Akash Rana

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Education

Master of Science in Computer Science May 2024 - Dec 2025
Case Western Reserve University Cleveland, Ohio, USA
Course Work: Analysis of Algorithms, Databases, High Performance and Distributed Computing, Computer Perception, Probabilistic Graphical Models, Machine learning, Natural Language Processing, Data Mining, etc.

Bachelor of Engineering in Computer Science & Engineering July 2018 - June 2022
Chandigarh University Mohali, Punjab, India
Course Work: Algorithms, Data Structures, Operating Systems, Databases, Object-Oriented Programming (OOPS), Artificial Intelligence, Theory of Computation, Computer Organization and Architecture (COA), Compiler Design.

Skills

Programming Languages & Tools : Python, C++, C, Arduino, Git, GitHub, CI/CD, Unit Testing
Web Development: ReactJS, JavaScript (ES6+), Bootstrap, Responsive Design, ExpressJS, PHP, RESTful APIs
Databases: MongoDB, MySQL, PostgreSQL, Schema Design, Query Optimization
Python Libraries & Frameworks NumPy, Pandas, TensorFlow, Keras, Scikit-learn, Matplotlib, Seaborn, OpenCV
Machine Learning & AI :
Classical ML: Linear/Logistic Regression, SVM, Decision Trees, K-NN, K-Means, Naive Bayes, PCA
Sequential Models: HMM, Particle Filtering, Dynamic Bayesian Networks (DBN)
Deep Learning: CNN, RNN, LSTM, Transformers (BERT, ViT)
Applied Domains: Computer Vision, Natural Language Processing (Transformers, Seq2Seq), Time-Series Activity Recognition

Work Experience

Web Developer (MERN Stack) June 2022 – Sep 2023
Go Sky Aviation Pvt. Ltd. Delhi, India

- Developed and maintained three e-commerce websites, transitioning from a Frontend Developer role (React.js) to Full-Stack Developer.
- Collaborated closely with UI/UX teams to enhance customer experience, resulting in a 30% increase in user engagement.
- Built and integrated RESTful APIs using Node.js and Express, improving load times by 20% and backend response efficiency by 25%.
- Managed MongoDB databases for scalable data handling of over 10,000 product entries, ensuring robust and efficient data retrieval.

Academic Projects

Human Activity Recognition using ConvLSTM *(Python, ConvLSTM2D, TimeDistributed, UCF101)* [Github Link]

- Designed and implemented a ConvLSTM-based architecture to simultaneously extract spatial features (from video frames) and model temporal dependencies, enabling accurate activity classification from sequential visual data.
- Built a full deep learning pipeline with layers like MaxPooling3D, TimeDistributed, Flatten, and Dense for end-to-end learning and multi-class classification.
- Trained on datasets like UCF101 with 92 percent accuracy; addressed challenges like class imbalance and high computational overhead through data augmentation and architecture tuning.

Furniture Village: E-commerce Website *(ReactJS, Node.js, ExpressJS, MongoDB)* [GitHub Link]

- Developed a full-stack e-commerce platform for furniture sales with a dynamic and responsive frontend built using ReactJS.
- Designed RESTful APIs and handled business logic through ExpressJS and Node.js, ensuring scalable server-side functionality.
- Integrated MongoDB as a NoSQL database to manage users, products, and order data with efficient schema design.
- Focused on enhancing user experience with features like category filtering, secure authentication, and shopping cart persistence.

Next Move Prediction using HMMs and Bayesian Networks *(Python, HMM, DBN, Particle Filtering)* [Github Link]

- Developed a hybrid model combining Hidden Markov Models (HMMs) and Dynamic Bayesian Networks (DBNs) to predict the next room/location of a user in a smart home using temporal sensor data.
- Used HMM to model sequential location-activity pairs, then passed its predictions to the DBN along with contextual dependencies like time of day and user movement history for refined forecasting.
- Trained and evaluated the model on the CASAS Aruba dataset, achieving 90 percent accuracy in room transition prediction with strong performance on metrics like F1-score and confusion matrix analysis.