

## **PROJECT PROPOSAL**

### **Title:**

Enhanced Bicycle Route Planning: Leveraging Boulder Bicycle Traffic and Weather Data

### **Team:**

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### **Problem Statement:**

It often becomes difficult for cyclists to make decisions on their route based on real-time information. It's essential for them to be aware of the traffic of fellow cyclists on a specific route and determine if it's advisable to head that way considering the weather conditions.

### **Background:**

Commuting by bicycle is a sustainable and health-conscious way to travel, gaining popularity among people and urban centers due to its manifold advantages. However, bikers frequently face problems with safety and convenience, particularly in urban environments with heavy traffic and unpredictably changing weather.

### **Goals:**

- **Bicycle Traffic Prediction:** Develop a machine learning model using ensemble learning techniques to forecast the volume of cyclists on a particular path, given our extensive dataset. This model will consider elements like the time, day of the week, and trends in previous data. For effectively managing a large dataset and guarantee good training, distributed learning will be used.
- **Ride Safety Evaluation:** Design a machine learning model that integrates both the anticipated number of cyclists and weather conditions (such as rainfall, snowfall, temperature, and wind). Given the complexity of the dataset, this model will leverage both ensemble and distributed learning to assess the safety of a route for cyclists.

### **Dataset:**

- **Bicyclist Traffic Data:** Accumulate past records detailing the number of cyclists on the selected path. Our strategy is to utilize all (Southbound, Northbound, Eastbound, and Westbound) the Boulder bicycle traffic statistics (<https://open-data.bouldercolorado.gov/search?collection=Dataset&tags=bicycle&type=table>), which we acquired from local transit authorities, biking groups, or detectors set up along the route.
- **Weather Records:** Gather historical meteorological data for the region, encompassing factors such as temperature, rainfall, wind velocity, and clarity, along with the corresponding dates and times.

We plan to acquire data from various sources such as <https://psl.noaa.gov/boulder/dailyrecords/>, <https://www.extremeweatherwatch.com/cities/boulder> etc.

### Tools:

- Programming Languages: Python.
- Libraries: Pandas, NumPy, Scikit-Learn, TensorFlow, Matplotlib, PySpark.
- Data Processing: Hadoop, Spark, and Kafka.
- Database management: MongoDB.

### Final Products:

- **Bicycle Traffic Prediction:** Software or a web application that predicts the number of bikers on a certain route based on past data enables users to foresee periods of heavy traffic.
- **Bicycle Safety Assessment Tool:** An application that provides real-time predictions on the safety of different cycling routes.

### Team Contribution:

Task	Contributing Members
Data Collection and Preprocessing	Anudeep, Aishwarya
Feature Engineering	Adi, Adarsh
Bicycle Traffic Prediction Model Development and Evaluation	Anudeep, Adi
Bicycle Safety Assessment Model Development and Evaluation	Aishwarya, Adarsh
Project Report Preparation	Aishwarya, Adarsh
Presentation Preparation	Anudeep, Adi
Project Presentation	Anudeep, Aishwarya, Adi, Adarsh