Advanced Streamlit AutoML Dashboard for Visual Machine Learning and Explainable AI

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Problem Statement

Investigating the effects of customer behavior on churn prediction to build an explainable, user-friendly system that makes insights accessible to all users.

Objective

- To build a no-code AutoML dashboard that enables users to upload data, train models, and generate insights effortlessly.
- To provide interactive visualizations and SHAP-based explainability for transparent and user-friendly machine learning.

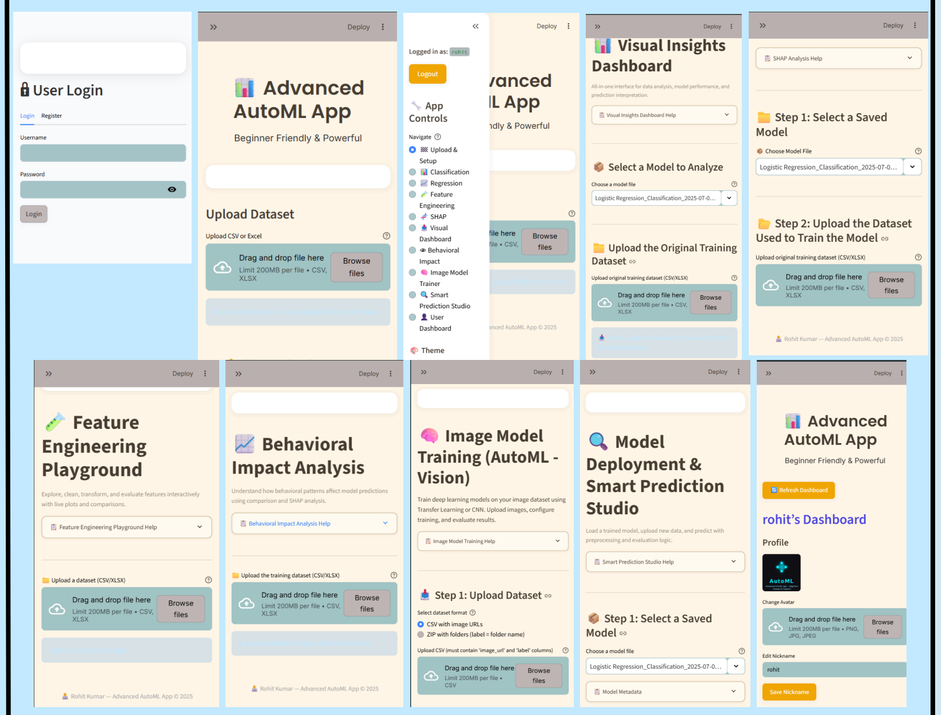
Abstract

This project presents a no-code, interactive AutoML dashboard built using Streamlit that simplifies the machine learning pipeline for classification, regression, and image-based tasks. Users can upload datasets, train models, explore SHAP-based explainability, simulate behavioral scenarios, and generate downloadable performance reports — all through an intuitive interface. The application is designed for accessibility, interpretability, and modular expansion, making it a powerful tool for both beginners and experienced users seeking transparent and rapid ML experimentation.

