Bibek Koirala

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Education

Southern Illinois University Carbondale, MS Computer Science — Aug 2024 - Present
Research Assistant (Computer Vision | Object Detection)

- CGPA: 4.0/4.0
- **Coursework:** Machine Learning and Soft Computing, Artificial Intelligence, Deep Learning, Data Mining, Natural Language Processing, Parallel and Distributed Computing, Advanced Database System, Cryptography and Network Security

Pulchowk Campus, IOE, Tribhuvan University, Bachelor's Degree in Computer Engineering — Nov 2012 - Sep 2016

- Stood in the top 1% among 15,000 applicants and awarded a full scholarship.
- **Coursework:** Structured and Object-Oriented Programming, Assembly Language, Microprocessor, Signal Processing, Computer Organization and Architecture, Data Structure and Algorithms, Big Data, Computer Security, Operating System, Software Development, AI, Database System

Technical Skills

Programming Languages: Python, C, C++, Java, SQL

Frameworks & Libraries: PyTorch, TensorFlow, OpenCV, scikit-learn, NumPy, SciPy, Pandas, Matplotlib

Specialization: Statistics, Convex Optimization, ML (regression, SVM, DT, PCA, kernel methods), DL & Transformers, Computer Vision (Object Detection & Segmentation), LLM, VLM

Tools & Platforms: Git, Linux, VS Code, Jupyter, Cursor AI, LaTeX

Research & Experience

Research Assistant — Computer Vision, SIUC — Aug 2024 - Present

- Developed an end-to-end Mask R-CNN instance segmentation and classification model on time-stamped microscopy images of bacterial cultures under varying backgrounds, achieving mIoU 0.91–0.98 across growth stages. Improved early detection performance with mAP@0.5 $\approx$ 0.95 at 2h incubation (previous best 3h); accepted for *oral presentation* at *IEEE ICMLA 2025*. https://github.com/vbek/bacteria-detection
- Conducted econometric analysis on countries with $\approx$5% of GDP from remittance (1960–2023), using ML techniques and clustering to examine relationships among macroeconomic indicators. https://github.com/vbek/Inflation-Dynamics
- Analyzed a highly sparse, high-dimensional criminology survey dataset to identify victimization patterns and cluster victims by reporting behavior, achieving strong alignment with prior research. https://github.com/vbek/Victim-Crime-Perception
- Conducted comparative analysis for automated plant disease detection using CNN (34.7M params), fine-tuned ResNet50 (9.9M params), vanilla ResNet(36.4M params), and vanilla Vision Transformer (ViT) (57.5M params) models on the PlantVillage dataset, achieving accuracies of 99.0%, 99.6%, 98.9%, and 97.9% respectively. https://github.com/vbek/Plant-Disease-Detection
- Developed an automated news credibility detection framework integrating NLP and ML to classify articles using linguistic, semantic, and source-based features, achieving 97% precision and 98% recall on benchmark datasets. https://github.com/vbek/News-Credibility

Lieutenant — Nepali Army — Apr 2018 - Dec 2023

- Completed 8 rigorous military training emphasizing leadership, discipline.
- Developed a Windows-based GUI Dashboard and Database Management System to manage troop leave and training records, supporting a paperless workflow. https://github.com/vbek/Military-Leave-Management-Dashboard
- Designed and implemented a highly efficient artillery shell-guiding software integrating precision targeting and system automation, reducing manual calculation errors from 50m to 10m over a 1000m range and cutting computation time from 10 minutes to microseconds, significantly enhancing operational accuracy and speed.
- Developed software to calculate logistic requirements for operational Bailey bridge installation reducing errors, and accelerating deployment.

Leadership & Extracurricular Activities

Military Training and Sports led to strong discipline and teamwork. Captained the Pulchowk Campus cricket team in 2015 and 2016, and played district-level cricket in 2016 and 2017. Also actively participated in volleyball, chess, badminton, and running events.