

Fnu Mallika (Mallika Singh)

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EDUCATION

MSE in Biomedical Engineering, Johns Hopkins University

Courses: Deep Learning, Machine Learning for Signal Processing, Medical Imaging Analysis, Medical Imaging Systems

B.Tech in Biomedical Engineering, Manipal Institute of Technology, Manipal

Courses: Object Oriented Programming, Artificial Neural Networks

SKILLS

Python, PyTorch, Torchio, SimpleITK, Nibabel, Scikit, Pandas, Keras, Linux, Windows, Machine Learning, Deep Learning, Image processing, Medical image analysis, segmentation, image translation, object detection, MATLAB, Shell Scripting, Pattern recognition, object-oriented programming

TECHNICAL EXPERIENCE

Research Assistant / Musculoskeletal Informatics Group

Boston Children's Hospital - Harvard Medical School, Boston, MA

- Development and Validation of our **VirtualHip** pipeline that analyzes clinical hip CT scans to identify areas of hip impingement. Built a robust segmentation module to segment hip bones and landmarks based on UNet.
- Incorporated a data validation and processing pipeline to streamline the extraction of radiology scans from the hospital database. Created a unique database containing over 24000 pediatric hips.
- **Knee healing:** Part of a team responsible for analyzing ACL healing as a part of an IRB and FDA-approved clinical trial. Incorporated surrounding soft tissues to better assess the healing of the whole knee and ACL.
- **Image synthesis:** Generating Synthetic images for hip (CT) and knee from existing MRI scans to expand the scope of our projects.
- **Predicting surgical outcomes:** Finetuned language models (BERT, Clinical BioBERT) to extract keywords to predict outcomes.
- Mentoring interns to streamline data annotation, and to utilize existing data to come up with better quality control solutions.

Research Assistant / IACL Lab

Johns Hopkins University, Baltimore, MD

- **Total Intracranial Volume (TIV) Estimation:** Developed a multi-modal image synthesis and segmentation model using MRI and CT Brain scans. The modified GAN network showed significant improvements for both tasks when compared to individual baselines.
- Produced a semi-manual segmentation protocol using ITKSNAP and MIPAV software. Reduced time to annotate one scan by 25%.
- Student mentor for the REU (undergraduate) summer program. Planned a detailed weekly research plan and organized weekly meetings to clarify doubts, and track progress.

Student Strategy Consultant

Dassault Systèmes - Johns Hopkins University, Baltimore, MD

- Investigated and assessed Dassault's portfolio for potential applications in the Alzheimer's industry.
- Analyzed and proposed business models for software as a medical device to provide business strategies to personalize the Alzheimer's market using Dassault's project portfolio.

ADDITIONAL EXPERIENCE

- Adaptive Deep Brain Stimulation — DBS: (Creating an application on MATLAB that will generate a stimulus pulse when a tremor is detected. The application was designed to treat tremors caused by Parkinson's Disease. Tech: MATLAB)
- Multimodal Brain Tumor Segmentation & Survival Rate Prediction using the BraTS: Implemented a hybrid and a machine learning-based segmentation method to segment and classify the tumor into the histological sub-regions of gliomas. A random forest regression model was used to estimate the survival rate. Tech: Python, UNet, PyTorch, KNN, K-Means.
- Chest X-Ray Segmentation and Nodule Detection: Using CNNs 3D U-Net to segment the lungs and the heart, identify lung nodules, and classify the nodules as malignant or benign.
- A Review and Feature Analysis of CNNs for COVID-19 Detection in CT Slices: Employed various CNNs such as (AlexNet, VGG-16, GoogLeNet, ResNet-50) to understand network learning and to visualize features. Used GradCam and Smooth Cam to visualize the heatmaps.
- Look Who's Talking: Reconstructing faces from voices: Employed a Generative Adversarial Network (GAN) to synthesize face images from voice samples using the EmoVoxCeleb dataset. Added an emotion recognition module that improved the reconstructed faces images.