

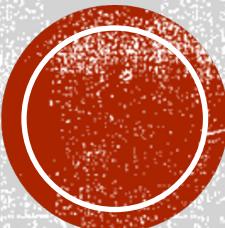
PREDICTING DOGE COIN PRICE BUBBLES USING EPIDEMIC MODELLING



A study on application of EPI
research on Crypto domain

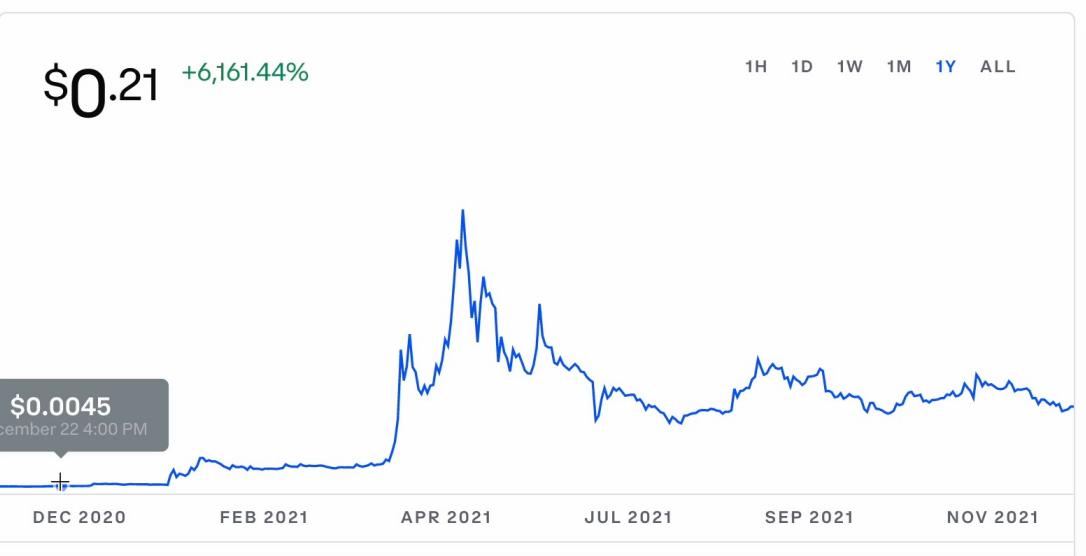
Garimendra Verma

Surya Teja Adluri



MOTIVATION

D Dogecoin price (DOGE / USD)



Bayesian Markov switching models for the early detection of influenza epidemics

M. A. Martínez-Beneito^{1,2}, D. Conesa², A. López-Quílez² and A. López-Maside¹

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Another Look at Low-Order Autoregressive Models in Early Detection of Epidemic Outbreaks and Explosive Behaviors in Economic and Financial Time Series

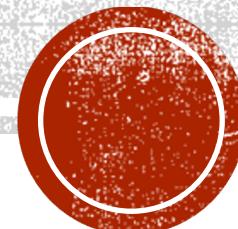
Ernest S. Shatland, eStatConsulting, Stoneham, MA
Timur Shatland, eStatConsulting, Stoneham, MA

Using Time-Series and Sentiment Analysis to detect the Determinants of Bitcoin Prices

Ifigeneia Georgoula¹, Demitrios Pournarakis¹, Christos Bilanakos¹, Dionisios N. Sotiroopoulos¹ and George M. Giaglis¹

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Athens University of Economics and Business

