

ROHAN BISWAS

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github.com/RohanBiswas67/ rohan-biswas-portfolio.vercel.app

Professional Summary

Computer Science graduate with hands-on experience in machine learning and quantum computing research. Developed a speech processing system for Indian languages that achieved accuracy of 90%, implemented quantum error correction codes (80% success rate) and built multiple ML projects using PyTorch/TensorFlow. Passionate about applying technical skills to solve real-world problems in NLP and AI research.

Education

Tezpur University

Bachelor of Technology(B.Tech) in Computer science and Engineering

November 2021 – June 2025

Tezpur-784028, Assam, India

Projects

Hybrid Classical Quantum Audio Watermarking

Python, IBM Qiskit, Numpy, Librosa

[Ongoing]

- Developing an extremely novel approach to combine Quantum as well as Classical Approach to create and embed watermark for secure Intellectual Property.
- Involves unique Signal Processing, Quantum Information, and Mathematical concepts for a noise tolerant, resilient, and secure pipeline for audio signal watermarking.
- Partially completed. Working on further improvement of the pipeline.
- Started as final year project, but continuing as a personal project.

Portfolio Site

Astro JS, Node JS, ReactJS, Tailwind CSS, Three JS

[January 2025]

- Developed a personal portfolio website that effectively showcases projects and research interests, increasing visibility and engagement with potential collaborators.
- Implemented interactive 3D visualizations using Three.js to enhance user engagement.
- Integrated a responsive design with Tailwind CSS for optimal viewing across various devices.
- Deployed the site using Vercel for reliable hosting and performance.
- The live portfolio can be viewed at: rohan-biswas-portfolio.vercel.app

Adaptive PCA-Based Portfolio Decomposition of Global Index Strategies

Quantitative Research, PCA, Regime Detection, Backtesting, Alpha Generation

[June 2025 - June 2025]

- Built a full-stack quantitative research pipeline analyzing 9 global index strategies (Market Cap, Equal Weight, ESG, Momentum, etc.) across US and Indian equity markets.
- Applied Principal Component Analysis (PCA) to extract latent factors from daily log returns and construct synthetic portfolios based on eigenvectors (PC1 as market beta, PC2 as defensive tilt).
- Implemented Rolling PCA (60-day) to track dynamic shifts in factor dominance, enabling regime detection and structural variance decomposition across time.
- Designed an Adaptive Allocation strategy by reallocating exposure between PC1 and PC2 portfolios based on real-time PCA variance signals.
- Outperformed both static portfolios and the S&P 500 benchmark: achieved Sharpe Ratio of **2.45** (vs 0.63 for S&P 500) with lower volatility, using interpretable unsupervised signals.
- Demonstrated expertise in asset class diversification, dimensionality reduction, market structure inference, and signal-driven portfolio construction.
- GitHub repository (code + notebooks + visualizations): github.com/RohanBiswas67/Quant/tree/main/week1task1_pca

Speech Segmentation, Word Discovery, & Automatic Phonetization of Indian Native Languages

NLP, Speech Processing, XAI

[December 2024]

- Developed a system for speech segmentation, word discovery, and phoneme recognition tailored to native Indian languages, addressing linguistic diversity and under-representation in technology.
- Utilized Explainable Non-Negative Matrix Factorization (XNMF) for enhanced segmentation accuracy to about 90%.
- Demonstrated expertise in preprocessing techniques (noise reduction, spectrogram generation), feature extraction (MFCC, spectral analysis), and segmentation methods (ZCR, STE, and Dynamic Time Warping).

- The project therefore contributes to multilingual NLP tools, language preservation, and cultural empowerment.
- The link to the github repository of the project : github.com/RohanBiswas67/Segmentation

Speech-Based Disease Predictor

ASR, NLP, Transformers, Pandas

[September 2024]

- Utilized the *SpeechRecognition* library to convert user speech into text for symptom extraction.
- Applied the *BERT tokenizer* to accurately tokenize and match symptoms from the speech input.
- Built a disease prediction model that compares extracted symptoms against a custom dataset of diseases using *Pandas*, ranking potential matches based on symptom overlap.
- Provided users with recommendations for further tests or medical consultation if multiple diseases were detected.
- Accuracy of about 75% achieved with the symptom dataset used here.
- The link to the github repository of the project : github.com/RohanBiswas67/Speech-Based-Disease-Identification

Image Denoiser

Python, Flask, OpenCV

[September 2023]

- Developed a web application using Python, Flask, and OpenCV to enhance image quality by reducing noise and imperfections with about 70% accuracy.
- Utilized the Flask framework to create a user-friendly web platform for image processing.
- Enabled users to enhance image quality by applying advanced noise reduction techniques, improving user satisfaction and engagement.
- Implemented various Denoising Algorithms and Techniques like NLM, Bilateral Filter, Gaussian and Median Blur, Wavelet Denosing, Total Variation, BM3D, Anisotropic Diffusion and Deep CNN
- The link to the github repository of the project : github.com/RohanBiswas67/Image-Denoiser
- The live project can be viewed and tested at : image-denoiser.onrender.com

Technical Skills

Languages: Python, C/C++, JavaScript, MATLAB , PHP, x86_64

Database Management Systems: MySQL, PostgreSQL, MongoDB, Apache Cassandra

Technologies/Frameworks:

- **Web development:** ReactJS, ExpressJS, NodeJS, Django, Flask, Astro.js
- **Machine Learning/ Deep Learning:** Scikit-Learn, Tensorflow with Keras, PyTorch, OpenCV, Transformers, NLTK
- **Others:** Git/GitHub, IBM Qiskit

Experiences

IASc FAST-SF Summer Research Intern

June 2024 – July 2024

Department of Electrical Communication Engineering, Indian Institute of Sciences

Bangalore-560012, Karnataka, India

- Investigated Quantum Noise impact on information transmission and applied Quantum Error Correcting codes to enhance signal retrieval accuracy to 80%.
- Successfully implemented the [5,1,3] quantum error correcting code using codeword stabilized codes, enhancing the reliability of quantum information transmission, and improving the fidelity by 75% as compared to other conventional techniques.

Licenses / Certifications

Qiskit Global Summer School 2023

June 2023- August 2023

Quantum Excellence

IBM Quantum

- Demonstrated exceptional problem-solving skills by completing 100% of lab tasks on time, earning recognition for Quantum Excellence.
- Gained hands on experience on several topics in Quantum Computation and Quantum Information sciences including Quantum Algorithms.