STOCK ANALYSIS USING PYTHON

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INTRODUCTION

"What is AI & ML?"

AI (Artificial Intelligence)

What comes to mind when I ask you about Artificial Intelligence (AI)? Is it a case of robots taking over the world? Or something you might have seen in a science fiction film? Don't be concerned; it happens to all of us! Even when I first started learning about it, I had this thought. But as I dug deeper into AI, I realized that it is nothing like that, and yet it is so much more. If the twenty-firstcentury is to be remembered for anything, it must be AI and the changes it has brought. Artificial Intelligence refers to the intelligence demonstrated by machines. Artificial intelligence has grown in popularity in today's world. It is the simulation of natural intelligence in machines that are programmed to learn and mimic human actions.

These machines can learn from experience and perform human-like tasks. As artificial intelligence (AI) technology advances, it will have a significant impacton our quality of life.

It is only natural that everyone today wants to connect with AI technology insome way, whether as an end user or as a developer. Humans created an intelligent entity. Capable of intelligently performing tasks without being explicitly instructed. Capable of rational and humane thought and action.

How does AI & ML work?

While it's one thing to know what AI is, it's another to understand the underlying functions. Artificial intelligence operates by processing data throughadvanced algorithms. It combs large data sets with its algorithms, learning fromthe patterns or features in the data. There are many theories and subfields in AIsystems including:

Machine learning. Machine learning uses neural networks to find hidden insights from data, without being programmed for what to look for or what to

conclude. Machine learning is a common way for programs to find patterns andincrease their intelligence over time.

Deep learning. Deep learning utilizes huge neural networks with many layers,taking advantage of its size to process huge amounts of data with complex patterns. Deep learning is an element of machine learning, just with larger datasets and more layers.

Cognitive computing. Cognitive computing has a goal for a human-like interaction with machines. Think robots that can see and hear, and then respondas a human would.

Computer vision. In AI, computer vision utilizes pattern recognition and deeplearning to understand a picture or video. This means the machine can look around and take pictures or videos in real time, and interpret the surroundings.The overall goal of AI is to make software that can learn about an input, and explain a result with its output. Artificial intelligence gives human-like interactions, but won't be replacing humans anytime soon.

Why is Python So Popular for AI and Machine Learning?

With each passing minute, AI and machine learning are grabbing more eyeballs than ever. Who'd have thought that there could exist a self-drivencar or smartphones that forecast what weather it will be tomorrow! But today, all this is a reality.How Does Home Automation Work?

Companies like Uber, Tesla, JP Morgan Chase, Apple, and other industry giants have accepted these technologies. With this, they've also befriendedone programming language that is flexible, stable, with a variety of tools available: PYTHON.

Here are the top reasons that make Python so popular for AI and machinelearning:

1. Rich library ecosystem

A programming language library refers to a module that comes with a pre-written code that helps the user to use the same functionality to perform different actions. Python contains libraries that help in saving developer's time as they do not have to start from scratch.

List of some common libraries used for AI and machine learning:

- Pandas
- Scikit-learn
- Keras
- TensorFlow
- Caffe
- PyBrain

With the help of these libraries, AI and ML algorithms can be implementedmore easily. These libraries are useful for data analysis, deep learning, machine learning, computer vision, and advanced computing. This helps in the faster development of the product as the developers can now resolve complex problems without rewriting code lines.

2. Flexibility

Python is a flexible language, which means that it can be used along with other programming languages to achieve the desired result. It offers an optionto the developer to choose between OOPs or scripting. Also, it does not require recompilation of the source code, making it easier to view the results. Due to its flexibility, it gives the developer a safe environment and reduces the chances of mistakes.

3. Simple and Consistent

This programming language offers concise, readable codes. As complex algorithms stand behind AI and ML, the simplicity of the language helps indeveloping reliable systems. Now the entire focus is on solving an ML problem instead of worrying about the technical

details of the language.

Another reason which makes Python so popular is that it is an easy-to-learn programming language. Due to its easier understandability by humans, it is easier to make models for machine learning. Furthermore, many coders say that Python is more intuitive than other programming languages. It is suitable for a collaborative implementation as and when multiple developers are involved. Being a general-purpose language, it allows you to build prototypesfaster so that you can test your product for machine learning.

4. Platform Independent

Platform independence of a programming language means that it can run on avariety of platforms and software architectures. The code has to be written once and it can be compiled and run on multiple platforms.

Python is easy to learn and use and scores high on versatility. It can run on any platform, be it Windows, MacOS, Linux, Unix, and more. If one wants torun the code of different platforms, packages like PyInstaller come in handy. Let's say a coder wants to shift from one platform to another, it is far easier with Python. This saves time and money for tests on multiple platforms. As a result, the overall process becomes more convenient.

What exactly is Deep Learning?

