Abstract

Title: Automated Machine Learning Model Selector with Gemini AI Integration and Enhanced Features

Objective: This project aims to develop a web application that allows users to upload a CSV dataset, automatically identify the nature of the task (regression or classification), apply various machine learning algorithms, evaluate their performance, and provide detailed reports. Integration with Gemini AI is leveraged to provide data summaries, insights, and suggestions for improving models and feature engineering.

Methodology: The application consists of a user-friendly frontend for file uploads and result visualization, and a backend for data processing, model evaluation, and report generation. The backend, built with Flask or Django, handles the preprocessing of data, identifies the task type, applies suitable machine learning models, evaluates them, and communicates with Gemini AI to fetch insights and recommendations. The frontend, developed with React.js, allows users to interact with the application, view data insights, and download comprehensive reports.

Features:

1. **User Interface**: Simple web interface for uploading datasets and displaying results.
2. **Data Preprocessing**: Automated data cleaning, handling of missing values, and encoding of categorical variables.
3. **Task Identification**: Automatic detection of whether the task is regression or classification.
4. **Model Selection and Evaluation**: Application and comparison of multiple machine learning algorithms with performance metrics.
5. **Gemini AI Integration**: Enhanced data insights and feature engineering suggestions.
6. **Reporting**: Generation of detailed reports including model performance, data insights, and recommendations.

Results: The application streamlines the process of selecting and evaluating machine learning models, providing users with insightful data summaries and actionable recommendations. This enables users to make informed decisions based on their datasets without requiring extensive technical knowledge.

Conclusion: By integrating automation and AI-driven insights, the project aims to democratize machine learning, making it accessible and easy to use for a broader audience. The application provides a comprehensive solution for dataset analysis, model selection, and performance evaluation, enhanced by Gemini AI's powerful insights and recommendations. Future enhancements will include support for more advanced algorithms, deep learning models, and real-time interactive visualizations.