Pavithran Sriperambuduru

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Summary

Passionate and highly motivated Computer Science undergraduate with a solid foundation in programming, data structures, and algorithms (DSA), complemented by practical, hands-on experience in machine learning, deep learning, and data science. Proficient in Python and C++, leveraging strong analytical and problem-solving skills to tackle complex challenges across various ML/AI paradigms. Actively seeking impactful internships in AI/ML engineering, research, or applied data science roles where I can contribute to cutting-edge projects and drive real-world solutions. Committed to continuous learning and innovation in the field.

Education

Indian Institute of Information Technology Kottayam   *Aug 2023 – May 2027*
B.Tech in CSE with Specialization in Artificial Intelligence and Data Science

- GPA: 8.679/10

Relevant Coursework

Deep Learning • Machine Learning • Natural Language Processing • Computer Vision • Statistical Theory • Linear Algebra • Probability Theory • Statistical Methods • Database Management Systems • Computer Networks

Technologies

Languages: Python, C++, C, Java, SQL, PHP, HTML, CSS

Libraries/Frameworks: scikit-learn, XGBoost, PyTorch, imbalanced-learn, Flask, Streamlit, Pandas, NumPy, Matplotlib, Seaborn, MNE

Tools & Platforms: Git, GitHub, Jupyter Notebook, Google Colab, VS Code, PyCharm, MySQL, Joblib

Projects

Credit Card Fraud Detection (Multi-Stage Analysis)

- Developed a full-stack machine learning pipeline for credit card fraud detection across real (2013) and synthetic (2023) datasets, tackling extreme class imbalance and concept drift.
- **2013 Dataset:** Achieved **0.8883 AUPRC** (Precision: 0.87, Recall: 0.85) using XGBoost with class weighting.
- **2023 Dataset:** Demonstrated near-perfect separation (**1.0000 AUPRC**) with Random Forest and XGBoost on balanced data.
- **Concept Drift:** Identified **94% drop in recall** from 2013-trained model on 2023 data, highlighting the importance of model monitoring.
- **Combined Training:** Consolidated both datasets (33.37% fraud), achieving **1.0000 AUPRC** using XGBoost on the merged distribution.
- **Ensemble Learning:** Built a meta-learning ensemble (Logistic Regression over XGBoost and RF), reaching **0.9990 AUPRC** and **0.9998 ROC AUC**.

NEUROPIN – EEG-Based Imagined Digit Classifier for PIN Authentication

- Designed a system to classify digits (0–9) imagined by users using EEG signals, forming the foundation for contactless 4-digit PIN authentication.
- Led ML pipeline using Kumar's EEG dataset (23 subjects, 14 channels, 128 Hz), applying wavelet denoising, bandpass filtering, and Z-score normalization.
- Extracted 343-dimensional feature vectors using time/frequency-domain metrics, Hjorth parameters, entropy, and inter-channel correlations; applied RFE for feature selection.

- Achieved **90.64% accuracy** (F1: 0.91, ROC AUC: 0.96) using Random Forest in the ML pipeline.
- Contributed to Conv1D + BiLSTM model trained on augmented samples (7,500), reaching **85.9% accuracy**; implemented jittering, Gaussian noise, and window slicing.
- Benchmarked ML vs DL performance, favoring ML for interpretability and slightly higher accuracy.

AI-Driven Demand Forecasting & Real-Time Inventory Tracker
- Built an AI-powered tool to forecast demand for perishable goods and track real-time inventory, aiming to reduce food waste by 15% and stockouts by 20%.
- Forecasted sales using Gradient Boosting on Walmart weekly sales data (2010–2012 across 45 stores); handled holiday effects and missing markdown data.
- Engineered lag features, time components, rolling averages, and interaction terms to enhance model accuracy.
- Achieved R^2 **Score: 0.9879**, accurately modeling seasonal and holiday demand trends.
- Integrated model into a Flask-based web dashboard with live stock updates, restock recommendations, and threshold alerts simulating IoT-based logic.

Experience

Summer Research Intern   *May 2025 – July 2025*
National Institute of Technology, Tiruchirappalli
Mentor: Dr. B. Shameedha Begum
- Contributed to the development of an EEG-based system for identifying individual imagined digits, forming a foundational component for future 4-digit PIN authentication systems.
- Drove the Machine Learning pipeline, applying rigorous EEG signal preprocessing techniques and comprehensive feature engineering to extract meaningful patterns for imagined digit classification.
- Successfully implemented a Random Forest classifier that achieved 90.64% accuracy for imagined digit identification, demonstrating robust performance on complex biomedical data.
- Collaborated on the Deep Learning pipeline, contributing to the development of Conv1D + BiLSTM architectures that achieved 85.9% accuracy on augmented datasets for digit classification.

Accomplishments

- Core team member of **Chitrachaya Club** at IIIT Kottayam; managed media coverage for major technical and cultural events, including *Apoorv* — the institute's largest annual fest.
- Led a team of 4 in building a complete ML pipeline for EEG-based imagined digit classification during a **Summer Research Internship** at NIT Trichy.
- Independently developed a multi-stage **Credit Card Fraud Detection** system using real and synthetic datasets, mastering concept drift, class imbalance, and ensemble learning techniques.