MIDHUN NATH K R

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Projects

Causal Attribute Engine

- **Developed Causal Model to Quantify Channel Impact**: Engineered a Bayesian Marketing Mix Model in Python (PyMC, Pandas) to move beyond correlational metrics and measure the true, incremental ROI of each marketing channel. The model successfully isolated channel effects from seasonality and market trends, revealing that 25% of marketing efforts were directed towards channels with low incremental impact, thereby identifying a potential efficiency gain of over 20%.
- **Designed a Data-Driven Budget Optimization Strategy**: Translated the causal model's outputs into an actionable strategy by building an optimization algorithm using SciPy. The algorithm's recommended budget reallocation was projected to increase the overall volume of qualified leads by 18% and improve the marketing Return on Ad Spend (ROAS) by 15%—all while operating within the existing budget framework.
- **Validated Channel Effectiveness with Experimental Design:** Formulated a rigorous A/B testing framework (geo-based experiment) to validate the model's findings for a high-spend channel previously undervalued by last-click attribution. The proposed statistical analysis projected a 12% incremental lift in conversions from this channel, providing a data-backed case to re-classify it as a key driver of top-of-funnel growth.

Dynamic Price predictor

- **Architected a Dynamic Pricing Engine to Maximize Revenue:** Developed a pricing engine in Python featuring a LightGBM demand forecasting model and a log-log regression model to estimate price elasticity. The system's optimization component, built with SciPy, was projected in back-testing simulations to **increase revenue by 12%** over a static pricing strategy.
- **Engineered a Real-Time MLOps System for Low-Latency Predictions:** Designed and deployed the pricing models within a microservices architecture using FastAPI and Docker to ensure scalability and low latency (<150ms). Implemented a CI/CD pipeline and an automated retraining workflow with Airflow to combat model drift, ensuring the system adapted continuously to new market dynamics.
- **Developed a Simulation Framework to Validate Pricing Strategies:** Constructed a historical back-testing environment to simulate the performance of different pricing strategies and their impact on revenue, profit, and price stability. This analysis identified a balanced strategy that was projected to **increase profit margins by 8%** while limiting price fluctuations to a maximum of 5% per hour, mitigating the risk of customer dissatisfaction.

Skills

Core Programming: Python,SQL,C++
Technologies: NumPy,Pandas,Docker,FastAPI
Machine Learning Skills: Scikit-learn, XGBoost,PyTorch,HuggingFace,LangChain
Big Data: Apache Spark,PostgresSQL,MySQL,Kafka
CS Fundamentals: Data Structures and Algorithms,Operating Systems,Computer Networks,Database Management Systems
Soft Skills: Problem-Solving & Critical Thinking,Stakeholder Communication & Storytelling,Team Collaboration,Business Acumen

Education

Vellore Institute of Technology **2022 - 2026**
(expected)

- Computer Science spec in AI & ML | CGPA: **8.64**

Academic and Extracurricular Achievements

- Winner of VIT android club hackathon
- Winner of VIT Buildathon
- Research paper on using Information Theory and AI for Agricultural crop prediction

Positions of Responsibility

VIT Bhopal / Android Club | Core member

- Led workshops on Android app development, teaching basics to advanced topics
- Collaborated with team members to develop club projects and demo apps