BACKGROUND: Forecasting cryptocurrency prices is challenging due to their extreme volatility. The unpredictability of cryptocurrency markets differs substantially from traditional stock markets for which analysts typically examine earning reports, macroeconomic trends, and regulatory changes. In contrast, cryptocurrency prices often correlate more with social media sentiment and influencer opinions than with traditional economic measures.

This project aims to address the volatility challenges posed by cryptocurrency by examining a hybrid approach that combines traditional statistical models like ARIMA and XGBoost with deep learning techniques such as LSTM to enhance predictive accuracy.

PROJECT AIM: Construct and test the predictive accuracy of a hybrid model that integrates historical patterns, sequential dependencies, and sentiment analysis.

Hypothesis: A hybrid model that integrates historical patterns, sequential dependencies, and sentiment analysis will have a higher predictive accuracy than traditional standalone models for predicting cryptocurrency volatility.

Approach: We will combine and test the predictive accuracy of a hybrid model that incorporates ARIMA and XGBoost abilities to capture historical cryptocurrency patterns with LTSM to identify sequential dependencies (and complex patterns) and the CrypTop12 dataset to integrate sentiment analysis from social media. Utilizing open-high-low-closing (OHLC) datasets from Kaggle and Binance, we will conduct extensive data exploration, cleansing and feature engineering, and incorporate indicators such as moving averages, relative strength index (RSI), and daily return percentage.

POTENTIAL IMPACT: By assessing the effectiveness of hybrid models to predict cryptocurrency prices and specifically to examine the role of sentiment analysis in forecasting, we aim to create a mechanism that accounts for both historical data and sentiment driven market trends. Accordingly, the results of this research will have immediate applicability to further our understanding of this rapidly evolving area of digital finance.