

Shijal Sharma Poudel

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Research Interests

Machine Learning; Data Engineering; Optimization Modeling; Human-Centered System Design; Behavioral Analytics; Data-Driven Decision Systems; **System Security and Privacy; Cybersecurity Analytics; IoT Resilience; Critical Infrastructure Protection.**

Education

Tribhuvan University, Nepal

2019–2023

Bachelor of Science in Computer Application

- GPA: 3.20/4.00 (Top 10% of class)
- **Relevant Coursework:** Machine Learning; Artificial Intelligence; Data Structures & Algorithms; Operating Systems; Computer Networks; Distributed Systems; Database Management Systems; Probability & Statistics; Software Engineering; Web Technologies
- **Undergraduate Thesis:** *Credit Card Fraud Detection using Random Forest Algorithm* — awarded Best Final Year Project

Experience

Data Engineer, Fusemachines

Kathmandu, Nepal — Aug 2022 – Present

- **Cloud migration with security-aware optimization:** migrated pipelines from Azure Synapse to Databricks using the Medallion Architecture; simplified logic and reduced monthly cloud costs by ~90%; enforced IAM roles, SSL/TLS, and secure API access.
- **ETL framework development:** automated ingestion from APIs, Google Sheets, MongoDB, and HubSpot using Airbyte and AWS Glue; integrated S3 with Athena and Superset for analytics with data quality checks and audit trails.
- **Instruction and mentorship:** delivered trainings on SQL, Apache Spark, Azure, Apache Kafka, and MongoDB; mentored new trainees on production-grade, secure data pipeline practices.

Teaching Experience

Teaching Assistant, Asian School of Management and Technology, Nepal

Jan 2021 – Apr 2021

- Assisted in Algorithms and Database Management Systems courses.
- Led labs on problem solving and SQL programming; helped craft assignments and evaluate code.

Projects & Research Experience

Intelligent TODO app

2025

- Built a clean, fast Streamlit app that classifies tasks using a hybrid approach.
- Combined rules (regex) for safety, local ML (TF-IDF + Logistic Regression) that adapts from edits, and Gemini (optional) for nuanced cases.
- Ensured robustness with keyword fallback and pseudo-labeling, enabling local ML to learn from high-confidence Gemini outputs.
- **Technologies:** Python; Streamlit (app); scikitlearn (TFIDF, Logistic Regression); regex (rules); Google Gemini,LLM.

AirAware — PM_{2.5} Air Quality Forecasts with Health Guidance

2025

- Predicts fine particulate pollution — PM_{2.5} (particles $\leq 2.5\mu\text{m}$) — for the next 6–24 hours, with live nowcasts and uncertainty bands.
- Combines multiple models for better accuracy, uses public air sensor + weather data, explains results, and provides simple health tips and alerts.
- Offers a web app and an API for real-time forecasts, “what-if” checks, and notifications; shipped with testing, monitoring, and containers.

- **Technologies:** Python; FastAPI; Streamlit; PyTorch; Prophet (time-series forecasting); ARIMA (time-series model); scikit-learn; SHAP (explainability); MLflow; Docker.

NepaliGov — Retrieval-Augmented Q&A for Nepali Government Documents (Nepali/English) 2025

- End-to-end system that turns scanned Nepali government PDFs into searchable text and answers questions with citations (Nepali & English).
- Uses staged OCR with fallback, builds a vector index for fast search, and routes answers in the user's preferred language.
- Provides a simple web app and REST API; includes quality checks, caching, and basic monitoring for reliability.
- **Technologies:** Python; FastAPI/Flask; FAISS (vector search); Sentence-Transformers (embeddings); PaddleOCR/Tesseract (OCR); MarianMT (translation); Redis (caching/queues); SQLite/Parquet; Docker; MLflow.

Chat with Your Files — Ask Questions about PDFs, Word, and Text 2024

- Upload a PDF/Word/text file and ask questions in plain English; the app finds matching parts and returns answers with citations.
- Cleans messy text (removes headers/footers, fixes broken lines) and chunks content into small, readable sections.
- Searches by meaning and by keywords; users can adjust model choice and the number of results.
- **Technologies:** Python; Streamlit (web app); PyMuPDF (PDF text); python-docx (Word text); sentence-transformers (embeddings); rank-bm25 (keyword search); scikit-learn; NumPy; Google Gemini (optional).

Risk Detection Framework for Advanced Nuclear Reactors 2024 – Present

- Built a framework to analyze geopolitical news, policy updates, and industry data for nuclear fuel supply chains.
- Implemented scraping, unsupervised clustering (K-Means/DBSCAN), and daily automation to classify risks and refresh dashboards.
- Framed risk signals in the context of resilience and potential security vulnerabilities in critical infrastructure.
- **Technologies:** Python; requests/BeautifulSoup; scikitlearn ; pandas/NumPy (data prep); spaCy (NLP); Airflow/cron ; PostgreSQL/SQLite ; Streamlit/Plotly .

Undergraduate Thesis — Credit Card Fraud Detection (Random Forest) 2023

- Built a Random Forest classifier to detect fraudulent transactions; performed data cleaning, feature selection, and cross-validation; recognized as Best Final Year Project.
- Reflected on adversarial behavior and model robustness, motivating a focus on secure ML applications.

Internal Analytics System (Fusemachines) 2022 – 2023

- Designed a scalable ELT framework for CRM, API, and NoSQL sources using Airbyte, AWS Glue, and S3.
- Exposed curated data via Athena and Superset for real-time BI; documented lineage and access controls.
- **Technologies:** Python; SQL; Airbyte; AWS Glue; Amazon S3 ; Amazon Athena ; Apache Parquet ; Apache Superset; AWS IAM/Lake Formation .

Full-Stack E-commerce and Booking System 2022

- Built a web app combining e-commerce and booking with payments using React, Node.js, Express.js, and MongoDB; implemented secure API patterns and input validation.
- **Technologies:** React; Node.js; Express.js; MongoDB; JWT; REST API

Achievements and Awards

- **AWS re:Invent All Builders Welcome Grant (2025):** Awarded grant to attend the premier global cloud and AI conference in Las Vegas.
- **Winner, AI Hackathon:** NLP-based compliance chatbot (*Fuse Compliance Monitor*).
- **Mentor/Instructor:** Led hands-on sessions on Apache Airflow, SQL, Apache Spark, and Azure.
- **Best Final Year Project:** Credit card fraud detection (Random Forest).
- Merit-based scholarship; student excellence recognition; community leadership for organizing meetups; Outstanding Intern Award (Fusemachines).

Skills

Programming & Scripting: Python (2+ yrs), SQL (3+ yrs), Bash, PowerShell (basic)

Databases & Tools: PostgreSQL, MySQL, SQL Server, MongoDB, Git/GitHub, Postman

Cloud: AWS (S3, Glue, Athena, MWAA, IAM)

Data Eng & ML: PySpark, Pandas, NumPy, scikit-learn, Airbyte, Apache Airflow, Apache Kafka, Superset, Matplotlib, OpenCV

Core CS Foundations: Operating Systems (Linux, Windows), Computer Networks (TCP/IP), Distributed Systems, Database Design

Security Foundations (exposure): Identity and Access Management (IAM), Role-Based Access Control, SSL/TLS, VPN, Secure APIs, Data Privacy

Languages: Nepali, Hindi, English