Kruthi Ninga Raj

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EDUCATION

Syracuse University - College of Engineering & Computer Science, Syracuse, New York August 2022 - May 2024
Master of Science in Computer & Information Science | CGPA: 3.63
Coursework: Design and Analysis of Algorithms, Artificial Intelligence, Data Analysis & Decision Testing, Social Media & Data Mining, Machine Learning, Operating System, Object Oriented Design, Natural Language Processing, Internet of Things: Security & Privacy

Visvesvaraya Technological University - Bangalore Institute of Technology, Bengaluru, India August 2018 - July 2022
Bachelor of Engineering in Computer Science & Engineering

TECHNICAL SKILLS

- Programming Languages: Python, Java, C++, R, SQL
- Data Analysis & Visualization tools: Power BI, Tableau, MS Excel
- Machine Learning: Statistical Analysis, Regression Analysis, Classification, Clustering, Deep Learning, NLP
- Frameworks & Packages: TensorFlow, PyTorch, Spark, Keras, Scikit-Learn, OpenCV, Pandas, NumPy, SciPy, NLTK, Cuda, Matplotlib, Seaborn
- Tools & Technologies: Spark, Hadoop, Jupyter Notebook, Spyder, Visual Studio Code, MySQL
- Database Management: SQL Server
- Cloud Platforms: AWS (S3, Sagemaker, EC2, Redshift), GCP, Azure

PROFESSIONAL EXPERIENCE

Academic Tutor, Stevenson Tutoring Center, Syracuse University – Syracuse, New York August 2023 - March 2024

- Provided specialized tutoring in data structures and algorithms, Java, Python programming, probability and statistics, linear algebra, calculus, Matlab, and R programming to student-athletes, with a focus on data science applications.
- Developed customized tutoring plans to enhance students' understanding and performance in algorithms and data science-related subjects, incorporating real-world data sets and problem-solving scenarios.
- Assisted students in building strong programming and analytical skills and guided hands-on projects utilizing tools and technologies including Jupyter Notebook, Spyder, Tableau, Eclipse, RStudio, Pandas, NumPy, Git, Matplotlib, Scikit-learn, TensorFlow, and Keras.

Machine Learning Intern, Bosch India – Bengaluru, India October 2021 - December 2021

- Developed a computer vision solution for automating the accurate dimensioning and precise measurement of circular and cylindrical industrial components by developing and optimizing edge detection, contour analysis, and geometric fitting algorithms using OpenCV and Python.
- Engineered a machine vision system for accurately counting small industrial parts like screws, implementing custom object detection models and image segmentation with TensorFlow and Keras, significantly enhancing inventory management by reducing manual counting errors and improving automation.
- Executed comprehensive image data acquisition strategies for diverse industrial components, utilizing high-resolution imaging systems and controlled lighting environments.
- Applied data augmentation and transfer learning techniques to convert a small pre-labeled dataset into a robust, large-scale dataset suitable for training high-performance models.
- Designed, trained, and deployed two high-accuracy Convolutional Neural Network (CNN) models for precise dimensional measurement (91% accuracy) and object detection and counting (97% accuracy) of industrial parts using TensorFlow and Keras, integrating them into a real-time processing pipeline.

Machine Learning Intern, Integrated Systems – Bengaluru, India. June 2021 - August 2021

- Implemented a computer vision-based solution for a machine vision system designed to detect and classify defects on steel surfaces in industrial parts.
- Developed and trained a convolutional neural network (CNN) using TensorFlow and Keras to accurately identify and classify two distinct types of stee surface defects.
- Implemented advanced data augmentation techniques and hyperparameter tuning to improve model generalization and performance.
- Conducted a comprehensive analysis using MATLAB to determine the optimal values of optical parameters (lighting, lens selection, and camera settings) for high-precision image capture.
- Architected and implemented a robust data acquisition pipeline leveraging Python, OpenCV, and Camera SDKs to acquire, preprocess and transform raw image data into suitable input for real-time model testing.