Deep Learning is a subset of Machine Learning, which on the other hand is a subset of Artificial Intelligence. Artificial Intelligence is a general term that refers to techniques that enable computers to mimic human behavior. MachineLearning represents a set of algorithms trained on data that make all of this possible.
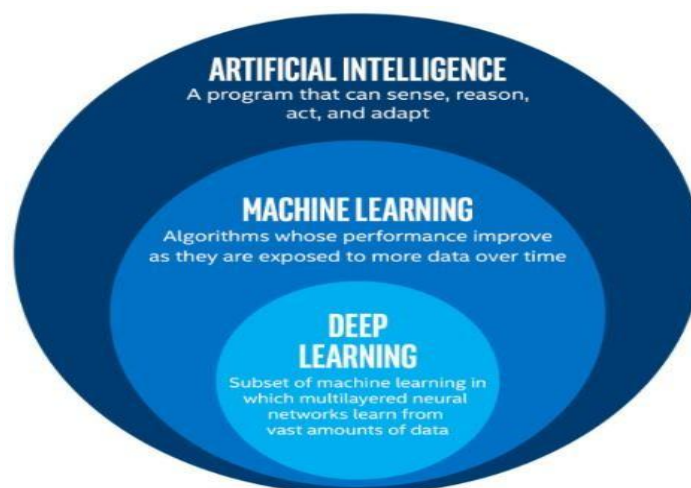
AI. vs ML. vs DL.

Deep Learning, on the other hand, is just a type of Machine Learning, inspired by the structure of a human brain. Deep learning algorithms attempt to draw similar conclusions as humans would by continually analyzing data with a givenlogical structure. To achieve this, deep learning uses a multi-layered structure ofalgorithms called neural networks.

The design of the neural network is based on the structure of the human brain.Just as we use our brains to identify patterns and classify different types of information, neural networks can be taught to perform the same tasks on data.

The individual layers of neural networks can also be thought of as a sort of filterthat works from gross to subtle, increasing the likelihood of detecting and outputting a correct result.

The human brain works similarly. Whenever we receive new information, thebrain tries to compare it with known objects. The same concept is also used bydeep neural networks.

Neural networks enable us to perform many tasks, such as clustering, classification or regression. With neural networks, we can group or sort unlabeled data according to similarities among the samples in this data. Or in thecase of classification, we can train the network on a labeled dataset in order to classify the samples in this dataset into different categories.

Why is Deep Learning is Popular these Days?

Why is deep learning and artificial neural networks so powerful and unique in today's industry? And above all, why are deep learning models more powerful than machine learning models? Let me explain it to you.

> *The first advantage of deep learning over machine learning is the needlessness of the so-called feature extraction.*

Long before deep learning was used, traditional machine learning methods were mainly used. Such as Decision Trees, SVM, Naïve Bayes Classifier and LogisticRegression.

These algorithms are also called flat algorithms. Flat here means that these algorithms can not normally be applied directly to the raw data (such as .csv,images, text, etc.). We need a preprocessing step called Feature Extraction.

The result of Feature Extraction is a representation of the given raw data that can now be used by these classic machine learning algorithms to perform a task. For example, the classification of the data into several categories or classes.
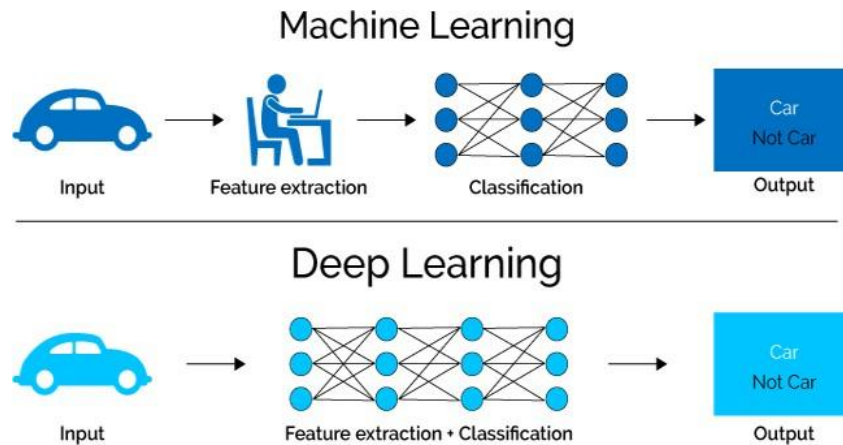
Understanding Stock Analysis

Stock analysis is a method for investors and traders to make buying and selling decisions. By studying and evaluating past and current data, investors and traders attempt to gain an edge in the markets by making informed decisions.

