ABSTRACT

**Swiggy Delivery Data Optimization**

This study presents an in-depth analysis of Swiggy delivery data using Python's powerful data manipulation library, Pandas, and the versatile data visualization library, Matplotlib. The dataset used in this analysis includes a wide range of delivery records, covering key attributes such as order time, delivery duration, restaurant location, delivery distance, traffic conditions, and weather. The primary goal of this project is to identify factors affecting delivery efficiency and to explore optimization strategies that can help reduce delivery times and enhance customer satisfaction.

In addition to examining individual parameters, this analysis also emphasizes the importance of **multivariate relationships**, such as how delivery delays tend to increase when heavy traffic coincides with bad weather or during peak order hours. By analyzing the time-based trends and categorizing delivery duration into time slots (e.g., lunch rush, dinner hours, late night), the study uncovers patterns that can help Swiggy allocate delivery personnel more efficiently.

The data was initially cleaned to handle missing values, incorrect data entries, and outliers to ensure the integrity and quality of the analysis. Advanced filtering and grouping techniques in Pandas were used to segment the data by city zones, restaurant types, and customer demographics where available.

Furthermore, Matplotlib was employed to generate insightful visualizations such as histograms for delivery time distribution, bar charts comparing traffic versus average delivery time, and scatter plots illustrating the effect of weather on punctuality. These visuals help not only in identifying existing issues but also in communicating findings to non-technical stakeholders.

The extended analysis also proposes intelligent interventions, such as dynamic route allocation based on real-time traffic data, predictive estimation of delivery times, and clustering restaurants based on performance metrics. Overall, the project provides a data-driven foundation for improving operational workflows, minimizing delivery delays, and ultimately boosting customer satisfaction and retention for the Swiggy platform.