MADAN BADUWAL

Machine Learning Engineer · Software Architect

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Machine Learning Engineer with 7+ years of experience in Data Structure and Algorithms, Deep Learning(Multimodal Learning, Generative AI, LLM), Computer Vision, Natural Language Processing, Software Engineering, and Robotics.
Key achievement: Engineered a student status engine in FuseClassroom for 60 colleges and 20k students in Nepal and USA.

EDUCATION

Mississippi State University | PhD in Computer Science | Starkville, MS — Exp. Dec 2028
University of Texas Permian Basin | MS in Computer Science | Odessa, TX GPA: 4.0/4.0, Top 1% — Dec. 2024
Tribhuvan University | B.E. in Computer Engineering | Kathmandu, Nepal GPA: 72.38/100, Rank: 2/43 — Dec 2019
Courses: Data Structure and Algorithms | Artificial Intelligence | Computer Programming | Object Oriented Programming | Image Processing & Pattern Recognition | Big Data | Distributed Database Systems | Advanced Software / Web Development | Linear Algebra | Probability and Statistics | Microprocessor | Operating System | Computer Network | C | C++

INDUSTRY EXPERIENCE

Sr. Machine Learning Engineer | Matrice.ai | Chicago, IL — Nov 2022 - Feb 2023

- Led, designed, and developed a no-code data-centric AI platform (Matrice.ai) for building and deploying ML apps, reducing user deployment time by 40% and development costs by 80% using PyTorch, React, Django, and AWS.

Sr. Machine Learning Engineer | BP Eye Foundation | Kathmandu, Nepal — May 2022 - Nov 2022

- Developed an ML app as a SaaS product for 5+ hospitals, using PyTorch, Django, CI/CD, and Dell EMC servers.
- Optimized and automated instance segmentation (accuracy 85%) for otitis media Otoscopy images of the tympanic membrane using CNN, driving $100k of revenue annually by increasing the doctor-patient ratio by 1.5x.

Machine Learning Engineer | Fusemachines | New York, NY — Feb 2020 - Feb 2022

- Led a 10-person team to develop an AI-enabled student progress tracking platform (fuseclassroom.com), increasing the teacher-student ratio by 2x. Currently operational in ∼60 Nepalese colleges with 20k active students.
- Orchestrated a phishing detection engine for over 10 clients under WMC Global, improving accuracy from 85% to 90% by selecting the optimal number of clusters using the silhouette score, detecting millions of URLs per day.
- Delivered over 20+ trainings, workshops, knowledge-sharing, and paper reading sessions on mathematics and machine learning. Empowered the ML skills of ∼5k students by collaborating with schools, colleges, and universities.
- Enriched affordable AI courses by researching, designing, reviewing, and refining content, including reading material, quizzes, assignments, and projects for Fusemachines AI Education Programs, focusing on AI, ML, CV, and NLP.

Computer Vision Engineer (R & D) | National Innovation Center | Kathmandu, Nepal — Jan 2021 - Dec 2021

- Led & collaborated with mechanical, electrical, and electronic hardware teams to deploy computer vision tasks in robots, resulting in the creation of initial prototypes for waiter and service robots within 9 months.
- Achieved 60% inference acceleration on computer vision tasks integrating into robots using quantization techniques and hardware-software accelerators like Google Coral TPU, NVIDIA J.Nano, Raspberry Pi., and Microsoft Azure.
- Implemented and fine-tuned computer vision tasks, including object detection, segmentation, tracking, face recognition, and depth estimation, using PyTorch and the Intel depth camera D435i, covering the entire vision pipeline.
- Improved pathfinding algorithms (A* and Dijkstra), leading to a 20% reduction in execution time and faster nav.

Software Engineer Intern | Omnibluetech | Kathmandu, Nepal — Aug 2019 - Feb 2020

- Devised and architected Django REST APIs and AWS-based background workers capable of managing millions of daily requests, facilitating third-party entities in extracting data from unstructured documents in a scalable fashion.
- Engineered web applications using front-end and back-end technologies: HTML5, CSS, JavaScript, and Django for retail stores and consultancies, resulting in a 15% increase in revenue for the company in the first quarter.

RESEARCH EXPERIENCE

Graduate Research Assistant | Mississippi State University | Starkville, MS — Jan 2025 - Ongoing

Graduate Research Assistant | University of Texas Permian Basin | Odessa, TX — Jan 2023 - Dec 2024

- Conducted research in polyp segmentation, focused on optimizing and fine-tuning advanced models such as YOLO8, U-Net, Detectron, SAM, MASK-RCNN, and OneFormer to improve accuracy and performance.
- Optimized and fine-tuned state-of-the-art multimodal models, including OpenAI's CLIP, MMBT, VL-BERT, ViLBERT, LXMERT, ALIGN, VisualGPT, UNITER, BLIP, Flamingo, LLaVA, LaMDA, and mPLUG.
- Collected a well-annotated multimodal dataset (text and image) that meets university requirements.

