TECHNICAL BEHIND IN SP500 COMPANIES STOCK CHANGES SYSTEM

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1) Introduction

Stock market is an important part of national economic development. Forecasting stock price movements is important for governments, investors and investment institutions. Therefore, it attracts many scholars to conduct research. However, the price trend of the stock market may be influenced by political factors, macroeconomic factors, legal factors, etc., resulting in great uncertainty and volatility of the stock price, making it a major problem in research. Therefore, creating a Web App System for stock prediction which deep learning is deployed is necessary these days.

1.1) Functional requirement

Functional requirements for applications describe what specifically needs to be implemented in a particular system or product and what actions users have to take to interact with the software. They determine what the system should do.

- Interface requires beginning date and ending date of survey.
- Interface requires a stock price ticker.
- Interface requires number of affected companies

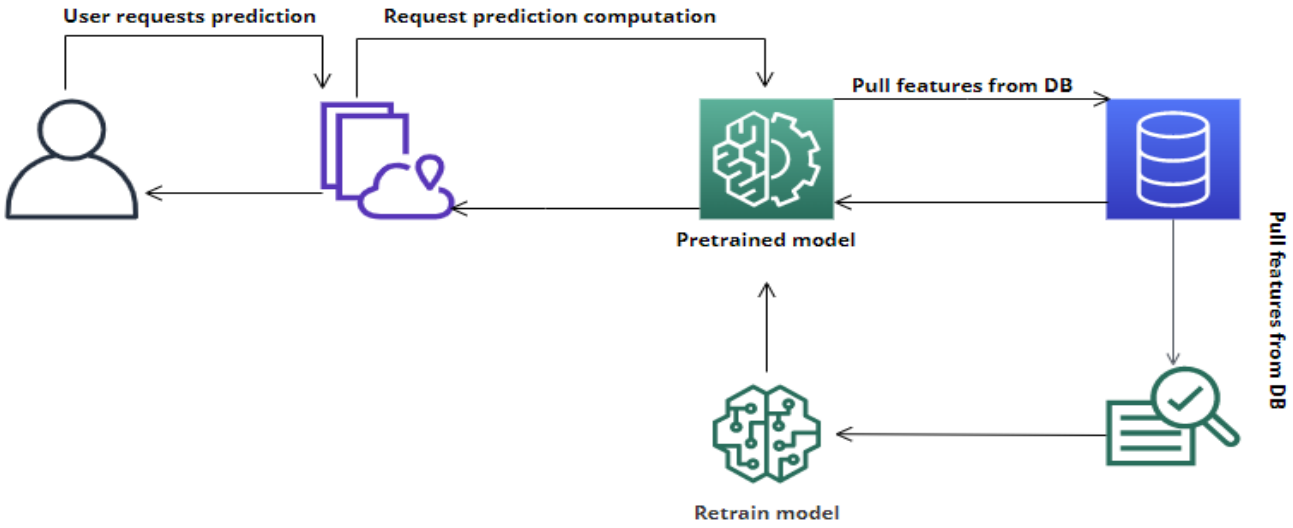
1.2) Non-Functional requirement:

- **Availability:** Ensure the overall efficiency
- **Performance:** Web's performance delay within 2 seconds, the data shared among users within 3 seconds, web response to multiple requests and manipulations within 1 second.
- **Maintainability:** Clean structure and architecture, which is easily maintained or updated to new versions after long-time operation.

2) Architecture and dataframe:

2.1) Architecture:

Real-Time Machine Learning Deployment is the process of training a machine learning model by running live data through it, to continuously improve the model.



2.2) Framework:

For representation: **Streamlit** which is a free and open-source framework to rapidly build and share beautiful machine learning and data science web apps.

For database: **MySQL** is a relational database management system (RDBMS) developed by Oracle that is based on structured query language (SQL)

For deep learning model (LSTM): **PyTorch** is an optimized Deep Learning tensor library based on Python and Torch and is mainly used for applications using GPUs and CPUs.

