Omkar Oak

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Education

College of Engineering Pune (COEP) — Pune, India
Bachelor of Technology in Computer Engineering, **GPA: 9.46/10** — Aug 2021 - May 2025
- **Department Rank:** 2 out of 180
- **Minor** in Mathematics with Quantitative Finance

Experience

Wells Fargo – Certificate — Chennai, India
Technology Analyst Intern — May 2024 - July 2024

- Designed and implemented Graph algorithms using CypherQL in a Customer Network Analysis project.
- Migrated data from Hogan DB to Neo4j, a cloud-based Graph Database, improving data retrieval efficiency by 30%.
- Explored Graph ML algorithms like kernel methods and walk-based approaches such as Node2Vec to extract topological features and analyze relationships between customer portfolios.

AI Lab, College of Engineering Pune — Pune, India
Researcher Assistant — July 2024 - Apr 2025

- Conducted research under Prof. Suraj Sawant, focusing on Computer Vision and Remote Sensing applications.
- Worked on semantic segmentation and VQA models for Urban Change detection using aerial imagery under IIT-Bombay's MH Drone Mission. 1 journal paper under review.

Publications

A Novel Transfer Learning based CNN Model for Wildfire Susceptibility Prediction
Omkar Oak*, *R. Nazre, S. Naigaonkar, S. Sawant, A. Joshi,* 5th IEEE INCET 2024 [pdf]

- Proposed a novel CNN model having a reverse pyramid structure for wildfire prediction using satellite imagery.
- Our proposed model yielded the best results, with an accuracy of 96.50% and precision of 97.15% outperforming all the traditional models such as VGG16, ResNet50, Xception and InceptionV3 by a notable margin.

A Comparative Analysis of CNN-based Deep Learning Models for Landslide Detection
Omkar Oak*, *R. Nazre, S. Naigaonkar, S. Sawant, H. Vaidya,* IEEE ACOIT 2024 [pdf]

- Investigated the potential of CNNs in disaster mitigation using remote sensing images and fine-tuning hyperparameters to boost model performance.
- Performed semantic segmentation using advanced UNet based models, achieving best results with LinkNet, which provided 97.49% accuracy.

A Novel Multivariate Bi-LSTM model for Short-Term Equity Price Forecasting
Omkar Oak*, *R. Nazre, R. Budke, Y. Mahatekar,* 5th IEEE GCAT 2024 [pdf]

- Developed a Bidirectional Multivariate LSTM model for short-term stock prediction, achieving a 99.48% R2 score using hourly data from 8 years.
- Improved prediction accuracy by 3.98% over past models with 12 technical indicators selected by correlation analysis.

Projects

LEVIR-CD based Building Change Detection | *Computer Vision* [github]

- Developed a building change detection model using the LEVIR-CD dataset, leveraging Spatial-Temporal Attention Network (STANet) to enhance feature extraction from satellite imagery, achieving a recall of 0.94.
- Utilized STANet to improve precision in detecting and classifying building changes over time, with an AUC of 90.72%, effectively identifying structural modifications in images spanning 5 years.

Financial Report Summarizer | *Data Mining, NLP* **[github]**

- Developed an extractive summarizer for SEC 10K filings, boosting document processing speed by 50% and achieving a 85% summarization accuracy using NLP techniques.
- Built a complete end-to-end ML pipeline, including web scraping and information retrieval, to streamline financial report summarization.

Time Series Analysis of Forex Rates | *Machine Learning* **[github]**

- Time series analysis and forecasting using ARIMA and LSTM models for Forex rates of 37 currencies (USD,EUR,GBP) to INR for the period 2006 - 2023.
- Also covers the TSA specific data preprocessing components such as finding trends and seasonality, converting to stationary, and finding the autocorrelation function (ACF) to make it suitable for modeling.

Priority Scheduling in xv6 | *Operating Systems* **[github]**

- As part of the OS Lab, implemented priority scheduling in xv6. Utilized C and assembly language for kernel modifications, adhering to best practices in low-level programming and system architecture.
- Modified the kernel to include priority queues, allowing for dynamic adjustment of process priorities based on predefined criteria.

Image Compression using Quadtrees | *Data Structures* **[github]**

- Developed an efficient image compression technique using Quadtree data structures and utilized uniformity calculations to determine compression threshold.
- Reduced image size by up to 60% while maintaining quality and improved processing time by 25% than matrix-based image representation, writing all algorithms in C and using PPM format for storage.

Positions of Responsibility

Research Head
DSAI Club

- As the Research Head at COEP's Data Science and Artificial Intelligence Club, organized workshops, collaborated with juniors on research initiatives and coordinated industry projects exploring AI applications.

Technical Blog Contributor
Medium – **Link**

- Wrote articles on Medium, covering advanced topics in Tree based Data Structures, Deep Learning, and Data Mining. Explained complex concepts in an easy to understand manner, improving public engagement with ML technologies.

Extra Curriculars

Rowing: Won 2 Golds and 1 Silver medal as part of COEP's Row Crew in the 94th and 95th Annual Regattas.

Japanese Language: Completed the Japanese Language Proficiency Test (JLPT) N4 level certification.

Mountaineering: Enjoy hiking and rock climbing in the Western Ghats and the Himalayas.

Volunteering

Team Camouflage - Participated in cleanliness drives on the ARAI hills surrounding Pune city

Jankalyan Blood Bank - Helped in organizing and promoting Blood Donation Camps

Coursework and Skills

Computing Coursework: Operating Systems, Design and Analysis of Algorithms, Database Systems, Data Structures, Computer Networks, Artificial Intelligence, Computer Organization, Theory of Computation, Cryptography and Network Security, Compiler Construction

Math Coursework: Probability and Statistics, Linear Algebra, Vector Calculus, Partial Differential Equations, Multivariate Calculus, Discrete Structures and Graph Theory

Interdisciplinary Coursework: Fudamentals of Robotics, Feedback Control Systems, Sensors and Automation

Machine Learning: TensorFlow, Keras, NumPy, Pandas, Scikit-learn, PyTorch, OpenCV

Programming Languages: C, C++, Java, Python, R, Julia, Javascript, SQL, Cypher, LaTeX