Abhiruchi Arvind Patil Bhagat

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EDUCATION

Yashwantrao Chavan College of Engineering — Nagpur, Maharashtra
B.Tech in Computer Science — Expected Aug 2026
CGPA - 8.8

EXPERIENCE

IIT Roorke — Roorke, Uttarakhand
ML Research Intern — May 2025 – present

- Researching **LLM-based Automated Traffic Rule Compliance** at roundabouts
- Formalized **traffic rules into structured machine-readable form** by converting natural language policies into **multi-task learning (MTL) objectives**.
- Designed LLM-based pipeline for automated detection of traffic rule violations in complex road scenarios.

NIT Jalandhar — Jalandhar, Punjab
ML Research Intern — May 2024 – July 2024

- Developed an ensemble regression model (Random Forest, Gradient Boosting) to predict Water Quality Index (WQI) using BOD, COD, and DO%.
- Achieved R^2 scores of 0.86 and 0.85; reduced dependency on expensive lab tests.
- Analyzed 1,637 samples from 44 stations and identified pollutant trends using temporal feature analysis

PROJECTS

SaferHood [Python, PyTorch, BeautifulSoup, Flask, scikit-learn]

- Created web-based AI platform to analyse data of 10 million crime history in the state of Karnataka and predict crime through various visuals such as interactive hotspot maps and graphs.
- Worked with a real life large dataset and analysed it to identify most probable repeat offenders.
- Developed an LSTM model to predict most likely possible crime locations in a period of hour, week, month.
- Designed a NLP model to scrape through news articles and extract the real time information about crime hotspots.

Doodle Recognition [Python, scikit-learn, XGBoost, CNN, OpenCV, NumPy, Matplotlib]

- Implemented multiple ML models (Naive Bayes, Random Forest, SVM, XGBoost, Bagging, AdaBoost, KNN, CNN) on Google's QuickDraw dataset (20 categories, ~73GB full dataset).
- Engineered features using HOG, LBP, SIFT, SURF, and raw pixel values with dimensionality reduction (PCA, LDA) for efficient classification.
- Achieved **96.01% MAP@3 accuracy** with CNN; XGBoost outperformed among traditional ML models due to boosting on multi-class noisy doodles.

Natural Language to SQL Converter [Python, LangChain, HuggingFace, ChromaDB, SQLite]

- Developed an application that translates plain English into SQL queries and executes them on real databases.
- Used **LangChain + HuggingFace FLAN-T5** model with a **Chroma vector database** to map natural language to the correct database schema.
- Evaluated on the **Spider dataset**, achieving accurate cross-domain query generation; deployed locally via HuggingFace Inference API.

ACHIEVMENTS

- Selected for **Amazon ML Summer School 2024**
- Runner-up – **AI Hackathon, VNIT Nagpur**
- Semi-finalist **– IIT Bombay e-Yantra Hackathon**

TECHNICAL SKILLS

- Machine Learning, Deep Learning, LLMs, CNN, RAG, Springboot
- **Languages:** Python, Java, C++
- **Tools:** Pandas, Numpy, MySQL, Java Springboot, Jupyter Notebook, Git, Github, Docker, PyTorch

CERTIFICATIONS

- Deep Learning By NPTEL. Passed with Elite grade
- Introduction to Machine Learning by NPTEL. Received Silver Medal.