AGNISH BHATTACHARYA

Email LinkedIn GitHub Scholar Webpage

EDUCATION

B.E. in Electrical Engineering	Jadavpur University **(CGPA: 9.22/10)**	*Nov 2020 - Jun 2024*
ISC (Class XII)	St. Xavier's Institution **(98.25%)**	*Mar 2018 - Mar 2020*
ICSE (Class X)	St. Xavier's Institution **(98.2%)**	*Mar 2013 - Mar 2018*

RESEARCH PUBLICATIONS

- **Agnish Bhattacharya**, Biswajit Saha, Soham Chattopadhyay, Ram Sarkar, "Deep Feature Selection using Adaptive β-Hill Climbing aided Whale Optimization Algorithm for Lung and Colon Cancer Detection," (*Published in **Biomedical Signal Processing and Control, ELSEVIER***).
- Faizanuddin Ansari, **Agnish Bhattacharya**, Biswajit Saha, Swagatam Das, "**Mo2E: Mixture of Two Experts for Class-Imbalanced Learning from Medical Images**," (*Presented at **IEEE ISBI, 2024***).

RESEARCH EXPERIENCE

Indian Statistical Institute, Kolkata, India *Aug 2022 - Jun 2024*
Research Intern, ECS Unit — Advisor: Dr. Swagatam Das

- Learned about advanced **Data Augmentation** & **Imbalance-handling** methodologies.
- Developed **MixUp** methods & **Bias-Mitigation** techniques for improved classification of minority classes.

Indian Institute of Technology, Kanpur, India *May 2023 - Jul 2023*
Research Intern, Comp-Bio Research Group — Advisor: Dr. Hamim Zafar

- Developed an architecture for **graph representation learning** on multi-omics data.
- Analyzed complex biological data for tissue-wise cell clustering.

Leiden Medical University, Netherlands (LOR) *Aug 2022 - Jun 2023*
Research Intern, Division of Image Processing — Advisor: Dr. Marius Staring

- Worked on generative modeling of living cell shapes using **Neural Implicit Functions**.
- Learned about 3D-image reconstruction and **Generative Adversarial Networks**.

Jadavpur University, India *Feb 2022 - Sep 2022*
Research Assistant, CMATER Lab — Advisor: Dr. Ram Sarkar

- Developed meta-heuristic hybrid **feature-selection algorithms** for computationally effective classifications.
- Composed **semantic segmentation architectures** and performed **loss function engineering**.

INDUSTRIAL EXPERIENCE

Sumitomo Mitsui Financial Group (SMFG) India Credit, Mumbai, India
Assistant Manager - Analytics *Jun 2024 - Present*

- Developed application scorecards for personal loan approvals, reducing bad rates by $\sim$ 18%. The process involved a **vintage study**, **capture-conversion**, and **roll-rate analysis** to identify the bad definition, followed by feature engineering (**IV**, **colinearity checks**), model development and validation (**K-S**, **Gini**).
- Conducted in-depth bad rate and volume analysis to identify regions for product expansion; performed peer analysis for **cross-selling opportunities**; devised a **cut-off strategy** to increase product profitability by $\sim$ 200 bps.
- Filtered bureau variables and identified risky segments using **Decision Trees**, **XGBoost**, and **Linear Regression** algorithms; developed an automated NCL tracker utilizing predictive multipliers like **PD**, **LGD** & **EL Adj. factor**.

RESEARCH INTERESTS

Broad Interests	Computer Vision, Deep Learning, Generative AI, Medical Image Analysis
Specific Interests	Semi & Self-Supervised Learning, Multimodal Learning, Diffusion Models

ONGOING PROJECTS

- **Spatial Multi-omics integration using Graph Variational Auto-Encoders**(*Manuscript to be submitted to **Nature Communications***) (Project Link)
  • Developed a novel framework that leverages a '**Graph Variational Auto-Encoder**' and an '**Adaptive Spatial Attention**' mechanism to integrate high-dimensional multiomics data into a unified low-dimensional latent space.
  • The framework incorporates a '**CLIP**' inspired loss function to precisely represent the similarity between the data points in the embedding, for accurate final clustering of the cells in a tissue sample.
- **Bridging the Bias Gap: Contrastive Learning Meets Proto-Topical Loss**(*Manuscript submitted to **IEEE ICASSP, 2026***)
  • Developed a bias class-based contrastive proto-topical loss to overcome the effect of inherent biases in datasets.
  • The proposed method focuses on reducing the distance between data points sharing the same target class but differing in biasing attributes, enhancing the model's ability to distinguish between different classes effectively.
- **PITSNet: A Poly-Attention Intel Transfer Segmentation Network** (Project Link)
  • Developed a state-of-the-art skin lesion segmentation architecture using a **ConvNeXT** encoder and a bottleneck decoder (compression ratio 0.25), enhanced with **attention-based squeeze-excitation modules** for efficient feature transfer across layers.
  • The model achieved benchmarking IoU and Dice scores of 0.948 and 0.974 respectively on the ISBI-2016 dataset.

OPEN-SOURCE PROJECTS

- **Automated E-commerce Product Listing Framework** (Project Link)
  A tool to automate product listing from social media content by processing audio and visual data; implemented **Katna** for keyframe extraction, **Whisper** for audio transcription, **YOLO v11** for object detection, and **Gemini** for generating product descriptions, keeping **Langchain** as the base and hosted using **MongoDB** and **Streamlit**.
- **Melanoma detection through Semantic Segmentation using U-Net** (Project Link)
  Illustrated a pipeline to generate near to accurate masks by performing Semantic Segmentation on the **PH2** dataset using U-Net, followed by feature extraction and classification using **EfficientNet-b4-widese**.
- **Deep feature extraction from CNNs followed by optimization with GA**(Project Link)
  Developed a project based on the deep analysis and optimization of histopathological image samples of the **BreakHis** dataset to classify the breast tumor tissue into benign or malignant, with the feature space further optimized using **Genetic Algorithm** to reduce the computational burden.
- **SARS-CoV-2 detection using SVM, MLP and KNN models** (Project Link)
  Designed a framework to classify the covid lung CT-Scan images by extracting **Gabor**, **GLCM**, and **Haralick** features from the SARS-COV-2 CT-Scan dataset and applying different classification models on them.

TECHNICAL SKILLS

Languages	Python, C/C++, SAS, SQL, R, Matlab
Tools & Frameworks	PyTorch, TensorFlow, Langchain, OpenCV, Pandas, NumPy, SAS Viya, AWS, MS Excel
Development	HTML, CSS, Streamlit, Shell Utilities, Git

COURSEWORK

- Digital Signal Processing
- Sequential Systems and Microprocessors
- Mathematics and Statistics
- Control Systems
- Advanced Instrumentation
- Database Management Systems

ACHIEVEMENTS/AWARDS

- **Department Rank 2** (Silver Medalist), Jadavpur University and WBJEE (2020) Rank **701/1L (99.3 %ile)**
- **AIR 7** at the Secondary Examinations (ICSE) and **AIR 8** at the Higher-Secondary Examinations (ISC)
- **SURGE-2023 Research Fellowship** by Indian Institute of Technology, Kanpur (Certificate)