API: **FastAPI** is a modern, fast (high-performance), web framework for building APIs with Python 3.7+ based on standard Python type hints

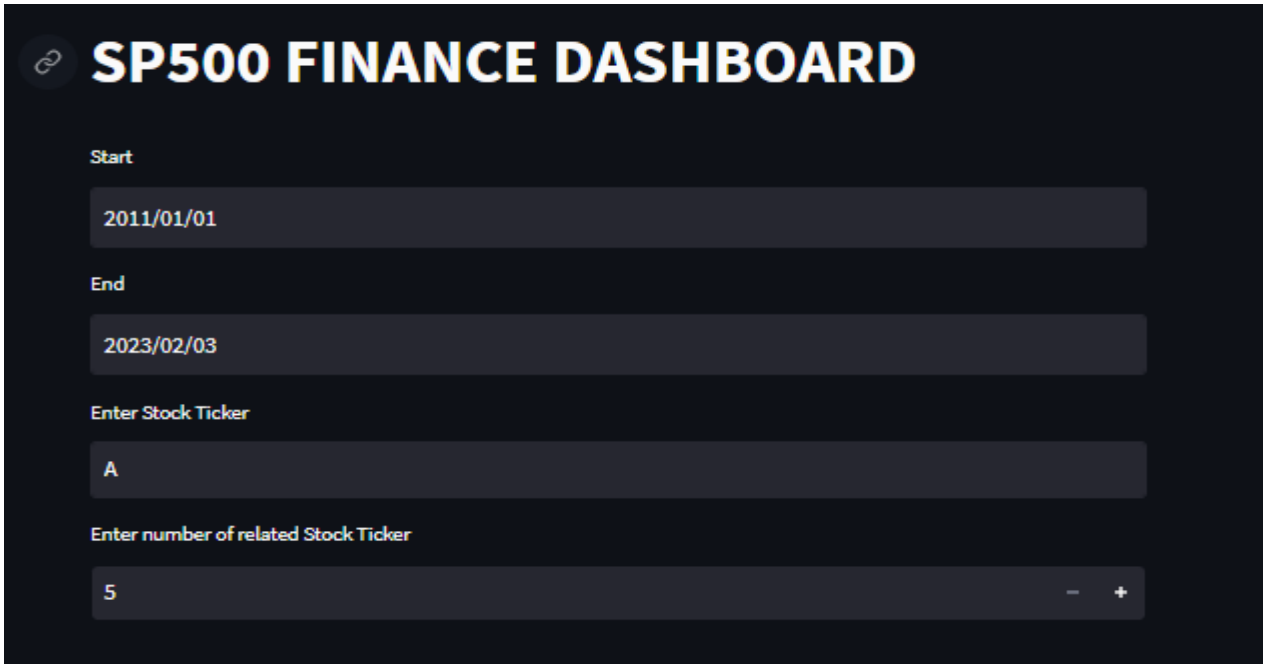
3) Implementation:

3.1) Setting up:

Github link: https://github.com/HungVoCs47/SP500-Analysis

3.2) Result:

