Quantum Computing Companies Stock Prices Analysis and Forecasting Web Application

Pushkar D, Sharanbasav S, Vignesh K

Summary:

Using the dataset from Kaggle, which contains the stock prices of the companies invested in development of quantum computers using research in quantum mechanics, our database application will provide analysis of the stock's price by visualizations and forecasts the stock price of those companies, Stock Analysts could use this application to their benefit by the statistics and Forecast by ML techniques to their advantage for their investment portfolio.

Objective:

The Main Objective of this database application would be to provide quick insights into the stock performance of the Quantum computing driven companies, by appropriate visualizations and Statistics of the stocks. It would also provide forecast of the stocks using ML algorithms (time-series forecasting).

Stock Price Prediction using machine learning helps the user discover the future value of company stock and other financial assets traded on an exchange. The entire idea of predicting stock prices is to gain significant profits. Predicting how the stock market will perform is a hard task to do. There are other factors involved in the prediction, such as physical and psychological factors, rational and irrational behavior, and so on. All these factors combine to make share prices dynamic and volatile. This makes it very difficult to predict stock prices with high accuracy. By the development of this web-application we try to maximize the accuracy and easy to use interface for the user to analyze the Quantum computing stocks present for investing.

Usefulness:

For both corporate America and Wall Street, the technology industry represents an unavoidably large investment potential. It is the market's largest single segment, outnumbering all others (including the financial sector and the industrials sector). Technology firms are most closely connected with creativity and innovation. Technology businesses are expected to spend a lot of money on research and development, but investors expect a consistent stream of growth fueled by a pipeline of inventive new products, services, and features.

These products and services are then disseminated throughout the economy. There is no sector of the modern economy that technology does not touch and that does not rely upon the technology sector to improve quality, productivity, and/or profitability.

Tech is also notable for its rabid competition and rapid obsolescence cycles. Although the examples have been used so often, they have become cliché, it is nevertheless still a fact that computers used to occupy entire rooms, 16 GB of hard drive storage was perfectly adequate for a tablet, and cell phones used to flip open and closed. With that constant drive to adapt and overcome competitors with new products, no company can rest easy for long in the tech sector.

Why Quantum Computing stocks?

Quantum computers are the next leap forward in computing power. Using the power of quantum mechanics to solve certain problems, quantum computers can do things that even the biggest and best classic supercomputers in the world cannot. This nascent technology creates multidimensional spaces to represent very large problems. Quantum computers can even perform certain tasks in about one second that would take a classic supercomputer a week to perform. Given the technology's potential, it is certainly understandable why investors are excited about the future of quantum computing.

Quantum computers are not meant to replace typical computers. In practice, they will be separate instruments used to solve complex, data-heavy problems, particularly those that make use of machine learning, where the system can make predictions and improve over time.

Big companies are investing in quantum tech: Quantum computing has progressed from a research experiment to a tool on the brink of transforming a variety of industries, including medicine — where quantum computers have achieved rapid DNA sequencing — and transportation — where they have precisely predicted future traffic volumes.

Experts expect quantum computing to help us understand biology and evolution, cure cancer, and even take steps to reverse climate change. The quantum computing market is projected to reach $64.98 billion by 2030 from just $507.1 million in 2019.A handful of big tech companies have been investing heavily in the space. Microsoft's Azure cloud has released quantum tools, as have Google and Amazon's respective cloud platforms.

A typical investor like you and me would find it hard to comprehend all the investment-related noise out there. There is an abundance of information available to retail investors. If investors like us want to construct and maintain a diverse portfolio, we'll need this information. Market forecasters combine market and economic news, long-form technical analysis from experienced market players, and strong tools to assist normal investors in making independent investment decisions.

The list of Websites that provide stock market Analytics:

- The Motley Fool
- Yahoo! Finance
- MetaStock
- Morningstar
- Bloomberg.com
- Alpha Vantage
- The Wall Street Journal
- Seeking Alpha

These Websites provide stock market Analysis, but we don't know the operation of the technology for e.g. What kind of variables they feed for predictions or What kind of mathematical algorithms they are using to provide analytics also these services are provided for a cost., we aim the niche of stocks related to quantum computing to better understand the stocks relating to the technology Quantum Computing , Currently for such a use case a website is not present, as our project progresses will try to mimic the years of study put into development of the stock analytics and make it available and easy to use pertaining to quantum computing stocks.