Stock Price Analysis With Python

A stock is the small chunk of ownership in the company. The stock price of the company reflects the net evaluation of the company and also gives a little insight into its performance. These stocks are traded on exchanges and their prices are constantly changing due to their demand and supply in the market. If a stock is in high demand and low in supply i.e. more people want to buy it and fewer people are willing to sell it then the price for the stock will go up and similarly if the stock is in low demand and high on supply which means people more people are ready to sell it but fewer people are willing to buy it then its prices go down.

The sudden increase in the demand for the stock can be due to various reasons including positive news about the company or an announcement from the company. After a period of time when the demand for the stock vanishes its prices slowly creep down as the investor loses interest in it. These stock prices going up and down is an iterative process and repeated. This volatility of stock makes investors nervous while investing in a company. So to understand the risk associated with it there must be a proper analysis of stock before buying it. In this article, we would try to explore just the tip of the iceberg for the stock market analysis as technical analysis of the stock is a vast field. This blog can prove to be the starting point for you in this industry.

The tool is not important for the analysis it can be performed in any statistical software like Python, R, or Excel but for sake of this article, we are demonstrating the analysis in Python.

Setting Up Our Environment

Before diving into any project it is important to have our toolbox ready, this is mainly setting up the environment.
We will create a folder and we will name ours 'Analysing_Stock_Prices', open our Anaconda prompt as an administrator and cd into the folder 'Analysing_Stock_Prices', and open the Jupyter Notebook.

Getting Live Data From Yahoo Finance

We will be using Pandas data reader, to get live data for us to work with and analyze.

We will start by importing the pandas data reader and the date-time module, we will use the data reader for remote data access and the datetime module for specifying the begin and end date times.


```
In [4]: bmw = web.DataReader("BMW.DE", "yahoo", start,end)

In [5]: bmw

Out[5]:
```

| Date	High	Low	Open	Close	Volume	Adj Close
2015-01-02	89.589996	87.379997	88.599998	88.010002	1532820.0	64.752594
2015-01-05	87.230003	84.550003	87.180000	85.080002	2308143.0	62.596867
2015-01-06	87.120003	84.550003	85.800003	85.830002	1841589.0	63.148670
2015-01-07	87.050003	85.269997	86.400002	86.290001	1239393.0	63.487103
2015-01-08	89.870003	86.879997	87.519997	89.389999	1837539.0	65.767906
...	...	...	...	...	...	...
2021-12-10	90.190002	88.949997	89.529999	89.660004	1415043.0	89.660004
2021-12-13	91.879997	89.550003	89.800003	89.879997	1086537.0	89.879997
2021-12-14	90.040001	88.220001	89.980003	88.400002	1116145.0	88.400002
2021-12-15	89.410004	88.230003	88.889999	88.269997	794212.0	88.269997
2021-12-16	90.309998	89.269997	89.750000	89.639999	1364574.0	89.639999

Analyzing The Market Cap

We want to check which of the car manufacturers is more valuable than the other. We do not want to rely simply on the time series data.
Our current data can not help us analyze this, that however won't stop us from using tricks within mathematics to get that data. We will use some basic math to get the total units of the stock present.
We will use the open price and the Volume, our end goal is to get the total money traded.
So we want to add a column for the total traded, for each car manufacturer.

```
tesla['Total Traded'].plot(label='Tesla Total Traded', figsize=
(16,5))
bmw['Total Traded'].plot(label='Bmw Total Traded')
nissan['Total Traded'].plot(label='Nissan Total Traded')
ford['Total Traded'].plot(label='Ford Total Traded')
mercedez['Total Traded'].plot(label='Mecedez Total Traded')
vw['Total Traded'].plot(label='Volkswagon Total Traded')
toyota['Total Traded'].plot(label='Toyota Traded')
plt.legend()
plt.title('Car Manufacturers Stocks')
plt.ylabel('Total Traded')
plt.show
```
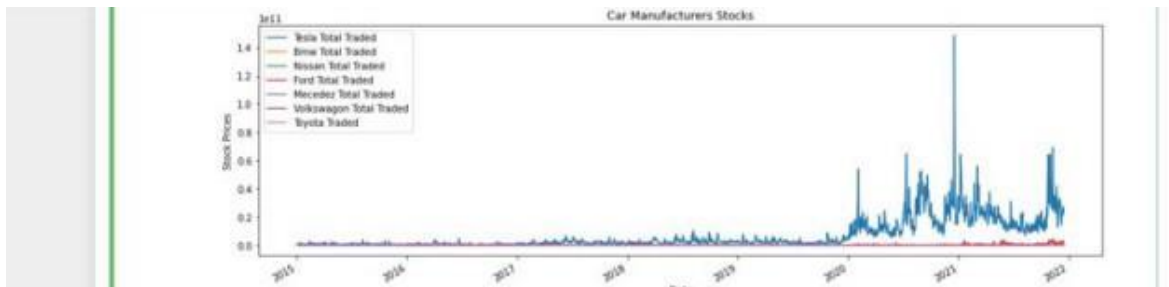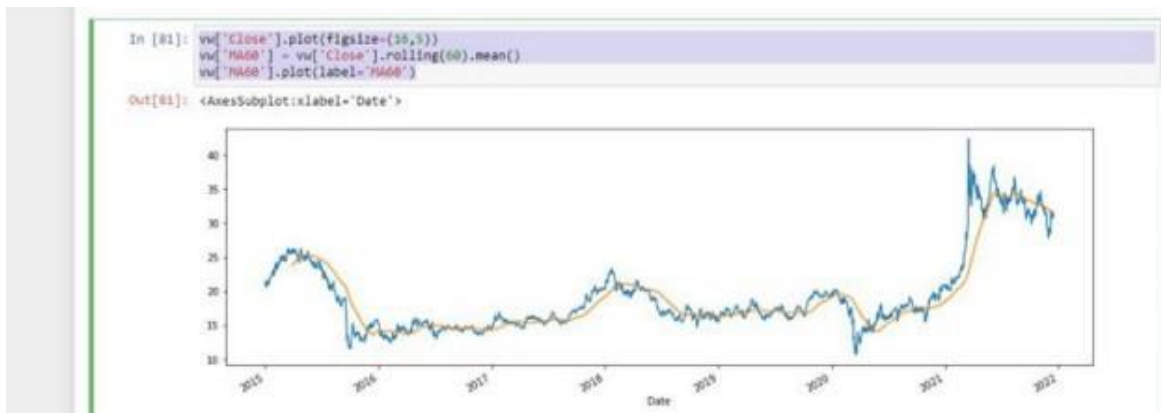