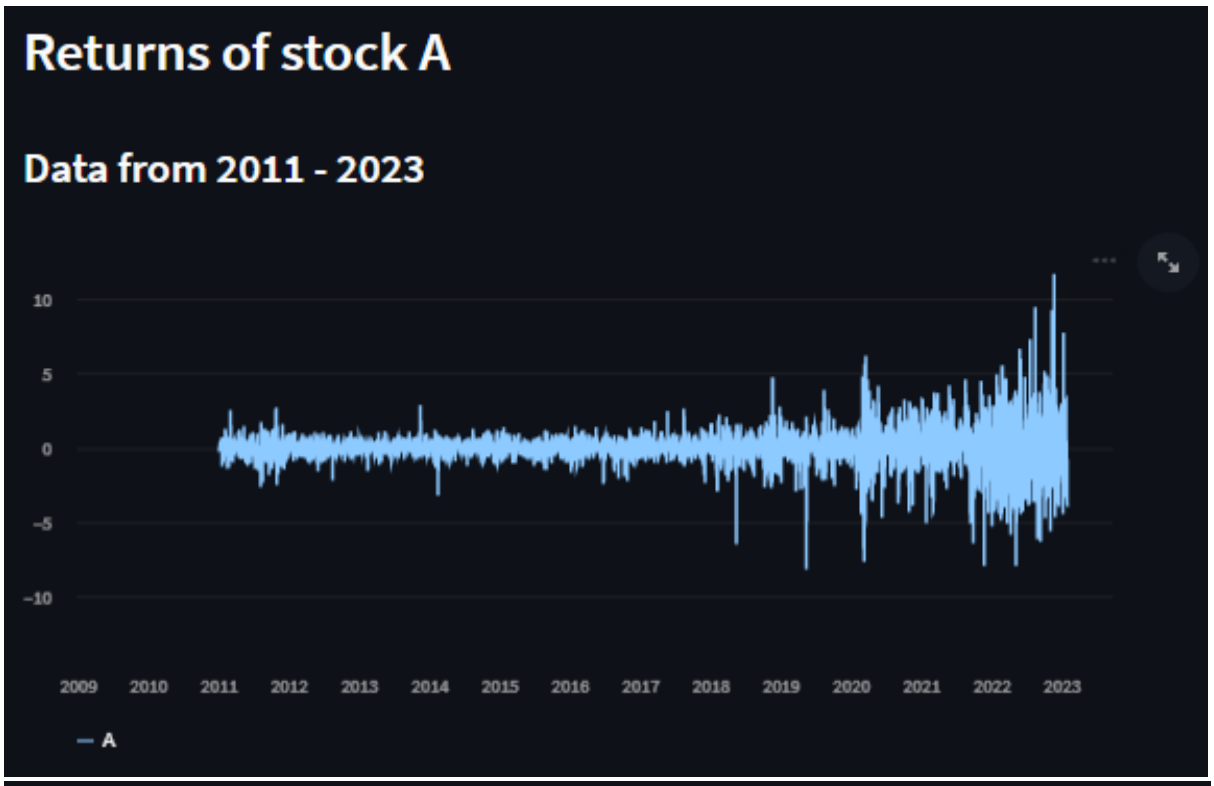
3.2.1) Input Dashboard view:

