**SAHIL NALAWADE**

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**LinkedIn:** <https://www.linkedin.com/in/sahilnalawade/> | **GitHub:** <https://github.com/Sahilnalawade>

**Google Scholar:** <https://scholar.google.com/citations?hl=en&user=NyYGcy8AAAAJ>

**Summary**

Passionate machine learning researcher dedicated to creating useful machine learning solutions to meet dynamic business and customer needs. Experienced project and team lead proficient in ML/AI solutions for improving medical workflows.

**Skills**

* **Primary skills**: Machine learning algorithms, Deep Learning application, Artificial Intelligence techniques, Model Deployment, Image processing, Neuroimaging data analysis, statistical and quantitative approach.
* **Programming Tools**: Python, Matlab, R, Shell, Linux
* **Architectures**: Neural Network, CNN, DNN, GAN, VAE, Auto-encoders, Inception, Res-Net, Dense-Net, SE-Net, Efficient-Net, LSTM, Vision Transformers
* **Libraries for Machine Learning**: Keras, Tensorflow, PyTorch, JAX, FLAX, Theano, Scikit-Learn (CPU, GPU or CUDA), Nvflare, Monai
* **Libraries for Image processing**: OpenCV, SimpleITK, Nibabel, NiPy, NiLearn, Scikit-Image, Scipy
* **Data visualization tools**: Matplotlib, seaborn, ggplot
* **Cluster and Cloud computing**: GCP, SLURM, HPC, AWS, Azure, Kaggle kernels
* **Troubleshooting**: GeeksforGeeks, Github, Stackoverflow, Kaggle, Leet code
* **Statistical Tool and Analysis:** R programming, Microsoft office, Regression analysis, t-test, ANOVA
* **Soft Skills**: Communication, critical thinking, positive attitude, teamwork, leadership, mentoring and meeting deadlines

**Experience**

Bio-informatics Team at Dana-Farber Cancer Inst. (Harvard) Boston, MA. **08/2021 to Current**

**Data Scientist**

* **Organ Segmentation** was performed for pancreas. Vision transformer network were used for segmenting the pancreas and surrounding organs.
* **Implemented** various vision transformer networks for the project of organ segmentation. Vision Transformer, Medical Transformer and Swin-Unetr for the semantic segmentation were implemented.
* Pipeline for detecting **Pancreatic ductal adenocarcinoma cancer** was executed with accuracy around 87% on the held-out test set. Visualizations were created for better illustrations of the results and methodology of the project.
* This approach was performed using unsupervised learning, and phenotype mapping. Phenotype mapping used (ICD, SNOMED, RXNORM, CPT and LOINC) different medical codes for unsupervised classification.
* Federated Learning pipeline was implemented using Nvidia Package (NVFlare). This was a pilot study for the deploying the framework across different clients. The pilot study was tested with different frameworks including pytorch, tensorflow, and numpy.
* Currently working on Federated learning project using Rhino Health package for executing a federated evaluation platform for testing a pre-existing pipeline across different client.
* Tested different packages for body composition analyses on the publicly available abdominal CT cases. The test pipeline was updated, maintained, and docker containers were created for ease of implementation for different clients.
* Organ radiomics pipeline was designed to extract features using segmented volumes and radiomics package. This package was tested using in-house dataset.
* Performed thorough literature review for the topics of semantic, lesion and organ segmentation task in the medical domain.
* Presented literature review on the task of Pancreas semantic segmentation, PDAC classification and self-supervised learning.

