

## **Bike Traffic and Weather Data Analysis Project**

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### **Project idea**

This project explores the relationship between bike traffic and weather conditions in Žvejų street in Vilnius, Lithuania. The aim was to develop an analytical dashboard and predictive models using historical bike counter and weather data, helping to uncover insights and forecast bicycle usage under different environmental conditions.

### **Methodology**

We began by merging and cleaning historical datasets containing bike counts (from sensors on Žvejų street) and weather parameters (temperature, precipitation, wind speed, and pressure). Data were resampled to daily granularity for consistency. We implemented filtering options in the dashboard by date, season, and time of day (night, morning, day, night), to allow users to explore trends interactively. Analysis was built on a Streamlit app dashboard.

The analysis phase involved computing daily averages, creating dual-axis line charts, and visualizing correlations between weather conditions and bike counts. For predictive modeling, we trained linear and polynomial regression models as well as Random Forest regressors on various feature sets, primarily focusing on weather attributes. The models were then tested for performance using  $R^2$  score to gauge prediction accuracy.

### **Final Product**

The end result of this project is a comprehensive Streamlit web application that includes three main sections:

- **Trends:** Interactive charts for visualizing historical bike traffic patterns across time.
- **Weather:** Insights into how different weather variables correlate with bike usage, with advanced regression analyses.
- **Predictions:** Multiple trained models capable of forecasting bike usage, including a live daily forecast based on input weather data.