Machine Learning Research Intern, Bosch India – Bengaluru, India January 2021 - May 2021

- Member of a team responsible for developing scalable ETL (Extract, Transform, Load) data pipelines for deploying fleet health monitoring models, significantly enhancing predictive maintenance capabilities.
- Worked on fleet analytics with a focus on condition monitoring and predictive maintenance of car diesel engines with an aim to enable data-driven decisions and minimize field failures and promote sustainable transportation.
- Identified anomalies in coolant temperature and predicted clog percentages in air and fuel filters using machine learning.
- Performed IoT data acquisition from electronic control units (ECU) of diesel engine vehicles using specialized diagnostic software, including DiagRA® D and ETAS INCA.
- Executed comprehensive data munging, exploratory data analysis (EDA), interactive data exploration and visualization, and feature engineering on large-scale raw time series data using Python (Pandas, Numpy, SciPy) and SQL, leveraging Jupyter Notebooks.
- Employed techniques such as time-series analysis and multivariate regression and implemented advanced machine learning techniques, including regression models, classification algorithms and ensemble techniques such as Random Forest and Support Vector Machines (SVM) with high-accuracy (>90%) using frameworks such as Scikit-learn and TensorFlow.
- Presented findings and insights in detailed reports to cross-functional teams, utilizing tools like Tableau for data visualization

Machine Learning Intern, I-Logicon Control Automation Pvt Ltd – Bengaluru, India September 2020 - December 2020

- Developed energy analytics model for predicting energy consumption of industrial machines, significantly contributing to sustainable energy usage.
- Conducted a comprehensive analysis of five years of historical energy data, performing extensive exploratory data analysis (EDA) using Python libraries such as Pandas, Numpy, and Matplotlib.
- Implemented robust data cleaning and preprocessing pipelines to handle missing values, outliers, and data normalization, leveraging tools like SQL and Python.
- Performed feature engineering to enhance model performance, utilizing domain knowledge and statistical techniques.
- Developed and trained an artificial neural network (ANN) model using TensorFlow and Keras, achieving a prediction accuracy of approximately 87%.
- Employed techniques such as grid search for hyperparameter tuning and cross-validation to optimize model performance.
- Visualized model predictions and insights using tools like Tableau and Matplotlib to communicate findings effectively.

PROJECTS

Taste Tuner– Applied Natural Language Programming Course Project, Syracuse University   January 2024 - May 2024
- Developed a system to analyze, classify, and recommend recipes.
- Implemented modules for ingredient network analysis (NetworkX), word cloud generation (WordCloud, Matplotlib), cuisine rating (Pandas, Numpy), recipe classification (decision trees, random forests), ingredient-based recipe clustering (k-means), recipe difficulty estimation (regression models), and recipe recommendation (collaborative and content-based filtering) using Python 3.8 and Jupyter Notebook.
- Managed data in CSV and JSON formats and applied natural language processing (NLTK, SpaCy) and statistical analysis techniques for data preprocessing and feature extraction.
- Utilized scikit-learn for model building, hyperparameter tuning, and cross-validation and visualized insights and results using Matplotlib and Seaborn.

Malware Detection in IoT Devices Using Machine Learning– IoT: Security & Privacy Course Project, Syracuse University   September 2023 - December 2023
- Implemented advanced machine learning models to detect malware and anomalies in IoT devices using datasets from the CTU-IoT-Malware-Capture repository and IoT23 dataset.
- Developed a comprehensive preprocessing pipeline, including data consolidation, label standardization, feature selection, and numeric transformation, to prepare the data for analysis.
- Trained various machine learning models such as Decision Trees, Gaussian Naïve Bayes, Support Vector Machines, Random Forests, Gradient Boosting, and Deep Neural Networks for anomaly detection.
- Achieved high accuracy in anomaly detection, with Decision Trees and Random Forests showing the best performance.
- Utilized performance metrics and visualization techniques for comparative analysis of models' performance.

