Aumkesh Chaudhary

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Portfolio GitHub YouTube

Summary

Computer Science undergraduate at IIT Patna with applied research experience in machine learning, computer vision, and speech technologies. My work focuses on developing AI-driven systems to support scientific inquiry across domains such as ecology, linguistics, and human-computer interaction. I'm particularly interested in building robust, interpretable models that address real-world research challenges.

Education

Indian Institute of Technology Patna *July 2023 – Present*
Bachelor of Science (Honours) in Computer Science and Data Analytics
CPI: 9.12

Research Interests

Collective animal behavior, computer vision for ecological analysis, machine learning for scientific discovery, speech and language technologies, deep learning optimization, and human-AI interaction.

Work Experience

Research Intern – Ahmedabad University (On-site) *May 2025 – June 2025*
Project: Understanding Decision Making and Coordination in Animal Groups
Supervisor: Dr. Jitesh Jhawar — Funded by Max Planck Society, Germany

- Studied collective behavior in animal groups via simulations and mathematical modeling.
- Processed and annotated video data collected daily over 4 months, labeling frames with multiple bird species for behavior and identity tagging.
- Used YOLO architecture to detect and analyze species-specific behaviors in datasets of birds.
- Utilized Idtrackerai to track ants and spiders, rendering trajectory data to visualize movement paths and group dynamics.

Project Intern – IIT Mandi iHub and HCi Foundation (Remote) *Apr 2025 – June 2025*

- Contributed to backend development of a web platform for coursework and user management.
- Built core features using Django, integrated REST APIs, and managed data pipelines with SQLite.
- Ensured system reliability through modular code design and efficient database handling.
- Collaborated with cross-functional teams to design scalable backend logic supporting multi-user roles and secure data access.

Projects

CareerNavigator – Capstone Project *GitHub & Hugging Face*
Supervisor: Dr. Kuldip Singh Patel, Asst. Prof., Dept. of Mathematics, IIT Patna

- Developed, CareerNavigator, a Machine Learning model that evaluates candidates' employability by analyzing key attributes and predicting suitability for a job role.
- Cleaned, pre-processed, and performed feature engineering on the dataset containing 70k+ datapoints.
- Designed, trained, and evaluated multiple algorithms, utilizing performance metrics such as accuracy, confusion matrix, and F1- score to optimize model effectiveness.
- Selected kernel support vector machine as the best-fit model with the highest accuracy of 80% and F1 score of 0.82.

Computer Vision Object Detection System *GitHub & Hugging Face*

- Developed an object detection system utilizing YOLOv5 and PyTorch, designed to capture and process individual videos and photos for object detection.
- Optimized the computer vision pipeline to achieve 20+ FPS processing speed for 640x640 input resolution.
- Applied Non-Maximum Suppression with IoU threshold of 0.3 for optimal detection accuracy.

Advanced Text-to-Speech Optimization *GitHub & Hugging Face*

- Fine-tuned Microsoft's SpeechT5 to enhance pronunciation of technical terms, abbreviations, and acronyms via optimized phonetic representations.
- Achieved 25% improvement in speech quality, measured via MOS, with enhanced pronunciation of technical terms and acronyms.
- Optimized the baseline model to generate a native Italian voice by enhancing pronunciation, prosody, and stress patterns in line with the phonological rules of the Italian language, significantly improving speech quality and naturalness compared to other existing models.
- Implemented 8-bit dynamic quantization to linear layers using PyTorch's native API, reducing memory usage by 30% while maintaining inference accuracy.

AudeX – Vision-to-Voice Conversion Model *GitHub & Web Demo*

- Combined multi-language OCR (Tesseract) and TTS (Web Speech API) for accessible document reading.
- Built user-friendly web interface with PDF export, word count, and profile management.
- Added functionalities for managing user profiles, including signup, login, activity tracking, and data editing.

Solar Panel Detection System *GitHub & Hugging Face*

- Developed an object detection model using YOLOv8n to identify and locate solar panels in low resolution satellite imagery.
- Achieved 94.27% precision and 91.77% recall, significantly improving solar infrastructure mapping capabilities.
- Implemented sophisticated object detection techniques with mean Average Precision (mAP50) of 96.8%.
- Designed and deployed an optimized real-time inference pipeline, hosting it on Hugging Face for seamless accessibility and large-scale solar panel detection.

Skills

Languages: Python, Java, R, C, MATLAB
Web Development: Django, Flask, Node.js, React, HTML/CSS/JS, Bootstrap
Databases & APIs: MySQL, SQLite, MongoDB, REST APIs
Operating Systems: Linux (Ubuntu), Windows, macOS
Developer Tools: Git, VS Code, Jupyter, Colab, Docker
Professional: OOP, Machine Learning, Deep Learning, Data Analytics, Mathematical Modeling
Productivity and Analytics: Tableau, Canva, Excel (Advanced), MS Office

Achievements & Fellowships

Anubhav Graduate Fellowship, *IIT Mandi* Apr 2025 – Jun 2025
INR 5000/month fellowship awarded for project-based work in HCI and allied areas.

Extracurricular Activities

- **Piano:** 7+ Years of experience in classical and contemporary styles, composing original pieces that explore and innovate across diverse genres and elements of music.
- **Guitar:** 2+ years of experience in Indian and Western contemporary styles, exploring fingerstyle techniques and songwriting.