Niraj Mahajan

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EDUCATION

UC San Diego   La Jolla, CA
Master's in Computer Science   Sept 2022 – June 2024
- Courses: Deep Generative Models, Computer Vision, Design and Analysis of Algorithms   *Expected completion by Fall 2022*

Indian Institute of Technology Bombay | **GPA: 9.33**   Mumbai, India
Bachelor of Technology with Honors, Major: Computer Science and Engineering   Jul 2018 – May 2022
- Activities: Teaching Assistant (Computer Vision: Theory and Lab, Digital Image Processing), CSEA General Secretary
- Courses: Medical Vision, Computer Vision, Reinforcement Learning, Image Processing, Fairness in ML, AI, ML with Graphs

EXPERIENCE

University of Illinois Urbana-Champaign   Illinois, USA
Research Intern   July 2020 – April 2021
- Replicate the FC computation using gaussian clustering on the convolutional outputs to enhance their explainability
- Developed a novel algorithm based on shifting and shrinking class clusters as trainable parameters in the convolutional space

UNSW, Canberra   Canberra, Australia
Research Intern   April 2020 – July 2020
- Employed ResNet in a siamese network for predicting the 3D registration parameters on synthetically generated femur images
- Incorporated a half dark channel filter algorithm to trim the soft tissue pixels from the clinical knee CT images

RESEARCH PROJECTS

Weak Supervision for Medical Abnormality Classification   IIT Bombay
- Achieved state-of-the-art segmentation on the BUSI dataset by using Pyramid Scene Parsing and Efficient Spatial Pyramid Blocks
- Developed an end-to-end classifier-segmenter pipeline to classify BUSI images using weak supervision for training the segmenter

Recurrent Neural Networks for Analysing 3D Medical Data   IIT Bombay
- Formulated 3D MRI images as a time series and tried several time series methods to tackle medical vision problems
- Devised a method to induce artifacts in MRI images by distorting the Fourier domain pixels to simulate patient movement

Conditional Diabetic Retinopathy Image Synthesis   IIT Bombay
- Incorporated a Pix2Pix Network, conditioned over the DR grade to generate grade-controlled abnormality images
- Optimised the process with a two-stage pipeline by generating the blood vessel structure followed by populating the fundus pixels

Location Controlled Brain Tumour Image Synthesis   IIT Bombay
- Devised a pipeline for generating location-controlled abnormality in 2D brain MRI images using Controllable GANs
- Designed a rectifier model based on a Context Encoder with a Pix2Pix backbone to generate corresponding healthy images

Matched Filtering Based Convolutional Blocks   UIUC
- Computed classwise representative filters from the activations of different regions of input images as perceived by the conv layers
- Visualised the features extracted by these filters based on their convolutional output at various spatial locations

KEY TECHNICAL PROJECTS

Deep Retinex Decomposition for Low-Light Enhancement   Fall 2021
- Implemented a neural network pipeline for separating and enhancing the reflectance and the illumination components of images

Domain Adaptable Feature Learning for Localisation   Fall 2021
- Performed Weakly Supervised object localisation for digit detection using feature detection with CAMs and saliency maps

Fischer Faces for Facial Recognition   Fall 2020
- Highlighted the performance of Fischer's LDA for face recognition in varying lighting & intra-class variance conditions

Popular Link Prediction Algorithms for Social Networks   Fall 2020
- Surveyed heuristic-based algorithms like Adamic Adar, Katz Measure, Preferential Attachment on link prediction applications

Face Ageing using GANs   Spring 2020
- Designed and trained a cGAN to induce two-way facial age transformation on images using an AlexNet-based age classifier

SKILLS

Languages	*(Fluent)* Python, Git, Matlab, *(Familiar)* C++, SQL, Bash, Java, C, HTML/CSS, JavaScript, Make, CMake
Libraries	PyTorch, OpenCV, Scipy, NumPy, Pandas, Matplotlib, Keras, TensorFlow