Undergraduate Student Assistant Editor | University of Texas Permian Basin | Odessa, TX — Mar 2023 - Dec 2024

- Refined the editing and proofreading of the UTPB Journal of Undergraduate Research, Volume 5, 2023, and the UG Research Book 2024 for publication under the direction of Prof. Rebecca Babcock and Prof. Mohamed K Zobaa.

PUBLICATIONS

- Prajapati, P.R., Poudel, S., **Baduwal, M.**, Burlakoti, S. and Panday, S.P., 2021. Signature Verification using Convolutional Neural Network and autoencoder. Journal of the Institute of Engineering, 16(1).

SKILLS

Languages	Python 3, R, Julia, C++, C, Java, JavaScript, C#, Go, Kotlin, Flutter, Rust, Bash, MATLAB, LaTeX, SQL
Packages	PyTorch, TensorFlow, JAX, Scikit-learn, NumPy, Pandas, Matplotlib, Scipy, OpenCV, NLTK, Hugging Face
Databases	Spark, Hadoop, PostgreSQL, MySQL, MongoDB, Snowflake, Databricks, Kafka, Tableau, PowerBI, ETL
Frameworks	Django, Node, Angular, React, React Native, Unity, Streamlit, Flask, Android Studio, RESTful API, ROS
DevOps	Git, GitHub, DVC, MLflow, SageMaker, Docker, Kubernetes, Jenkins, Airflow, Datadog, AWS, GCP, Azure
Miscellaneous	Agile, Confluence, Jira, Lambda, RabbitMQ, Redis, Ansible, ElastiCache, Elasticsearch, Selenium

PROJECTS

Phishing Detection | Python 3, Scikit-learn, Git, GitHub, AWS, Docker, Kubernetes, CI/CD — Jun 2021 - Feb 2022

- Classified websites into phishing and non-phishing categories using deep learning algorithms for GoDaddy, Bitly, InfoBip, and ICANN under WMC Global. Transformed unstructured data into structured data format using RegEx.

Student Status Engine | Python 3, Snowflake, Scikit-learn, Git, AWS — Jan 2021 - Jun 2021

- Crafted feature extractor pipeline that automatically extracts features from the data warehouse (e.g., Snowflake). Leveraged machine learning algorithms on extracted features to classify student status into different classes.
- Collaborated with back-end, front-end, and DevOps engineers to test and deploy a model into large-scale production.

Mina (AI-Robot) | Python 3, PyTorch, ROS, Gazebo, Coral TPU, Jetson Nano, Raspberry Pi — Jan 2021 - Dec 2021

- Retrained a classification model for Edge TPU using post-training quantization (23fps,85% mAP score with pre-training), face recognition using the Python 3 face recognition library, depth calculation using RealSense depth camera, Centroid-based object tracking, and wrote a rule-based algorithm from scratch.
- Incorporated and validated computer vision tasks into the ROS and gazebo simulation environments and implemented them into waiter and service robots. Visualize robot sensor data into rviz.

Text Extractor | Jupyter Notebook, Python 3, OpenCV — Jan 2020 - Oct 2020

- Conducted research and experiments on building image preprocessing techniques like erosion and dilation. Built a framework that uses Google Tesseract and RegEx to extract information from the form (e.g., buyer name, seller name, etc.).

Hastakshar | Python 3, OpenCV, Keras, Django *(paper accepted)* — Jan 2017 - Dec 2019

- Performed research and experimentation on image localization to boost classifier model accuracy to 83% with NumPy and OpenCV.
- Built a signature verification CNN classifier system using TensorFlow and Django web interfaces on local machines.

Android apps and websites | C#, Unity, Python 3, HTML, CSS — 2015 - 2019

- Android apps: Asteroid Smash, Antigravity Ball, Saveme, Beat Creator, and 1K downloads
- Web apps: horizonglobal.edu.np, youthcareer.edu.np: between 10,000 and 15,000 visitors per month

ACHIEVEMENTS

Graduate Research Assistant | Mississippi State University — Jan 2024 - Ongoing

Graduate Research Assistant | University of Texas Permian Basin — Jan 2023 - Dec 2024

- Secured a graduate research assistantship scholarship valued at $5,000 per semester, including a tuition fee waiver.

Merit-based scholarship | Tribhuvan University — Aug 2015 - Dec 2019

- $3,000 worth of scholarships awarded for securing the highest GPA in the Computer Engineering cohort (3/7 semesters).

Best Logic Code | Sagarmatha Engineering College — Jul 2019

- Secured first place in the Best Logic Code Competition at Sagarmatha Engineering College, winning $600.

Hackathon Runner-up | Kathmandu University — Mar 2018

- 1st runner-up of the hackathon organized by Kathmandu University, Kavre The prize was worth $1,000.

Best Idea Winner | Kantipur Engineering College — Jan 2017

- Best idea winner of the exhibition organized by Kantipur Engineering College and sponsored by NeoSphere. NeoSphere offered a 6-month ethical hacking course, which was nearly worth $200.