Dataset:

The dataset was obtained from Kaggle:

https://www.kaggle.com/nourajo/quantum-computing-companies-stock-data

But originally the data is taken from yahoo finance it includes 136518 rows × 7 columns. The list of companies is taken from the quantum computing report.[1]

The dataset was compiled and posted on the Kaggle for used to experiment and try techniques to implement Machine Learning techniques, to solve data centric problem statements. We will use this data to create web app with functionalities to provide analysis on stock related Quantum computers

Summary of the data

	Date	open	high	low	close	adjclose	volume	ticker
0	2021-01-04	11.125	11.25	10.500	10.80	10.80	150500.0	IONQ
1	2021-01-05	10.850	11.83	10.750	11.11	11.11	165300.0	IONQ
2	2021-01-06	11.500	11.50	11.000	11.05	11.05	175600.0	IONQ
3	2021-01-07	11.500	11.50	11.050	11.11	11.11	94200.0	IONQ
4	2021-01-08	11.650	12.35	11.000	11.01	11.01	137500.0	IONQ
5	2021-01-11	11.800	11.80	10.800	11.17	11.17	162600.0	IONQ
6	2021-01-12	11.800	11.80	11.070	11.18	11.18	210700.0	IONQ
7	2021-01-13	11.340	11.37	10.970	11.20	11.20	386100.0	IONQ
8	2021-01-14	11.310	11.70	11.225	11.44	11.44	291000.0	IONQ
9	2021-01-15	11.570	11.79	11.110	11.22	11.22	269600.0	IONQ

First 10 records of the Data

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 136518 entries, 0 to 136517
Data columns (total 8 columns):
 #   Column     Non-Null Count   Dtype
---  ------     --------------   -----
 0   Date       136518 non-null  object
 1   open       136473 non-null  float64
 2   high       136473 non-null  float64
 3   low        136473 non-null  float64
 4   close      136473 non-null  float64
 5   adjclose   136473 non-null  float64
 6   volume     136473 non-null  float64
 7   ticker     136518 non-null  object
dtypes: float64(6), object(2)
memory usage: 8.3+ MB
```

Columns and their respective data types

Data Description:

- Date : Date of observation

- open The Stock at which opens at the start of market

- high : Highest price during trading day

- low: Lowest price during trading day

- close: The stock closing at the end of the Market hours

- adjclose: Adjusted close price adjusted for both dividends and splits

- volume: Number of shares traded during the trading day

- ticker: Ticker symbols are basically arrangements of symbols or characters (generally Latin letters or digits) representing specific assets or securities listed on a stock exchange or traded publicly

Summary Statistics:

	open	high	low	close	adjclose	volume
count	136473.000000	136473.000000	136473.000000	136473.000000	136473.000000	1.364730e+05
mean	167.119533	168.892349	165.238686	167.098051	145.714925	1.256765e+07
std	499.878954	504.748352	494.531675	499.680962	451.972433	2.434017e+07
min	0.000000	0.015000	0.010000	0.015000	0.015000	0.000000e+00
25%	8.289412	8.390625	8.160000	8.282209	4.747473	8.074000e+05
50%	24.780001	25.059999	24.500000	24.796844	16.538219	3.271000e+06
75%	69.760002	70.559998	68.970001	69.773445	53.453701	1.122740e+07
max	5000.000000	5000.000000	5000.000000	5000.000000	5000.000000	1.123003e+09

There are 21 unique tickers related to quantum computing in the dataset. Each ticker is for a specific company.

```
IBM           13104
RTX           13104
LMT           11392
INTC          10583
NOC           10130
T              9651
MSFT           9069
NOK            6969
MIELY          6366
AMZN           6243
IFX.DE         5620
ONE.V          5497
4185.T         5295
ACN            5190
GOOG           4417
BIDU           4174
QUBT           3800
TOSYY          3063
QNC.V          2553
IONQ            295
RGTI              3
Name: ticker, dtype: int64
```

The data seems to have some missing values hence we will need to do through inspection and process the data

```
Date          0
open         45
high         45
low          45
close        45
adjclose     45
volume       45
ticker        0
dtype: int64
```

Number of missing values for each column

Description of the functionalities:

Basic Functions:
Our application will be able to provide basic functionalities such as creation of new entries/records in the database, as the data is available till 3rd March 2022 while the project progresses, we can update the new values of the stock price to it. we will also provide the Delete function as to when outliers are detected we can delete out of the database. Also, if we see any new tickers related to quantum computing then we will create new records to it. As of readability of the database we intend to also show the stock price based on the date.

Advanced Functions:
We will be incorporating Time Forecasting to the data and help users(investors) get an idea of the stock performances in the past. Through visualizations and statistics, we will help users to understand the aspects pf the stock data of the quantum computing related companies. We will be using ReactJS/Flask framework to develop the application and deploy using NodeJS or other compatible platforms.

Task Division:

Member	Task
Sharanbasav ssumbad@iu.edu	Statistical Analysis Modeling and Prediction Working on incorporation of advanced functionality on the web app
Vignesh vkolhatk@iu.edu	Development of Basic Webapp framework Development of functionality on the webapp Deployment of the application
Pushkar pdeshpa@iu.edu	Data processing Visualizations and EDA Working on incorporation of basic functionality on the web app.

References

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2. https://finance.yahoo.com/
3. https://quantumcomputingreport.com/public-companies/
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