ANSIR Lab at UT Southwestern Medical Center, TX **08/2017 to 08/2021**

**Research Associate**

* **Semantic segmentation** for segmenting brain tumor into 3 tumor subtypes (edema, non-enhancing and enhancing tumor) using 2D and 3D segmentation algorithm (Dice Score for Whole Tumor = 90.40%)
* Rigorous model evaluation for segmentation and uncertainty scores with emphasis on different tumor types.
* Comparative study of classifying brain tumor images with molecular subtype (IDH) using different CNN architectures such as Dense-Net, Res-Net and Inception-V4 (image analysis/processing or computer vision)
* **Classification** of MR Images into different molecular subtypes such as IDH mutation status, 1p/19q co-deletion status, MGMT methylation status, and EGFR status. (Accuracy = 80.09% to 97.14%)
* Predictive 2D and 3D classification and segmentation models were used for the molecular / genomic classification task.
* **Improving resolution** (super-resolution or image reconstruction) of medical images using deep learning architectures such as GAN, 2D Dense-Net and Se-Net.
* Motion artifact correction using deep learning algorithm was designed, trained and deployed achieving greater than 99% of SSIM and 56 dB of PSNR for MR Images with 100% corruption.
* Motion correction algorithm was used to improve the spatial resolution for motion corrupted medical images, Testing was performed on both simulated and clinical dataset.
* Extensive study for effects of image artifact and artifact correction on the classification network was determined using deep learning which includes training and testing on multiple networks with varied datasets
* **Super resolution network** (SR-Net) was designed for improving the quality of low resolution ASL Images using 3D CNN, which involves patch-wise training and testing of MR Images
* Cross-Modality Net (CM-Net) was designed using 3D Dense-Net for improving the resolution of ASL, FLAIR and T1 MR Images
* Predicting survival using classical machine learning networks such as decision trees, SVM, random forest and gradient boosting for glioma and lymphoma subjects. MR images and clinical features were used for feature extraction, feature engineering, training and testing. (Accuracy=55.2% to 81.4%)

Medical Imaging Device Lab at UT Arlington, TX **09/2015 to 06/2017**

**Research Assistant**

* Neuro-imaging using both modalities F-NIRS and EEG for building a relationship between neuronal signals and blood flow in frontal part of the brain, worked on hardware and software design.
* Designed Image processing pipeline for MRI and F-MRI Images using algorithm such as ICA, PCA, machine learning, noise removal, segmentation, binary operations
* Developed a single wavelength based blood perfusion measuring device, using non – invasive optical technology, LabVIEW and Matlab algorithm, performed FDA and IRB approved experiments for measuring blood flow
* Performed design of experiments, data analysis, quality checks, statistical analysis using Logistic and multiple linear regression models, Anova, and t-tests.

Service Team at GE Healthcare, India  **03/2011 to 08/2015**

**Service Engineer**

* Detecting errors in the production and pharmaceutical delivery system (process) for Medical Cyclotron. Unit cycle time saved by over 40% by cost saving & process improvements.
* Supported & improved manufacturing line by implementing engineering changes in compliance to ISO, FDA regulations

**Education**

**Master of Science**, Biomedical Engineering **May, 2017**

**The University of Texas**, Arlington, Texas

* 4.0 GPA
* Ranked in top 8% of class
* Tau Beta Pi Honor Member
* Completed coursework in Medical Imaging, Optical Imaging, Medical Image processing, Programming

**Bachelor of Engineering**, Biomedical Engineering **August, 2010**

**Vidyalankar Institute of Technology**, Mumbai, India

* 3.55 GPA
* Completed coursework in Signal Processing, Matlab, and Medical Imaging

**Publications** (Google Scholar Link - <https://scholar.google.com/citations?hl=en&user=NyYGcy8AAAAJ>)

* **Nalawade, S. S.**, Bangalore Yogananda, C. G., Wagner, B. C., Reddy, D., Das, Y., Fang, F. Y., ... & Maldjian, J. A. (2022). Federated Learning for Brain Tumor Segmentation Using MRI and Transformers. In *International MICCAI Brainlesion Workshop* (pp. 444-454). Springer, Cham.
* **Nalawade, S.S.**, Murugesan, G. K., Vejdani-Jahromi, M., Fisicaro, R. A., Yogananda, C. G. B., Wagner, B., ... & Maldjian, J. A. (2019). Classification of brain tumor isocitrate dehydrogenase status using MRI and deep learning. Journal of Medical Imaging, 6(4), 046003.
* **Nalawade, S.S.**, Fang, F. Y., Yogananda, C. G. B., Murugesan, G. K., Shah, B. R., Pinho, M. C., ... & Maldjian, J. A. (2020). Brain Tumor IDH, 1p/19q, and MGMT Molecular Classification Using MRI-based Deep Learning: Effect of Motion and Motion Correction. bioRxiv.
* Yogananda, C. G. B., Shah, B. R., Yu, F. F., Pinho, M. C., **Nalawade, S. S.**, Murugesan, G. K., ... & Maldjian, J. A. (2020). A novel fully automated MRI-based deep-learning method for classification of 1p/19q co-deletion status in brain gliomas. Neuro-oncology advances, 2(1), vdaa066.
* Bangalore Yogananda, C. G., Das, Y., Wagner, B. C., **Nalawade, S. S**., Reddy, D., Holcomb, J., ... & Maldjian, J. A. (2022). Disparity Autoencoders for Multi-class Brain Tumor Segmentation. In *International MICCAI Brainlesion Workshop* (pp. 116-124). Springer, Cham.