Moving Average

We want to read each manufacturer separately as it seems at this moment Tesla is winning, but we need need to analyze everything in order to make informed decisions. We will just work with the Close for now.
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The noise has been smoothened out a bit, and we can increase our moving average to maybe 300.

```
In [81]: vw['Close'].plot(figsize=(16,5))
         vw['MA60'] = vw['Close'].rolling(60).mean()
         vw['MA60'].plot(label='MA60')

Out[81]: <AxesSubplot:xlabel='Date'>
```


Percentage increase in stock value

A percentage increase in stock value is the change in stock comparing that to the previous day. The bigger the value either positive or negative the volatile the stock is.
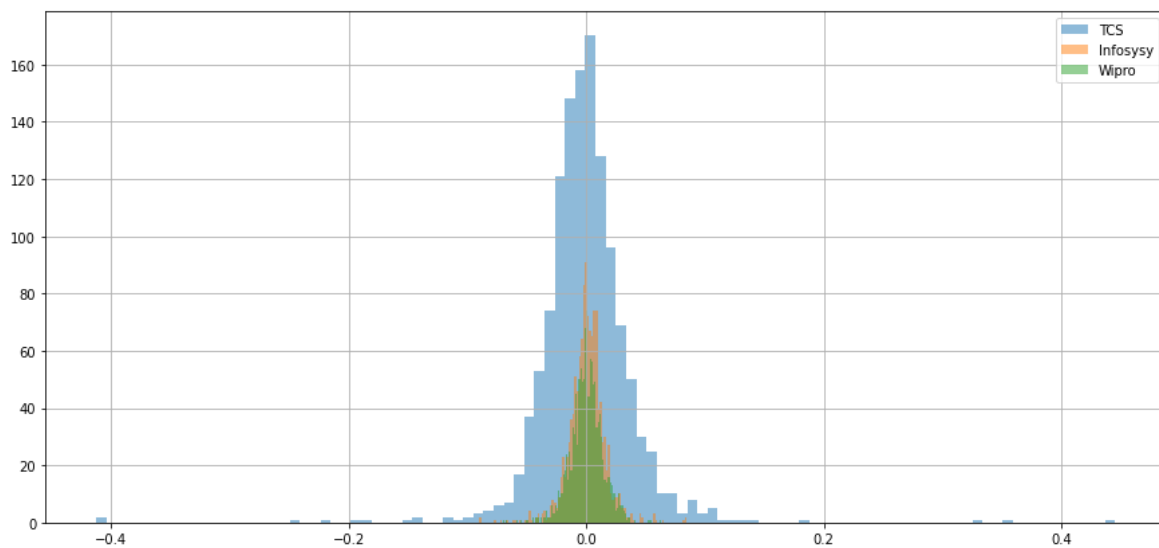
It is clear from the graph that the percentage increase in stock price histogram for TCS is the widest which indicates the stock of TCS is the most volatile among the three companies compared.

Conclusion

The above analysis can be used to understand a stock's short-term and long-term behaviour. A decision support system can be created which stock to pick from industry for low-risk low gain or high-risk high gain depending on the risk apatite of the investor.