**Statistics Project Analysis Report**

**Overall Goal:** Maximize revenue for taxi drivers by analyzing payment types.

**Problem Statement:** In the fast-paced taxi booking sector, maximizing revenue is essential for long-term success and driver happiness. The goal is to use data-driven insights to maximize revenue streams for taxi drivers. The research aims to determine whether payment methods impact fare pricing by focusing on the relationship between payment type and fare amount.

**Research Question:**

1. Is there a relationship between total fare amount and payment type?
2. Can customers be nudged towards payment methods that generate higher revenue for drivers without negatively impacting customer experience?

**Agenda:**

* Problem Statement
* Research Question
* Data Overview
* Methodology
* Analysis and Findings
* Hypothesis Testing
* Recommendations

**Data Overview:** The analysis utilizes a comprehensive dataset of NYC Taxi Trip records. Data cleaning and feature engineering procedures were applied to focus on relevant columns.

**Relevant columns used for this research:**

* passenger\_count (1 to 5)
* payment\_type (card or cash)
* fare\_amount
* trip\_distance (miles)
* duration (minutes)

**Methodology:** The analysis involved three main steps:

1. **Descriptive Analysis:** Performed statistical analysis to summarize key aspects of the data, focusing on fare amounts and payment types.
2. **Hypothesis Testing:** Conducted a T-test to evaluate the relationship between payment type and fare amount, testing the hypothesis that different payment methods influence fare amounts.

**Journey Insights:**

* Customers paying with cards tend to have a slightly higher average trip distance and fare amount compared to those paying with cash.
* This indicates that customers prefer to pay more with cards when they have higher fare amounts and longer trip distances.
* **Fare amount:**
  + Card: Mean = 13.7, Standard Deviation = 6.5
  + Cash: Mean = 12.25, Standard Deviation = 6.2
* Histograms illustrate the distribution of fare amount and trip distance for card vs. cash payments.

**Preference of Payment Types:**

* The proportion of customers paying with cards is significantly higher than those paying with cash.
* Card payments account for 67.5% of all transactions, compared to cash payments at 32.5%.
* This indicates a strong preference for card payments, potentially due to convenience, security, or incentives.

**Passenger Count Analysis:**

* Among card payments, rides with a single passenger (passenger\_count = 1) comprise the largest proportion (40.08% of all card transactions).
* Similarly, cash payments are predominantly associated with single-passenger rides, making up 20.04% of all cash transactions.
* There's a noticeable decrease in the percentage of transactions as the passenger count increases, suggesting larger groups are less likely to use taxis or may opt for alternative payment methods.
* These insights emphasize the importance of considering both payment method and passenger count when analyzing transaction data.

**Hypothesis Testing:**

* **Null hypothesis:** There is no difference in average fare between customers who use credit cards and customers who use cash.
* **Alternative hypothesis:** There is a difference in average fare between customers who use credit cards and customers who use cash.
* **Result:** With a T-statistic of 165.5 and a P-value of less than 0.05, the null hypothesis is rejected, suggesting a significant difference in average fare between the two payment methods.

**Recommendations:**

1. Encourage customers to pay with credit cards to capitalize on the potential for generating more revenue for taxi cab drivers.
2. Implement strategies such as offering incentives or discounts for credit card transactions to incentivize customers to choose this payment method.
3. Provide seamless and secure credit card payment options to enhance customer convenience and encourage adoption of this preferred payment method.