INTUITION



Crypto Price Bubbles

Epidemic Detection

Twitter Sentiment Analysis

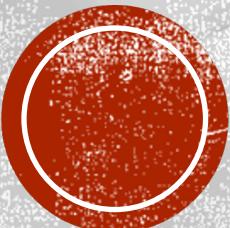
Hidden Markov Model

PROBLEM DEFINITION

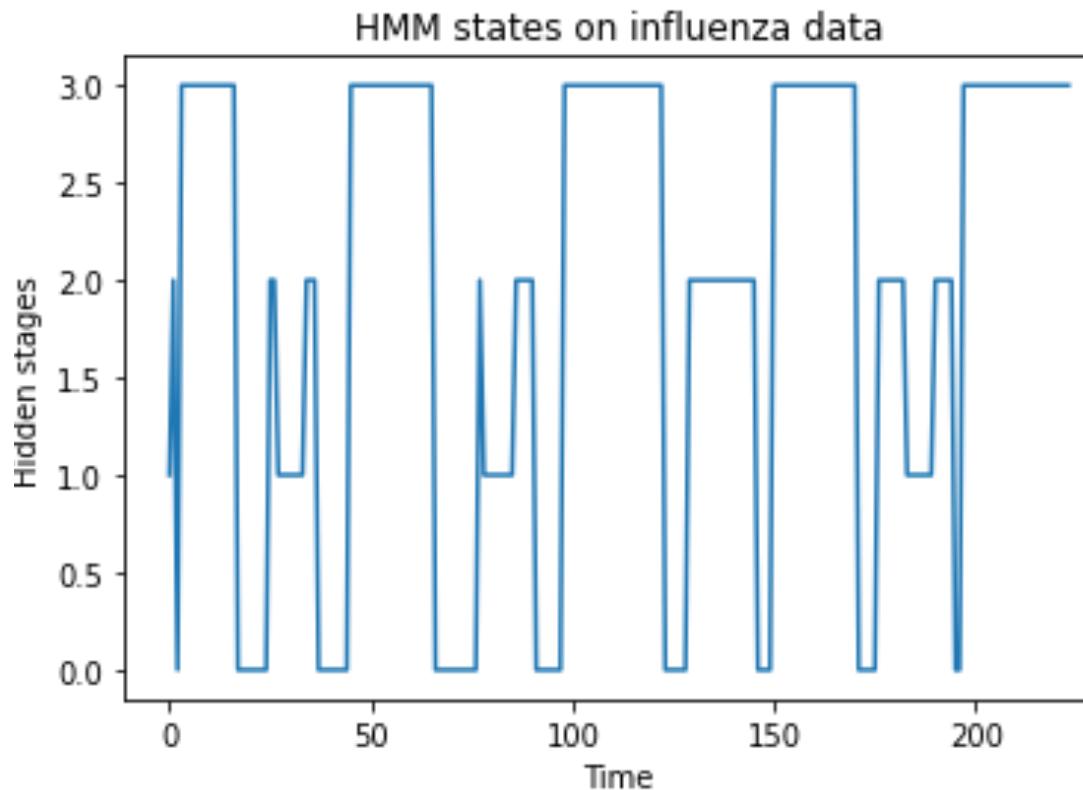




HOW DID WE APPROACH IT?



INITIAL ANALYSIS



- Influenza follows bubble behavior
- Once trained, HMM can help detect hidden epidemic stages, apart from low-high
- Crucial in early epidemic detection
- Based on “Bayesian Markov switching models for the early detection of influenza epidemics”





Twitter (TWINT API)

Data Extraction

Identifying Sentiment

Feature Selection

Hidden Markov Model

Prediction



THE MODEL – HIDDEN MARKOV MODEL

- HMM was used to detect epidemic and non-epidemic states of sentiment scores for tweets
- HMM has a number of underlying hidden states, which are transitioned between and each state has associated possible observations
- Given an observed series of data an HMM can be used to identify the most likely hidden state the model is in at each data point.



Tweets gathered from March'21 – Sept'21 with tags and keywords using Python's twint library – ['#dogecoin', '#tothemoon', '#dogefather', '#dogecoinrise', etc.]

Over 100,000 raw tweets collected using the Twitter API.

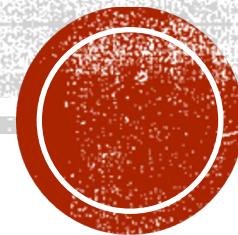
Influenza Data for the period over the past decade, indicating the number of ILI cases in the US for all regions collected from CDC Website

Dogecoin prices (daily OHLC) for Mar'21-Sept'21 extracted from CoinDesk due to the epidemic like behavior of the coin's value in the current year

New COVID Infections for US for the same period collected from [Our World in Data](#) with a 7-day rolling average.



