Query: Different payment methods used over time by passengers

One complex database query that our application can utilize is tracking the amount of different payment methods over time used by passengers for taxis to determine the effects the introduction of online/mobile payments has had on the modern world. It is known that as time progresses, so does human innovation and inventions to better suit the needs of people and improve convenience.

Real-world relevance:

One example of this is the introduction of mobile payment methods such as Apple Pay which allows Apple phone users to link their debit and credit card information to their phone for easy access wherever they travel with their phone. Additionally, it allows for smoother and faster transactions by simply scanning one's phone and helps if an individual forgets their wallet. For the purposes of our application, we know that taxis are one of the oldest and popular forms of paid transportation used by people in typical metropolitan areas, such as New York City. Due to the large population density and landscape that New York City has, people are more inclined to take a taxi to travel around as opposed to driving their own car. And with the technology that is steering people away from paper money and more towards digital payments, taxis would have to incorporate these newer methods of payment to keep and expand their target customers. With the New York City taxicab data provided to us, we would be able to track the counts of different payment methods accepted by taxi drivers over time to discover trends such as how payment methods have changed and evolved due to the introduction of technological advances to mobile payments like Google Pay, Apple Pay, and much more.

Representing the data:

We plan on fitting the data into simple linear fit model that displays the different payment methods provided to us from the NYC taxi data and how the counts of them used by passengers changed over time.

Different payment methods as a variable:

The primary parameters that we plan on following are the different kinds of payment methods used by passengers in the transactions for the taxi as well as how many were used during our observed timeframe.

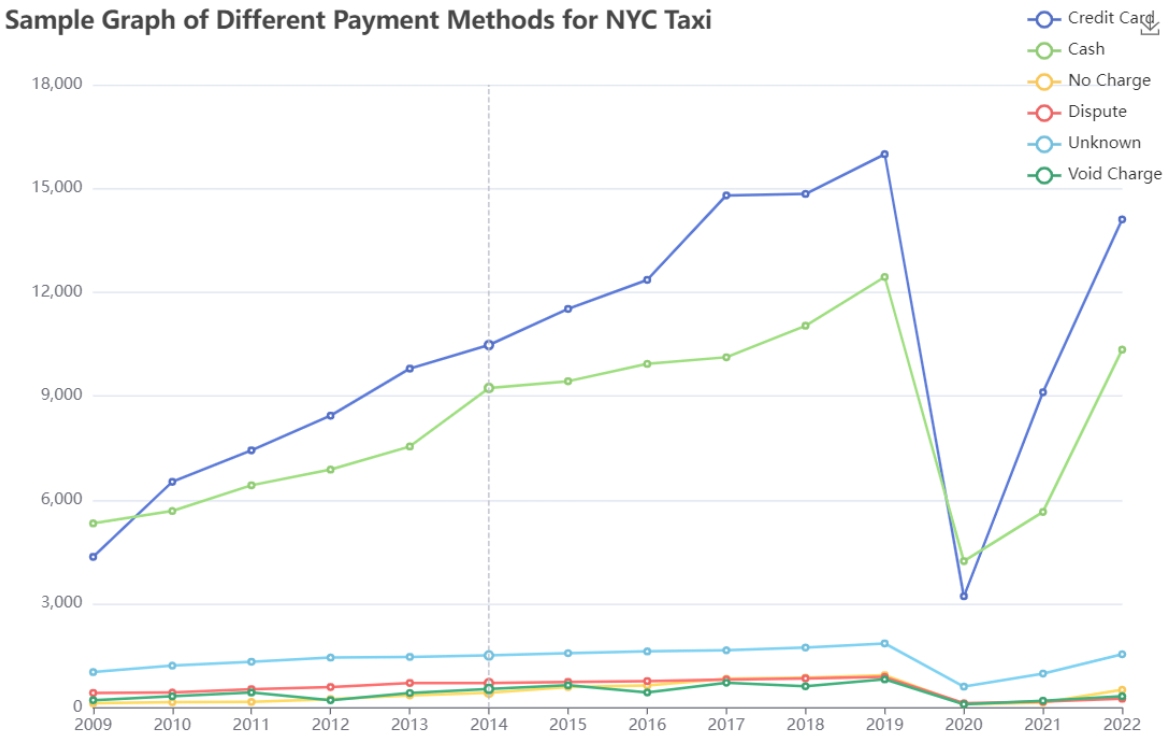

Figure 1: Sample Diagram of NYC Taxi Payment Methods Graph

In the case of our dataset, we have a considerable amount of taxi data from the years 2009 to 2022 so we'd be able to utilize the total numbers of the different payment methods used and plot them by year. As indicated by the sample plot, Figure 1, above, each payment method would be plotted linearly on a line graph showing the change of their counts over time.

Time as a variable:

Additionally, we'll be looking at time itself to determine how variables have changed and then we can draw conclusions based on what we find to support or refute our hypothesis. After some research, it seems that Google Pay was not fully launched onto mobile devices until 2011, and Apple Pay was not fully launched until 2014. With the datasets provided, we can track the trends over time of both the years before, 2009-2010, and the years after, 2015-2022, those two payment methods were introduced.

How the data can be used:

Based on the information from the trends we find, the data could be used by taxi drivers to better adapt the forms of payment they accept so that they can expand their groups of customers allowing for higher revenue and trust. Additionally, with the data we can observe this could not only reveal how payment methods have changed just for taxis in New York City, but also just for general lifestyle spending of people in the United States. New York City is widely regarded as a technological hub, home to the next generation of innovations and cutting-edge ideas. So, it would make sense that if there was a massive increase of people using Google Pay in New York City, then the rest of the United States, at least, would soon follow suit on the trend. This makes for an interesting topic of how technology has changed the lifestyles of everyday people by altering how they pay for expenses as simple as a taxi in New York City.

Notes:

Something to consider when recording and evaluating the data for this query is that possibly taxi drivers did not immediately incorporate Google Pay and Apple Pay as potential payment methods once they launched. As with all technology, it would take some time before those two payment methods became somewhat normal for people to use. Therefore, the amount of people using them won't be so high at the very beginning of their introductions as the sample diagram, Figure 1, would suggest.