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: Machine Learning, Natural Language Processing, Probabilistic Graphical Models, Data Mining, High Performance and Distributed Computing.

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.

Work Experience

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

- Developed three e-commerce websites, initially as a Frontend Developer using React.js, advancing to Full-Stack Developer.
- Collaborated with UI/UX teams, improving user engagement by 30%, and integrated RESTful APIs, reducing load times by 20%.
- Built backend services with Node.js and Express, optimizing server response time by 25%, and managed MongoDB databases for over 10,000 products.

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.

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.

Fitness Tracker using Machine Learning *(Python, SVM, Random Forest, Neural Networks)* [Github Link]

- Built a machine learning pipeline in Python to classify and analyze fitness movements using accelerometer and gyroscope data from MetaMotion sensors.
- Applied data preprocessing techniques including raw signal conversion, noise filtering, and time series visualization to prepare sensor data for modeling.
- Trained predictive models using SVM, Random Forest, and Neural Networks; additionally, designed a custom algorithm to detect and count exercise repetitions based on motion patterns.

Skills

- **Machine Learning & Statistical Methods:** Regression, SVM, Decision Trees, K-NN, K-Means, Naive Bayes, PCA
- **Probabilistic & Sequential Models:** HMM, Particle Filtering, Dynamic Bayesian Networks (DBN
- **Deep Learning Architectures:** CNN, RNN, LSTM, Transformers (BERT, ViT)
- **Applied Domains** Computer Vision (OpenCV, CNNs), NLP (Transformers, Seq2Seq), Time-Series & Activity Recognition
- **Python Libraries & Frameworks:** NumPy, Pandas, TensorFlow, Keras, Scikit-learn, Matplotlib, Seaborn, OpenCV

Achievements & Certifications

- Qualified Graduate Aptitude Test Engineering (GATE) - CS/IT with 91.07 percentile. ScoreCard 2023
- Completed certification on Building Modern Python Applications on AWS by Coursera. Certificate 2021
- Completed certification on Data Science and Math Skills from Duke University. Certificate 2021