AI-based Change Detection for Disaster Identification from Satellite Images – Undergraduate Capstone Project   November 2021 - February 2022
- Developed change detection frameworks utilizing bi-temporal satellite images to generate change maps for identifying natural disasters.
- Designed and implemented four deep learning frameworks: convolutional neural networks (CNNs), autoencoders, deep belief networks (DBNs), and recurrent neural networks (RNNs) using TensorFlow and Keras.
- Conducted qualitative and quantitative performance evaluations of the deep learning models by analyzing generated change maps and employing metrics such as precision, recall, F1-score, and Intersection over Union (IoU).
- Developed and convolutional neural network (CNN) to categorize post-disaster satellite images into specific disaster types, leveraging labeled datasets and advanced image augmentation techniques.
- Addressed the limitations of single-temporal image-based CNNs, enhancing model generalizability through the incorporation of temporal information, thereby reducing the volume of required training data.

Deep Learning-based Interpretable COVID-19 Identification – Research Assistantship   September 2021 - December 2021
- Conducted research under Dr. M. S. Bhargavi, developing transfer-learning-based deep learning models using TensorFlow and Keras to identify COVID-19 infection from chest CT scans.
- Collaborated with a pulmonologist to accurately interpret pulmonary findings from CT images, ensuring clinical relevance.
- Implemented and utilized the Local Interpretable Model-agnostic Explanations (LIME) model to validate and understand model predictions, achieving an initial accuracy of approximately 98%.
- Analyzed LIME outputs and discovered the model's focus on non-relevant areas to generate predictions, leading to a conclusion about the unreliability of the initial models despite high accuracy.
- Developed a segmentation program using OpenCV and U-Net architectures as a solution, to isolate lung areas in CT scans, improving the reliability and accuracy of model predictions.
- Retrained models on segmented lung images, employing advanced data augmentation techniques and optimizing hyperparameters, enhancing the reliability and clinical relevance of COVID-19 infection predictions.

Deep Learning-based Knit Fabric Texture and Dyeing Defect Classification – Research Assistantship   July 2021 - August 2021
- Conducted research under Dr. Indu G. K., focusing on the classification of knit fabric textures and dyeing defects using deep learning techniques.
- Performed image preprocessing (normalization, augmentation, standardization) on knit fabric image data to ensure high-quality inputs for model training.
- Developed and trained convolutional neural networks (CNNs) to classify knit fabric images based on texture.
- Implemented advanced transfer-learning models (VGG, ResNet) to accurately identify and classify dyeing defects in fabric images.
- Utilized tools and technologies like Python, OpenCV, NumPy, Pandas, TensorFlow, Keras and Matplotlib.
- Conducted a comprehensive study on the application of artificial intelligence in sustainable fashion, showcasing the potential of AI to improve quality control and reduce waste in the textile industry.

Chatbot – Freelance Project   April 2021 - May 2021
- Developed a retrieval-based chatbot to automate the webinar registration process using recurrent neural networks and Python libraries (NLTK, Keras).
- Streamlined webinar hosting tasks by automating FAQs, registration, feedback collection, and certificate generation using Flask, MongoDB, and ReportLab.
- Enhanced user experience and operational efficiency through automation of key webinar processes.

PUBLICATIONS
- "A Review on Advances in Machine Learning Interpretability", International Research Journal of Engineering and Technology (IRJET), Volume: 08 Issue: 10
- "Comparative Study on the Performance of LSTM Networks for STT Conversion Using Variations in Attention Mechanism Approaches and Loss Functions", International Research Journal of Engineering and Technology (IRJET), Volume: 08 Issue: 09
- "Multi-label Classification Approaches to Assist in Identifying Optimal Agricultural Crop for Cultivation Using the Predicted Crop and Its Yield", International Research Journal of Engineering and Technology (IRJET), Volume: 08 Issue: 09
- "Capsule Network GAN vs. DCGAN vs. Vanilla GAN for Apparel Image Generation", International Research Journal of Engineering and Technology (IRJET), Volume: 08 Issue: 08

ACHIEVEMENTS

1st place, Ideathon 2021 - Bosch India & Indian Road Safety Campaign
- Designed a deep learning and computer vision-based system to compute the probability of occurrence of road accidents.
- Suggested seven use cases including over-speeding detection, traffic law violation detection, tailgating detection, alcohol intake detection, age, gender, and mood identification, and driver distraction detection.
- Proposed the use of convolutional neural networks (CNNs) and autoencoders to implement the use cases utilizing libraries like OpenCV, TensorFlow, Keras, NumPy, Pandas and Matplotlib.