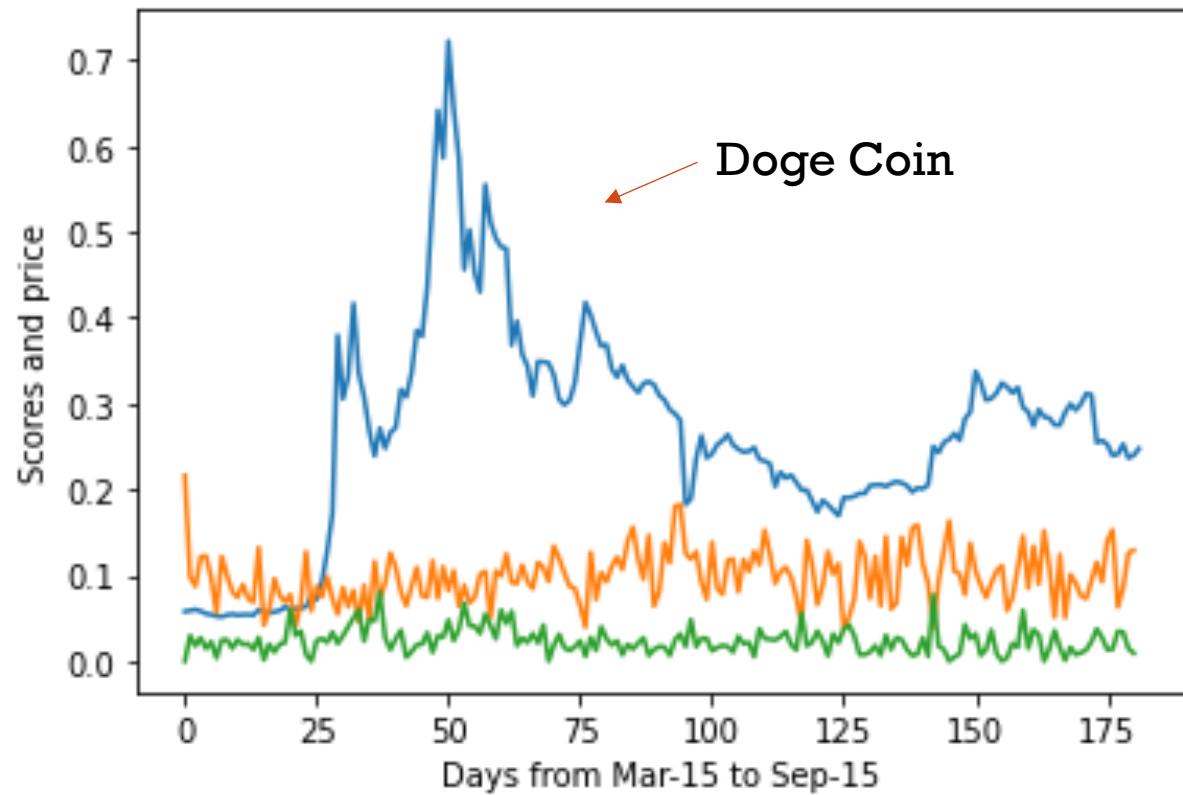
EXPERIMENTS AND RESULTS



SENTIMENT ANALYSIS ON TWITTER DATA

- Removal of duplicate tweets and converting the text to lowercase
- Tokenizing the data and removing stopwords
- Lemmatizing and stemming
- Removing the symbols and special characters

