SUSMITA GHOSH

Kolkata, West Bengal

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CARRIER OBJECTIVE

I aim to solve complex business problems by applying my strong foundation in machine learning, deep learning, and data analysis, along with extensive experience in image processing and build scalable models that drive innovation and improve business outcomes.

PROJECTS

- **Multi-task Learning for Breast Tumor Segmentation and Malignancy Detection:** To create a lightweight model that simultaneously performs segmentation and disease detection tasks using spatial and channel attention mechanisms, improving performance while reducing computational complexity.

- **Morphology-Integrated UNet for Medical Image Segmentation:** To enhance medical image segmentation by integrating trainable multi-scale morphological operations into UNet, improving accuracy and adaptability to irregular shapes and sizes of ROIs, while maintaining efficiency across diverse medical datasets.

- **COVID1-19 Detection from Chest-xray**: The primary objective of this project was to develop an automatic diagnostic system that could efficiently and accurately detect COVID-19 from chest radiographs. The project aimed to address the limitations of existing models by integrating spatial and spectral features extracted from medical images, which had not been widely explored in previous studies. By transforming the images into the spectral domain using Discrete Cosine Transform (DCT) and Discrete Wavelet Transform (DWT), the goal was to capture complementary information that spatial features alone might miss, leading to more reliable predictions.

- **Improved Vision Transformer for Medical Image Classification:** An improved version of the Vision Transformer, specifically designed to capture the complex and subtle attributes essential for medical image classification. These adaptations tackle the challenges of accurately classifying medical images, where precise feature recognition is crucial for diagnosis. The project aims to elevate classification performance across diverse medical datasets compared to standard ViT models, ultimately delivering a more robust solution for medical diagnostics

- **Classification of Cognitive States During Bistable Perception Using MEG Data:** To classify cognitive states—transition and maintenance—during bistable perception using magnetoencephalogram (MEG) data. The project aimed to develop an automatic method for identifying these internal mental states, which are difficult to label and short-lived, through spatio-temporal feature extraction.

TECHNICAL SKILLS

- Python, PyTorch, Keras/TensorFlow, MatLab, Keras, NumPy, Scikit Learn, OpenCV, Albumentations, CNN, U-Net, Transformer, ANN, SVM

SOFT SKILLS

- Adaptable, Attention to Detail, Responsible, Quick Learner, Positive Minded

PUBLICATIONS

- Ghosh, Susmita, and Swagatam Das. "Multi-scale morphology-aided deep medical image segmentation." Engineering Applications of Artificial Intelligence 137 (2024): 109047.

- Ghosh, Susmita, and Swagatam Das. "Enhancing Medical Image Analysis with MA-DTNet: A Dual Task Network Guided by Morphological Attention." International Conference on Pattern Recognition. Springer, Cham, 2025.

- Ghosh, Susmita, Swagatam Das, and Rammohan Mallipeddi. "A deep learning framework integrating the spectral and spatial features for image-assisted medical diagnostics." IEEE Access 9 (2021): 163686-163696.

- Sen, Susmita, Syed Naser Daimi, Katsumi Watanabe, Kohske Takahashi, Joydeep Bhattacharya, and Goutam Saha. "Switch or stay? Automatic classification of internal mental states in bistable perception." Cognitive Neurodynamics 14 (2020): 95-113.

- Sen, Susmita, Katsumi Watanabe, Joydeep Bhattacharya, and Goutam Saha. "Decoding mental states in bistable perception by using source based wavelet features.", 2017 IEEE CALCON, pp. 144-149. IEEE.

- Sen, Susmita, Syed Naser Daimi, Katsumi Watanabe, Joydeep Bhattacharya, and Goutam Saha. "A machine learning approach to decode mental states in bistable perception." In 2017 international conference on information technology (ICIT), pp. 1-6. IEEE, 2017.

- Ghosh, Susmita, and Swagatam Das. "Adaptive Feature Mixing with Vision Transformers for Clinical Image Analysis" Under review in Applied Soft Computing.

ACADEMIC ACHIEVEMENTS AND PROFESSIONAL ACTIVITIES:

- The AMIYA KUMAR PUJARI Best Paper Award for the best paper presentation in the 16th International Conference on Information Technology (ICIT - 2017) held during Dec. 21-23, 2017, Bhubaneswar.

- Teaching Assistant: Biomedical Signal Processing, January 2016 - June 2016 in the Department of Electronics and Electrical Communication Engineering, Indian Institute of Technology Kharagpur.

- Lecturer and Speaker: Seventh (2022), Eighth (2023), Ninth (2024) "Summer School on Computer Vision, Graphics and Image Processing", an initiative by ISI, Kolkata. Regular lecturer in the "Winter School on Deep Learning" (WSDL 2022, 2023, and 2024) at ISI, Kolkata.

- Supervised: 10+ undergraduate and graduate research interns from various notable academic institutes (such as ISI, Jadavpur University, IIT Madras, Cornell University, Assam University, Kalyani University etc.) from 2022.

EDUCATION

- **PhD in Computer Science, ISI, Kolkata**   *July 2018 – Present*
  Thesis Title: Enhancing Medical Image Analysis through Deep Learning: A comprehensive Study on Classification, Segmentation, and Multitask Learning.

- **Master of Science (M.S.), IIT Kharagpur**   *July 2014 – July 2018*
  Specialization: Biomedical signal processing, CGPA: 9.69
  Thesis Title: A Machine Learning Approach to Decode Internal Mental States in Bistable Perception from Magnetoencephalogram.

- **Bachelor of Engineering,** UIT, West Bengal   *July 2008 - June 2012*
  Score (TCPA): 80.00

- **Pre-Degree Examination,** Visva Bharati University, West Bengal   *June 2008*
  Score: 91.09%

- **School Certificate Examination,** Visva Bharati University, West Bengal   *June 2006*
  Score: 88.22%