**IE 434: Deep Learning Mathematics & Applications - README file**

**Project Title: NYC Citi Bike Rentals Prediction Model**

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**Overview:**

We are working with the ‘NYC Bike Rentals’ dataset, focusing on predicting the most frequented Lyft Bike destination stations in New York City.

**Data:** [NYC Citi Bike Rentals](https://ride.citibikenyc.com/system-data)

**Objective:**

The aim is to generate a predictive model to find the most popular Lyft Bike destination stations in NYC. By understanding when and where bikes are most likely to be used, we can enhance availability and user experience especially since start and end stations frequently differ.

**Problem Statement:**

Our task is to develop a Graph Neural Network (GNN) model capable of identifying intricate patterns and correlations, to significantly enhance the accuracy of our predictions pertaining to the most frequented Lyft Bike destination stations.

**Labels:**

- End station name

**Features:**

- Start Station Name (One-hot vector)

- Rideable Type (e.g. classic bike, electric bike, docked bike)

- Date, Month, and Day of the Week

- Start and End Times

- Trip Duration (seconds)

- Start and End Latitude/Longitude

- Weather (Daily summaries)

- User Type (Customer or member)

- Year of Birth

- Gender

**Hypothesis:**

Analyzing the network of stations through a graph neural network may reveal intricate spatial patterns and relationships among the stations, enabling a deeper understanding of user preferences and behaviors.

**Impact:**

Strategic allocation of bikes across stations, guided by data-driven predictions, stands to significantly enhance user convenience and satisfaction. By ensuring higher availability of bikes where they are most needed, we can provide a more seamless and efficient service, ultimately contributing to the advancement of sustainable urban mobility solutions.

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