Saurabh J. Shigwan**, Suyash P. Awate, "Hierarchical generative modeling and Monte-Carlo EM in Riemannian shape space for hypothesis testing" appeared in *Medical Image Computing and Computer Assisted Intervention* (MICCAI-2016), Athens, Greece

Akshya Gailkwad, **Saurabh J. Shigwan**, Suyash P. Awate, "A statistical model for smooth shapes in Kendall shape space" appeared in *Medical Image Computing and Computer Assisted Intervention* (MICCAI-2015), Munich, Germany

**EDUCATION**

**PhD, Computer Science (CGPA: 8.85/10)** *Jul' 14 - August' 20*
CSE, Indian Institute of Technology Bombay, Maharashtra, India
Thesis title: **Hierarchical Pointset-Based Statistical Shape Modeling and Applications**

**MTech, Computer Science (I Class)** *Jul' 12 - Jul' 14*
MIU, Indian Statistical Institute Kolkata, West Bengal, India
Thesis title: **Shot Boundary Detection in Video**

**BE, Computer Engineering (I Class)** *Jul' 07 - Jul' 11*
University of Mumbai, Maharashtra, India