Bhavesh Misra

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Education

- **BITS Pilani, Hyderabad Campus** — Hyderabad, India
  Bachelor of Technology - Electronics and Communication — *July 2020 - June 2024*

Skills Summary

- **Languages**: Python, C++, JavaScript, SQL, Bash, JAVA, Lua
- **Frameworks**: Scikit-Learn, TensorFlow, Keras, Django, Flask, NodeJS
- **Tools**: Docker, GIT, PostgreSQL, MySQL, SQLite
- **Platforms**: Linux, Web, Windows,Raspberry
- **Soft Skills**: Leadership, Collaboration, Creativity, Communication, Adaptability
- **Courses**: Operating Systems,Artificial Intelligence, Machine Learning,Object Oriented Programming, Linear Algebra, Differnetial Equations, Probability and Statistics

Experience

- **Google Summer of Code - JdeRobot** — Remote
  Student Developer (Full-time) — *May 22 - Aug 22*
  - **Improvement of the Preceding Model**: Custom trained and found an enhanced DL model,**SSDMobilenetv2** (**mAP from 0.33 to 0.365**) Implemented to detect only humans specifically.
  - **Enhancement of exercise through React.js.**: Improved the interpretability (added 2 graphs, namely the 11-pt interpolation and the Precision vs Recall Curve , use case applicability, and visual aesthetics (used Seaborn instead of MatplotLib) of the model's bench marking component.
  - **Enabled GPU Support in Docker**: Enabled GPU support while executing the exercise from the docker container, making the exercise **2.23x Faster**
- **OrcaSound - Project Acartia** — Remote
  UX-Researcher — *Dec 22 - Current*
  - **Competitive Analysis**: Led the team of UX-Researchers at OrcaSound to develop a **Competitive-Analysis** of **20 similar organisations** for the Project Acartia
  - **Integration of Acartia to OrcaSound**: Collaborating with various Stakeholders,Developers in order to integrate Acartia to OrcaSound
- **Amazon - Machine Learning Summer School** — Remote
  Full Time — *July 22 - September 22*
  - **An Integrated learning program**: Was one of the **300 students** selected from all Colleges of India for this Programme
  - **Acquired diverse Machine Learning topics of significance**: Was part of an integrated learning program for students on key Machine Learning (ML) topics including Supervised Learning, Deep Neural Networks, Dimensionality Reduction, Unsupervised Learning, Probabilistic Graphical Models, Sequential Learning, Causal Inference and Reinforcement Learning.

Projects

- **Human Detection using TFoD(Tensorflow Object Detection, ONNX, Computer Vision)**: Developed and deployed Human Detection using TFoD, training multiple models from the Tensorflow Object Detection Database on the COCO Dataset. Successfully converted the highest-performing model, **SSDMobilenetv2, with an mAP of 0.365**, to the ONNX format using Netron, Tensorflow, ONNX, and Python. (September '22)
- **Flask Application to predict Runfall (Machine Learning, Web Development)**: Created a Flask App that predicts the Runoff from Rainfall and Evapotranspiration as Input Parameters from the Lower Godavari Basin using XGBoost. Achived a **r2 score of 0.95** on the Lower Godavari Basin Input dataset. Hyperparameter tuned using RandomisedSearchCV, available in Scikit-Learn (Tech: Python, Flask, Scikit-Learn, Openpyxl). (October '21)
- **Conway's Game of Life (Game Development, Pygame))**: Utilised pygame to implement the Game of Life (an example of a cellular automaton) by the Scientist Conway. (Tech: Python, Pygame, os) (March '22)
- **Dunder Mifflin Biometric (OpenCV, Haar Cascade, Python, Flask)**: A Python recognition-based web-application for identifying characters from the popular American TV series, 'The Office'. Curated the data-set from scratch, as the images for all the characters weren't available at one place. The features I selected for recognition include the eyes and frontal face, from the images, using the Haar Cascade Classifier. After comparing some of the algorithms, **SVM (linear SVC kernel) gave the best score, with a test-accuracy of 89.23**. Saved the model's pickle file for the classification task.

Publications

- **Publication: Machine learning algorithms for streamflow forecasting of Lower Godavari Basin**:
  - This paper applies three Machine Learning Algorithms, namely, Bi-directional Long Short-Term Memory (Bi-LSTM), Wavelet Neural Network (WNN), and eXtreme Gradient Boosting (XGBoost), to assess their suitability for streamflow projections of the Lower Godavari Basin.
  - XGBoost model displayed an exceptional performance with R2 = 0.88, RMSE = 1.48, NSE = 0.87, and PBIAS = 29.3 in training. These values in validation were 0.86, 1.48, 0.85, and 28.5. XGBoost has the edge over the four variants of WNN and a Bi-LSTM model.
  - The highest daily streamflow projections were observed in D1, D3, D4, D5, and D8 in SSP245 as per XGBoost analysis.
- **Publication: Boosting Algorithms for Projecting Streamflow in the Lower Godavari Basin for Different Climate Change Scenario (under review)**:
  - The present study investigates the ability of five boosting algorithms, Adaptive Boosting (AdaBoost), Categorical Boosting (CatBoost), Light Gradient Boosting (LGBoost), Natural Gradient Boosting (NGBoost), and eXtreme Gradient Boosting (XGBoost) for simulating streamflow in the Lower Godavari Basin, India.
  - Thirty-nine years of rainfall, temperatures, and streamflow data were used for training and testing. Train test-split ratios of 70:30 and 80:20 were examined in this study.
  - All the models performed exceptional (KGE>0.75), and the best performing Model, NGBoost (KGE=0.95) was used for the SSP calculations.
- **Publication: Fuzzy-Based Hybrid Deep Learning Algorithms for Projecting Streamflow in the Lower Godavari Basin (under review)**:
  - This study aims to examine the efficacy of six machine learning (ML) algorithms, namely Convolutional Neural Network (CNN), Long Short-Term Memory (LSTM), Convolutional Long Short-Term Memory (C-LSTM), Fuzzy Convolutional Neural Network (F-CNN), Fuzzy Long Short-Term Memory (F-LSTM), and Fuzzy Convolutional Long Short-Term Memory (FC-LSTM), in the simulation of streamflow within the Lower Godavari Basin, located in India.
  - All of the models exhibited remarkable performance, as shown by a Kling-Gupta Efficiency (KGE) value more than 0.75. The model that demonstrated the highest performance, namely the Fuzzy-CNN-LSTM model, achieved a KGE value of 0.89 on the test dataset. Consequently, this model was selected for the subsequent SSP calculations.
  - The data reveals a reduction in streamflow of 21.58%, 21.85%, 18.34%, and 14.81% across four different time frames, in comparison to the average recorded streamflow of 887.96 m^3/s.