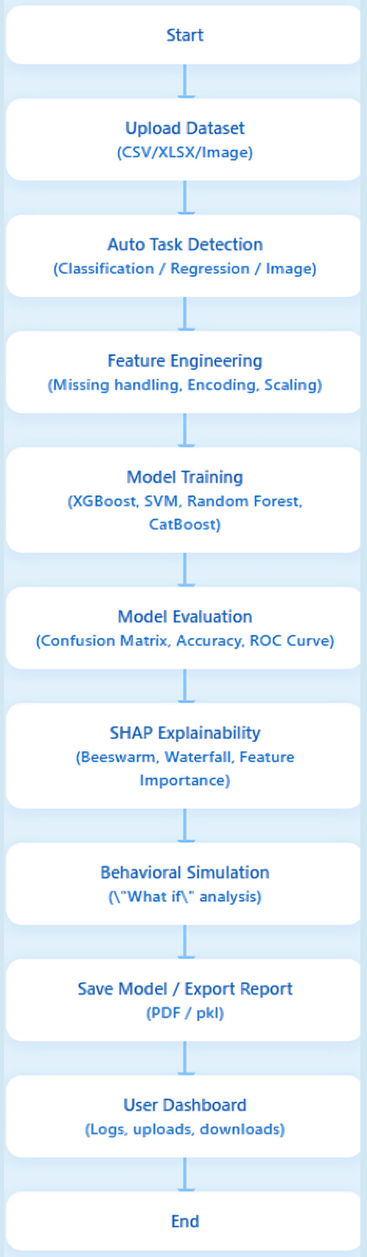
Introduction

In today's data-driven world, machine learning is widely used for solving critical problems like customer churn prediction, yet it often remains inaccessible to non-technical users. This project focuses on investigating the effects of customer behavior on churn prediction by building a no-code, interactive AutoML dashboard. The platform allows users to upload datasets, train ML models, and understand predictions through visual explainability tools like SHAP and behavioral simulations. Built using Streamlit and popular ML libraries, the tool bridges the gap between data science and real-world usability by making AI transparent, interpretable, and easy to use.

App Workflow and Development

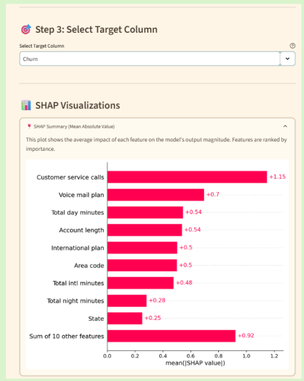


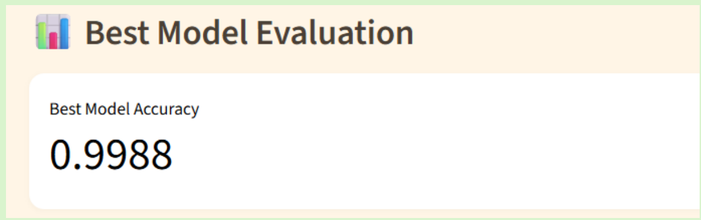
AutoML App Workflow

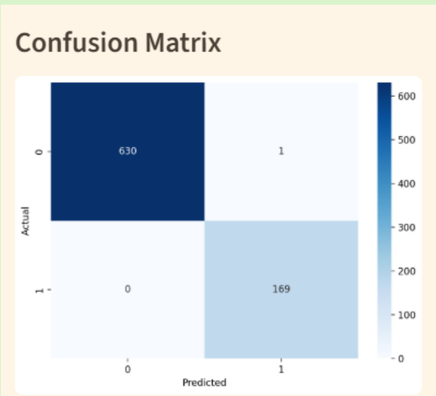


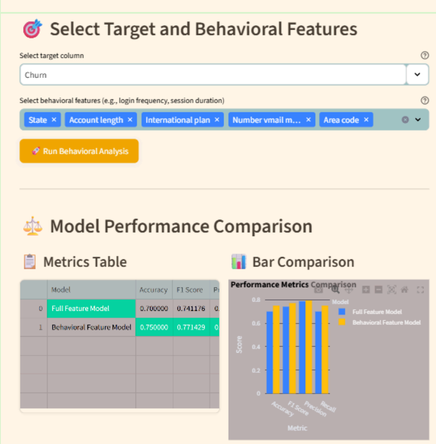
Data Analysis

- The dashboard provides interactive insights through:
- Dataset preview & summary
- Visual EDA: missing values, correlation heatmap
- Model performance: accuracy, R^2, confusion matrix
- SHAP plots for global/local interpretation
- "What-if" behavioral simulations









Conclusion

This project delivers a no-code AutoML dashboard built with Streamlit, enabling users to upload data, train models, and interpret results without coding. It supports classification, regression, and image tasks with SHAP-based explainability and real-time behavioral simulation. Features like model saving, PDF reporting, and an intuitive UI make it accessible for both technical and non-technical users. Overall, the system simplifies machine learning and proves its value for practical, interpretable AI applications.

Future Scope

- User Authentication: Add login support and personalized model storage for multi-user access.
- Cloud Deployment: Host the app on AWS or Streamlit Cloud for global access and real-time use.
- Support for NLP & Time Series: Extend functionality to handle text and time-series data tasks.
- Advanced Explainability: Integrate fairness checks, model drift detection, and additional tools like LIME.