Bishal Rai

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RESEARCH INTERESTS

- **Deep Learning & Computer Vision:** Neural networks, CNNs, Transformers, and adversarial robustness
- **NLP & Speech Recognition :** Speech synthesis and recognition, text analytics, and NLP for underrepresented languages (e.g.,Newari, Rai)
- **Music Information Retrieval:** Applying transformer-based models and LLMs to analyze musical patterns, chord progressions, scale structures, and compositional elements
- **Applied AI Systems:** RAG pipelines, LLM fine-tuning, real-time systems, production deployment of AI models

ACADEMIC QUALIFICATION

Bachelor of Science in Computer Science and Information Technology (BSc CSIT)

Academia International College, affiliated with Tribhuvan University, Nepal | 2019-2023

Final Grade: 74.24% (First Division)

Relevant subjects: Artificial Intelligence, Data Structures & Algorithms, Database Systems, Software Engineering

Final Year Project: Image Search System with Full-Fledged E-Commerce Platform using Pytorch, CNN & Django

High School (NEB)

Grammar School & College, Koteshwor, Nepal | 2017-2019

Completed Higher Secondary Education (Science Stream)

Relevant subjects: Physics, Mathematics, Computer Science, Chemistry

OPEN SOURCE & COMMUNITY IMPACT

Full-Stack Real-Time Twitter Clone (131 combined GitHub stars | 26 forks)

- Architected and implemented complete social media platform with real-time features, separating concerns across backend API and React frontend
- Complete social media platform with Django REST + WebSockets backend (83 stars) and React SPA frontend (48 stars), deployed on Heroku with real-time messaging, notifications, and live feed updates

- Demonstrates end-to-end systems thinking: API design, real-time protocols, frontend state management, and production deployment
- Technologies: Django REST, Django Channels, WebSockets, Redis, PostgreSQL, React, REST APIs
- Project link **: [Backend Repo](#)   [Frontend Repo](#)**

Real-Time Multiplayer Bingo Game (94 stars | 19 forks)

- Developed real-time multiplayer game using Django Channels and WebSocket protocols for distributed state synchronization
- Implemented game logic with sub-second latency for responsive gameplay across multiple concurrent players
- Deployed to production on Heroku with persistent Redis state management
- Technologies: Django Channels, WebSockets, Redis, JavaScript
- Project Link: **[Github Repo](#)**

Sajilo ORM - Localized Database ORM (18 stars, PyPI package)

- Created lightweight Object-Relational Mapping (ORM) library using Python and psycopg2 for PostgreSQL databases
- Designed API using Nepali romanized terms to make database programming more intuitive for Nepali-speaking developers
- Published as installable package on Python Package Index (PyPI), making it accessible to the broader community
- Demonstrates commitment to language accessibility in software development tools
- Technologies: Python, PostgreSQL, psycopg2, Package Publishing
- Project Link: **[Github Repo](#) [PyPi Package](#)**

HACKATHONS & COMPETITIONS

GIGO – Blockchain-Based Waste Management Incentive System
Ace Ignite 2023, Devfolio | Kathmandu, Nepal

- Blockchain waste management platform using Hyperledger Iroha for tamper-proof reward tokens, with React Native app and Django backend
- Implemented CNN-based waste classification using ResNet and QR code token transfer system
- 36-hour hackathon sprint, team of 5 developers
- Project Link: **[Devfolio Detail](#)**

Academia College Mobile App | App Development Competition Winner | [Github Repo](#)

- Won first place in college-wide mobile app development competition
- Built cross-platform mobile application using React Native and Firebase for real-time data synchronization
- Designed and implemented complete student information system with authentication, notifications, and data management

PROFESSIONAL EXPERIENCE

Senior Software Engineer   **Jul 2025 - Present**
Verisk Analytics

- Built RAG pipelines and fine-tuned LLMs using LangChain/LangGraph for intelligent knowledge retrieval, integrating vector databases and evaluation frameworks
- Designed FastAPI microservices for AI model deployment and established internal GenAI team enabling knowledge automation
- Implemented domain-specific LLM fine-tuning improving performance on internal knowledge tasks

Software Developer   **Feb 2022 - Jul 2025**
Pathway Technologies

- Led the development of **TripTurbo**, a travel marketplace that scaled to 100,000+ downloads and 60,000 active users.
- Worked on **GeoKrishi app**, used by thousands of Nepali farmers nationwide, integrating geospatial data and advanced weather notifications for agriculture.
- Designed web GIS solutions using Django, PostGIS, and geospatial APIs for mapping, visualization, and querying
- Integrated third-party services and payment gateways, ensuring seamless system operations.
- Built scalable backend systems and RESTful APIs to support complex workflows and real-time data processing.
- Contributed to introducing GenAI/knowledge-based workflows within the company, setting foundations for AI-assisted internal tools.

SKILLS

AI & Machine Learning: PyTorch, CNN, Transformers, transfer learning, LangChain, LangGraph, Generative AI
Programming: Python, JavaScript, TypeScript
Web & Backend: Django, FastAPI, Flask , VueJS, ReactJS
Data & Infrastructure:: PostgreSQL, MySQL, MongoDB, Redis
Cloud & DevOps: AWS (EC2, Lambda, ECS), Docker, CI/CD

LANGUAGES

- English: Fluent (IELTS 8.0)
- Nepali: Native Speaker
- Hindi: Fluent