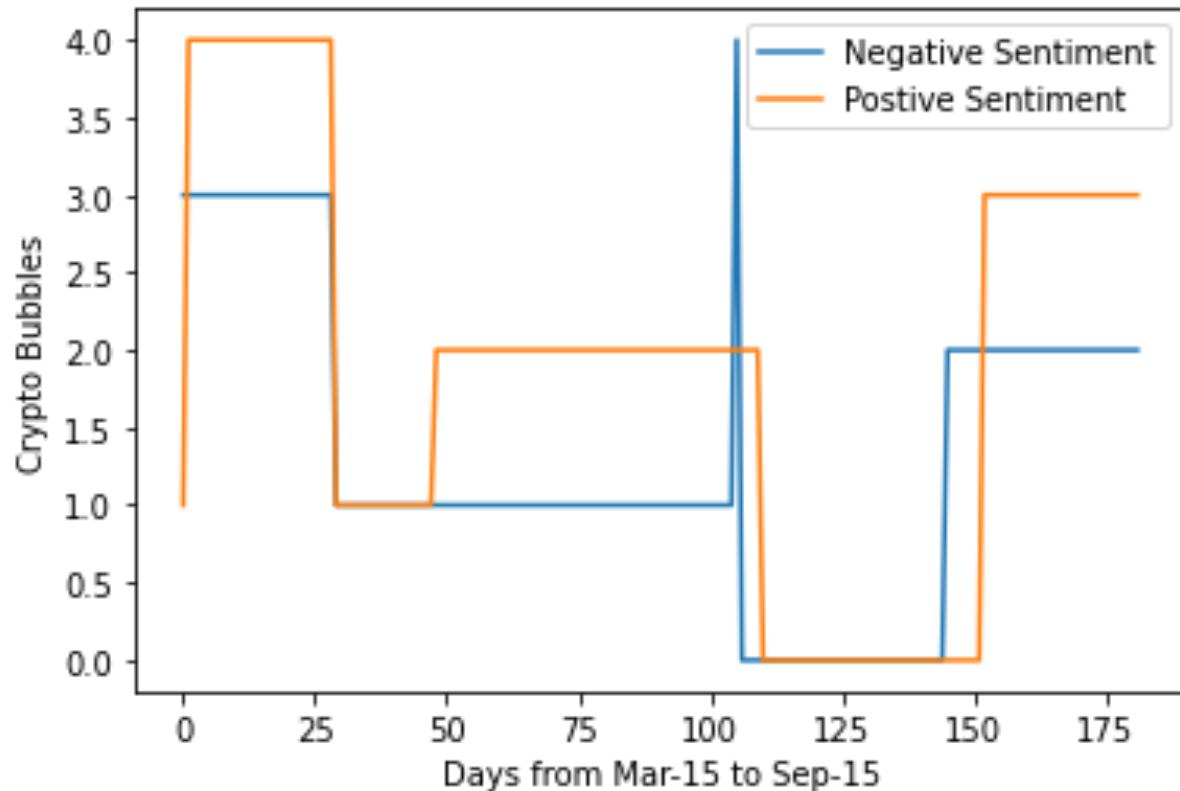
SENTIMENT SCORES VS DOGECOIN



- Sentiment scores were compared against the doge coin prices.
- It's hard to predict the prices solely based on the twitter sentiment scores since correlation is less.
- Dogecoin follows an epidemic like pattern for the given time frame.
- Need of an epidemic model can be inferred from this experiment.



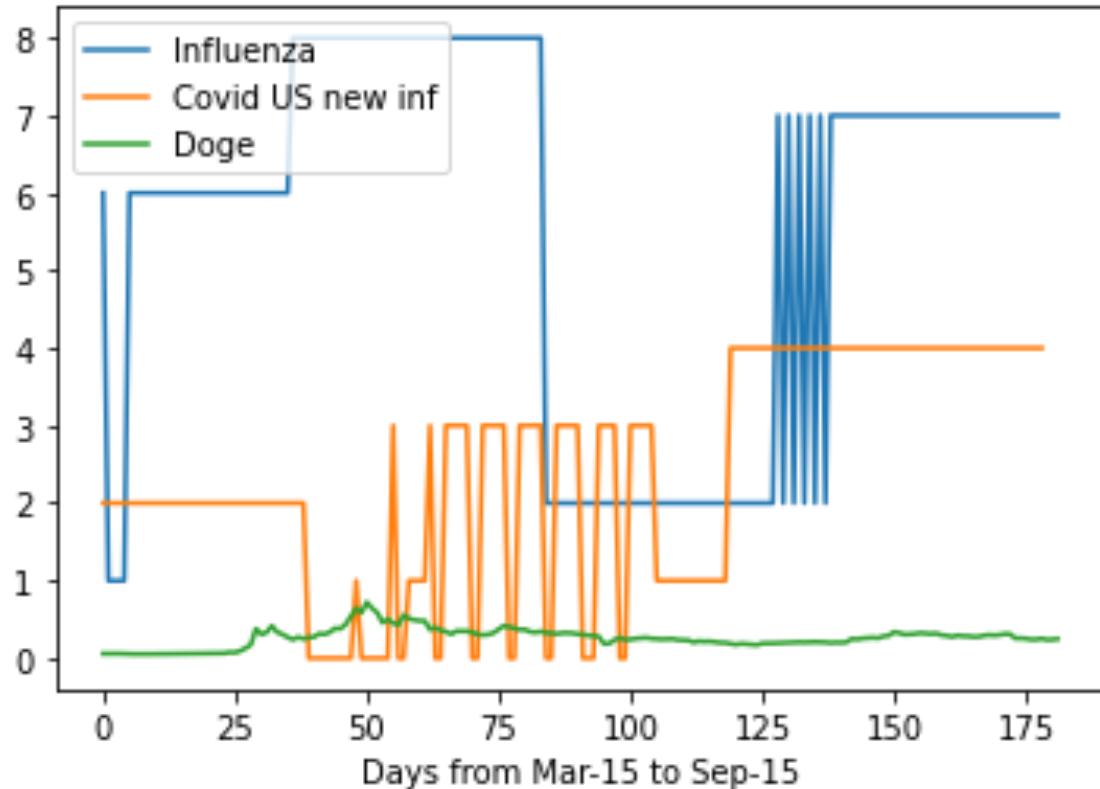
HMM ON SOCIAL MEDIA ANALYSIS



- Train HMM using both positive and negative twitter sentiments separately.
- Repeated the training for several iterations to prevent it from falling into local maxima
- Shows positive correlation with dogecoin prices in determining the epidemic stages
- Clearly, early detection of boom and burst cycles in Dogecoin prices is possible



HMM ON US INFLUENZA & COVID DATA



- We trained two separate HMM models for both Covid and Influenza data.
- First, a new HMM model is created with hidden states, then covid new infections data from the same period of 6 months is trained on it
- Similarly influenza data for six months is collected and trained using HMM to detect hidden stages in the infections.
- No effect on Doge Coin prices from epidemic signals directly.



CONCLUSIONS

- Highlights how the techniques of epi-demic detection can be applied to Tweets for prediction of the Cryptocurrency price bubbles.
- Like the spread of an infectious disease , ideas of investments also spread and form bubbles.
- Epidemic and non-epidemic stages were learned and classified by the model.
- Strong correlation between the DogeCoin prices and the behavior expressed by users on the internet while COVID and Influenza infections prove to be less useful.



Q-N-A ?