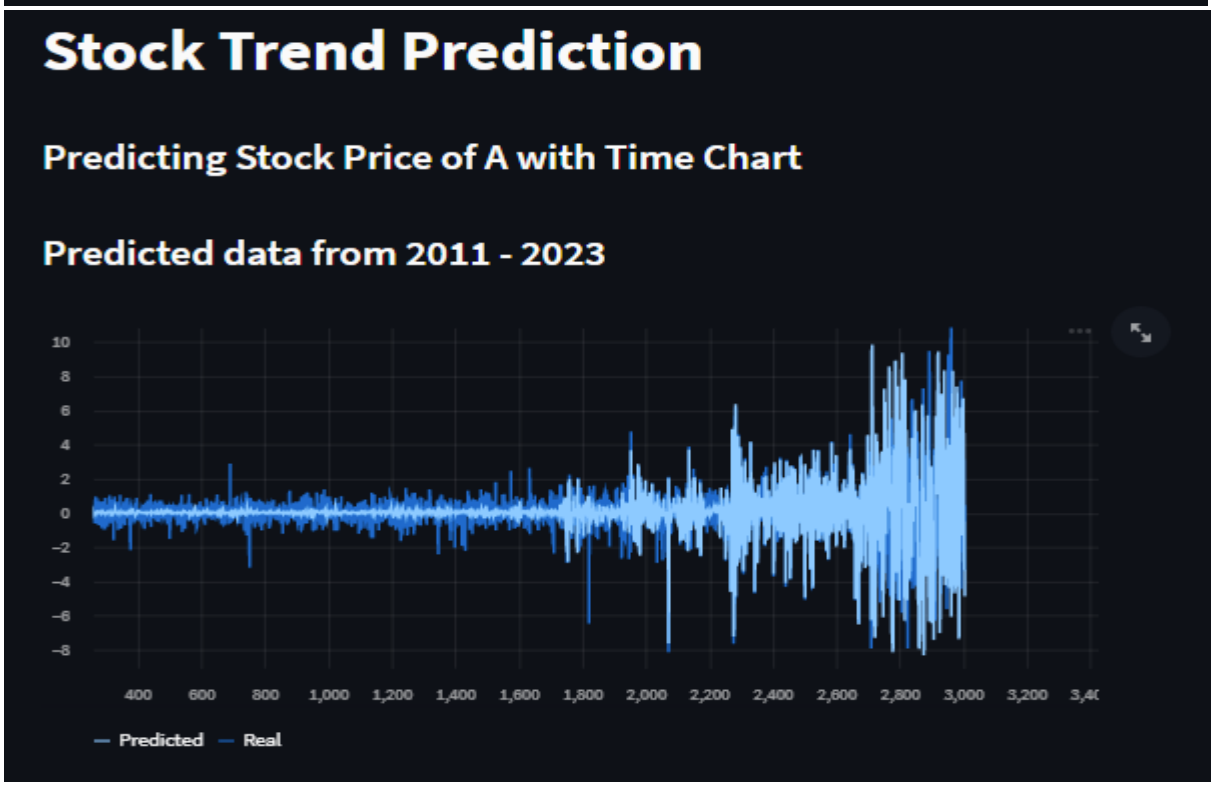


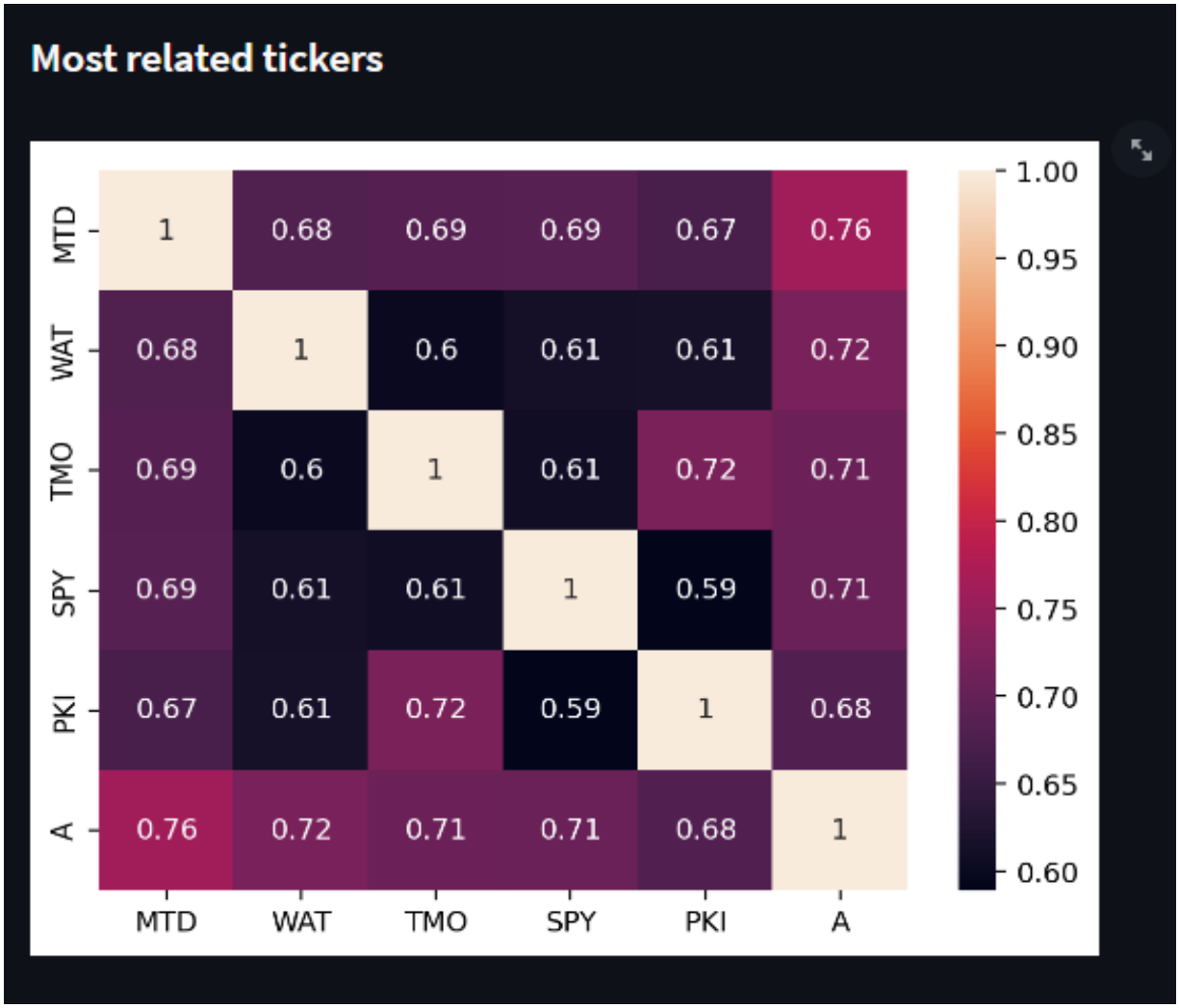
Users have to input in the 4 fields:

- Start date of survey
- End date of survey
- Stock price Ticker
- Number of related stock prices

3.2.2) Dashboard result:

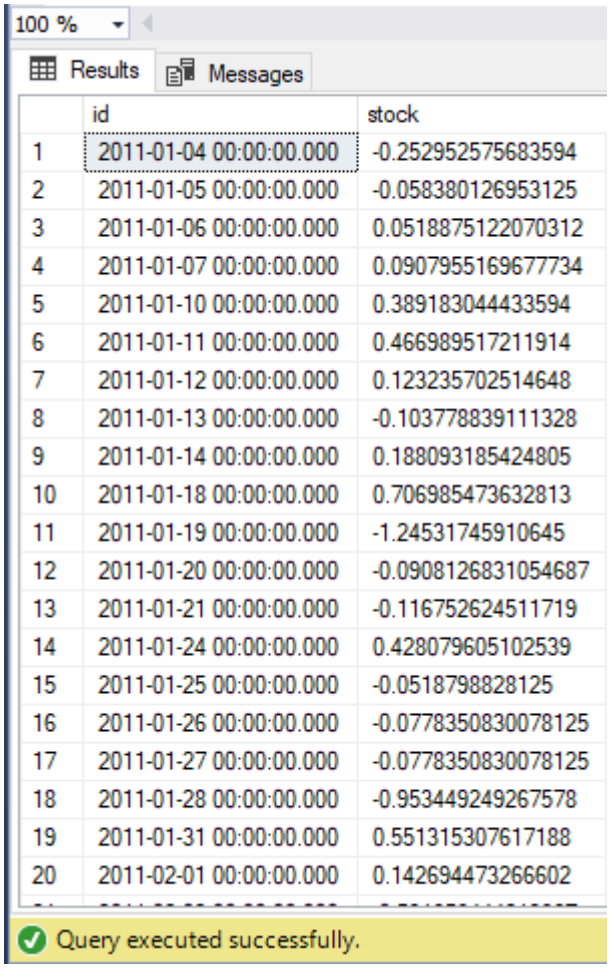






The Web returns **the desired stock price and the prediction stock price. After that, the model will calculate the most N affected stock price which is related to the survey stock price.**

3.2.3) Database:



100 %

Results | Messages

	id	stock
1	2011-01-04 00:00:00.000	-0.252952575683594
2	2011-01-05 00:00:00.000	-0.058380126953125
3	2011-01-06 00:00:00.000	0.0518875122070312
4	2011-01-07 00:00:00.000	0.0907955169677734
5	2011-01-10 00:00:00.000	0.389183044433594
6	2011-01-11 00:00:00.000	0.466989517211914
7	2011-01-12 00:00:00.000	0.123235702514648
8	2011-01-13 00:00:00.000	-0.103778839111328
9	2011-01-14 00:00:00.000	0.188093185424805
10	2011-01-18 00:00:00.000	0.706985473632813
11	2011-01-19 00:00:00.000	-1.24531745910645
12	2011-01-20 00:00:00.000	-0.0908126831054687
13	2011-01-21 00:00:00.000	-0.116752624511719
14	2011-01-24 00:00:00.000	0.428079605102539
15	2011-01-25 00:00:00.000	-0.0518798828125
16	2011-01-26 00:00:00.000	-0.0778350830078125
17	2011-01-27 00:00:00.000	-0.0778350830078125
18	2011-01-28 00:00:00.000	-0.953449249267578
19	2011-01-31 00:00:00.000	0.551315307617188
20	2011-02-01 00:00:00.000	0.142694473266602

Query executed successfully.

Then the Web will save the data to the database to retrain the LSTM model.