Orbuculum for Foreign exchange market

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VIDEO PITCH: https://youtu.be/ax24y18z7S0

Github: https://github.com/MMoRann/UTS_ML2019_13065040

Read the instructions before:

1. **Orbuculum** means A **crystal ball;**
2. Sentiment Analysis is the process of 'computationally' determining whether a piece of writing is positive, negative or neutral. It's also known as opinion mining, deriving the opinion or attitude of a speaker.

AIMS

Prophecy is a wonderful superpower for all investors in this unstable and fast-moving business world. All of us hope to know what would happen tomorrow, but we are not living in the Hogwarts, and there is no real orbuculum helping us decipher the future. Therefore, this project is going to make full use of the access and resources we have to predict the foreign exchange (Forex) market. The aim of this project is to develop a program to predict the future trends of the Forex market in Australia using macro indicators, including interest rate, unemployment rate and gross domestic production (GDP), etc. and sentiment analysis of twitter and Facebook messages. This general aim could be broken down into five specific objectives:

(1) Data collection

Get access to different data sources to collect relevant data, including macro indicators, related Facebook, and twitter messages, and store them into the local database.

(2) Data cleansing

Detect, correct, replace, and modify inaccurate records in the database to make sure the quality of our input data.

(3) Data model design

Try and evaluate several classifiers for sentiment analysis and the final prediction model.

(4) Model selection

Validate and deploy the last model to conduct the prediction.

(5) Data visualization

Using a proper methods to present the prediction result and support investors' decision-making activities.

BACKGROUND

In the past decades, there are a number of methods investigating financial market prediction. These researches provide a foundation that historical data could be used to guide the trend prediction of the investing market. Specifically,

Arima model is a common method used to predict the macro indicators. Meyler (1998) established the Arima model to predict the trend of inflation in Irish. Besides, this model was also applied to forecast the gold price (Guha & Bandyopadhyay, 2016) and stock price (Adebiyi, 2014).

Meanwhile, the neural network is another great algorithm to do the predicting job. For example, Adewole Olatunji et al. (2011) build a neural network model to predict the trend for European Currency (EURO), Japanese Currency (Yen), USA dollar, and Great Britain Pound (GB) against Nigerian Currency (Naira). Hann et al. (1996) compared the linear monetary model with neural network models to predict foreign exchange rates for the USA dollar against the Deutsch mark. Jingtao Yao et al. (2000) established a predicting model using time series variables and their moving average to capture the trend of exchange rates between USA dollars and British Pounds, Australian Dollar, Japanese Yen, and Deutsch Mark.

Additionally, there were also various other methods used to predict the movement of the financial market. For instance, Lavanya et al. (2013) applied a propagation algorithm to

forecast the trend of the foreign exchange rate for the Australia dollar against Chinese yuan. Besides, Refenes (1993) explored a constructive learning algorithm to build a model predicting the foreign exchange rate.

Basically, this literature provides a theoretical and practical foundation for our project by discovering the economic pattern in the financial market. We can obtain many variables from this literature to help us predict the movement of the foreign exchange market.

In terms of sentiment analysis, we can use this tool to investigate the attitude of investors in the foreign exchange market and predict the trend based on this information. Sentiment analysis for the exchange market is a method to evaluate how investors feel about a current Forex market. In the stock market, we have a bear market and bull market. Similarly, good news in the market would lead to a positive sentiment toward the Forex market, usually followed by a bull market, while bad news would cause a negative sentiment toward the Forex market, always followed by a bear market. Therefore, we can apply this tool to help investors make reasonable decisions.

RESEARCH PROJECT

Significance of project

The foreign exchange rate is a pretty hot topic interested by all companies with international trade and investors involved in the relevant transactions. Usually, they would make an investment plan based on the future movement of the foreign exchange rate. There is no doubt that the plan would be super effective if they can have a very accurate prediction.

Additionally, investors can make a great profit by trading foreign currency at the right time. In other words, if we can know when the exchange rate is more likely to go up or down, we would have a great opportunity to expand our fortune.

Innovation

Based on the literature review, regardless of the importance of foreign exchange market prediction and the powerfulness of sentiment analysis, there is little research using this powerful algorithm to predict the movement of the foreign exchange market. So, this project is aimed to fill this gap and provide a more accurate predicting model for the investors. Then, this project also innovatively combines the result of sentiment analysis and the result of other classifiers to improve the accuracy of the traditional predicting model. Specifically, this project would conduct sentiment analysis based on Facebook and twitter messages to get a market sentiment score. Then, we would use this sentiment score and other macro variables, such as inflation rate, unemployment rate, and GDP, to establish the predicting model.

Project outline

This project can be broken down into the following tasks,

(1) Define data sources and collect media data

We need to define where to get the latest macro indicators. For example, we can get access to the inflation rate, unemployment rate, and GDP data from the Trading Economics website, WorldAtlas.com, or Australian Bureau of Statistics official website. Then, we need to design a web crawler to scrape foreign exchange related messages from Facebook and Twitter. This project would use Python to design the crawler. Specifically, we would

use packages such as BeautifulSoup, re, request, urllib, and selenium to achieve the function. Meanwhile, this project would also make full use of the official API provided by Facebook and Twitter to get relevant information.

(2) Clean the data to improve the quality of data

Using Python, R, or other tools, we can deal with the errors and missing value in the raw data. Packages include pandas, numpy, etc.

(3) Conduct the sentiment analysis to get the market sentiment score

First of all, we need to label some messages from social media platforms using a 5-point system as the training dataset. Five points mean the most positive attitude, while 1 point means the most negative attitude. Then we would this training dataset to build several models based on different classifiers to analyze the text and use an unlabeled validation dataset to evaluate the performance of each classifier to get the best model. Finally, we would use this model to get the general market sentiment score for the foreign exchange market.

(4) Using market sentiment score and other macro variables to build the predicting model

Similarly, we would build different models to predict the trend of the foreign exchange rate. Based on the accuracy, specificity, sensitivity, and roc value, we could pick the best model to do the prediction work.

(5) Present the prediction result and corresponding notes or alarms

In this step, we would show the trend of foreign exchange using an obvious and clear method and provide corresponding alarms if the movement is unusual and dramatical.

Timeline

No	Task	Time required (in months)	Date range
1	Define data sources and collect media data	2	10/10/2019-12/10/2019
2	Clean the data to improve the quality of data	2	12/11/2019-2/10/2020
3	Conduct the sentiment analysis to get the market sentiment score	3	2/11/2020-5/10/2020
4	Using market sentiment score and other macro variables to build the predicting model	3	5/11/2020-8/10/2020
5	Present the prediction result and corresponding notes or alarms	2	8/11/2020-10/10/2020

Outcome & Benefits

The outcome of this project is the predicted movement of the foreign exchange rates in the following months or years. Investors can use this predict to arrange their investments or portfolio and make the best decision.

For the society, with the progress of globalization, many people choose to travel abroad. If people can predict the general trend of the exchange rate through the results of this project,

people can choose whether to purchase foreign exchange in advance before preparing for travel. The same help is given to the students who are preparing to study abroad.

BUDGET

Item	Cost	Notes
Personnel	$ 83454*3=250362	Employee's salary for 1 year
Equipment	P1$1500 P2$20000 P3$3500	P1: Database access, software certificate, etc. P2: Cost for office rental for 1 year; P3: Office supplies and installation costs.
Others	$500	Another relevant cost
Total	$275862	

PERSONNEL

This project requires 1 data collector to do the web scraping and data cleansing job, 1 model designer to do the sentiment analysis, final predicting model design and model evaluation, and 1 data presenter to visualize the predicting result.

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