Predicting Wine Grape Varietal Suitability Based on Climate and Precipitation

Introduction & Problem Statement

This project aims to create a machine learning model to estimate the suitability of wine grape varietals for specific locations based on climate data. It addresses the challenges of climate change in viticulture, offering a tool for winemakers to assess the feasibility of cultivating different grape varieties or exploring new regions. The problem space includes the impact of climate change on traditional zones, adaptation for sustainability, and predictive analysis for grape viability.

Proposed Vision & Approach

The vision involves a predictive machine learning model utilizing historical climate data to forecast the suitability of grape varieties for viticulture. This data-driven approach trains models on weather, sunlight exposure, and wine scores to understand climate's effects on wine production, leveraging binning wine scores into categories to minimize bias.
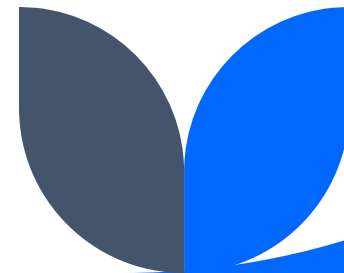
Potential Impact

The project aims to assist viticulturists in adapting to climate change, explore new viticulture areas, stimulate economic growth, and enhance the global wine market's competitive quality and pricing by identifying untapped regions.

Dataset Overview & Preliminary EDA

Data includes wine reviews from Kaggle and weather data from NOAA, requiring custom parsing for analysis. Preliminary EDA shows weather's significant influence on wine quality, with optimal conditions varying across growth stages. High-scoring wines generally experience warmer temperatures and controlled water stress during key growth phases.

Next Steps

Future work involves detailed data processing, focusing on averaging weather data based on grape growing cycles. Feature engineering will refine the model's inputs, and baseline modeling will establish initial viability assessments, with further analysis to refine and validate the predictive model.