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**1. Introduction**

**1.1 Problem Statement and Research Motivation.**

The rise of cryptocurrencies has introduced unprecedented levels of market volatility. IoTeX, a blockchain platform specializing in the Internet of Things (IoT), is a notable asset due to its price fluctuations and technological innovation. Seasonal price variations in traditional financial markets have been well-documented, but their influence in cryptocurrency markets remains under-researched. This project investigates whether IoTeX's median daily price changes differ across seasons. By identifying seasonal trends, investors and analysts can make more informed decisions and potentially optimize trading strategies. Our analysis contributes to the growing field of cryptocurrency market behavior research.

**1.2 The Dataset**

The dataset, titled "Internet of Things Coins Historical Prices," contains daily records of IoTeX prices from May 25, 2018, to 2022. The dataset includes key variables such as open, high, low, close, adjusted close prices, and trading volume. The daily price change was calculated as the difference between the close and open prices. The dataset spans 1,462 days and was categorized into seasons (Winter, Spring, Summer, Autumn) based on the recorded dates.

**1.3 Research Question**

Our research question is: "Do median daily price changes of IoTeX asset prices differ across seasons during the period 2018 to 2022?" This research question guides the investigation into whether seasonal factors significantly influence IoTeX’s price behavior, with seasons serving as the independent variable and daily price changes as the dependent variable.

**1.4 Null Hypothesis and Alternative Hypothesis (H0/H1)**

* **Null Hypothesis (H0):** There is no difference in the median daily price change between seasons.
* **Alternative Hypothesis (H1):** The median daily price change varies significantly across seasons.

**2. Background Research**

**2.1 Research Papers**

**"Seasonality and Asset Returns" by Jegadeesh and Titman (1993):** This paper discusses predictable price movements in financial markets during specific periods, demonstrating how year-end periods often yield higher returns.

**"Cryptocurrency Market Efficiency" by Urquhart (2016):** This study investigates inefficiencies in cryptocurrency markets and how pricing anomalies, such as seasonality, can influence trading.

**"Volatility Clustering in Cryptocurrencies" by Katsiampa et al. (2019):** This research highlights how external factors like seasonal trends impact cryptocurrency price volatility.

**2.2 Research Gap and Future Directions**

While prior studies have examined seasonality in traditional financial markets, limited research exists on specific cryptocurrencies like IoTeX. This study addresses a critical gap by exploring seasonal price variations within a single asset. Future research could integrate external macroeconomic factors to enhance predictive models and inform algorithmic trading strategies.

**3. Visualisation**

**3.1 Appropriate Plot for RQ Output**

We used a seasonal boxplot to display the distribution of daily price changes for IoTeX across Winter, Spring, Summer, and Autumn. This visualization effectively highlights variations in the median, interquartile range, and outliers for each season, aiding in the assessment of whether significant differences exist between seasons.

**3.2 Additional Information Relating to Understanding the Data**

The seasonal boxplot reveals that Autumn exhibits wider variability in daily price changes, indicating heightened volatility during this period. In contrast, Winter and Spring have relatively consistent price changes, as seen in their narrow interquartile ranges.

**3.3 Useful Information for Data Understanding**

* **Median Values:** Median daily price changes are close to zero, reflecting overall stability.
* **Outliers:** Significant outliers appear in Autumn, possibly linked to external market events.
* **Comparative Stability:** Winter and Spring show stable price patterns, while Autumn and Summer show greater variability.