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Impact on Stock Market across Covid-19 Outbreak

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Abstract: ***This paper analysis the impact of pandemic over the global stock exchange. The stock listing values are determined by variety of factors including the seasonal changes, catastrophic calamities, pandemic, fiscal year change and many more. This paper significantly provides analysis on the variation of listing price over the world-wide outbreak of novel corona virus. The key reason to imply upon this outbreak was to provide notion on underlying regulation of stock exchanges. Daily closing prices of the stock indices from January 2017 to January 2022 has been utilized for the analysis. The predominant feature of the research is to analyse the fact that does global economy downfall impacts the financial stock exchange.***
Keywords: Stock Exchange, Matplotlib, Stream lit, Data Science, Web scrapping.

I. INTRODUCTION

The uncanny variations of the novel coronavirus called as Covid-19 has impacted the globally and engendered towards economic breakdowns in numerous nations. Initially, the SARS-CoV-2 infection originated from Wuhan, China that eventually triggered the upsurge of Covid-19 all over the globe. This sudden outbreak was not just lethal for the global well being of individuals but also initiated significant economic downturn. The primary reason behind this economic nosedive was the enforcement of safety protocols that restricted individuals in the form of quarantine. This similar trend was witnessed by numerous countries to sustain against this obscured pandemic that led to cease in economic activities. Most significantly the consumers and the corporates have altered their consumption patterns due to uprising situations due to this pandemic causing noticeable economic impact over the world haunting both advance and developing countries such as United States, Spain, Italy, Brazil and India.



Figure 1 – Volatility of Market Indices

The stock exchanges have shown anomalous behaviour in this pandemic with volatile movements and unfavourable turns. Economic mayhem connected with Covid has impacted the financial markets acutely inclusive of bond as well as stock exchanges. Due to this pandemic the was stringent protocols over transportation, that jolt the price of oil and skyrocketed the indices of gold. Many renowned economists have coined this pandemic as greatest financial crisis over decades. In many nations, commercial activities are extremely indebted, small and medium sized organizations have further been dismantled and rattled due to this pandemic along with corporates debt. The world financial market perilousness has been proliferated in riposte to the outbreak. This paper is organised in order to heed the key features in economic transition based on S&P500 share listing in various GICS sectors across novel corona virus outbreak.

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II. LITERATURE REVIEW

The impact of Sars-Cov-2 virus on stock markets has been motif to many factual analogies both in developed and emerging economies. Despite the number of publications on the whack of covid-19 on financial markets there is subordinate number of factual materials in case of underdeveloped or developing economies. To bring light on this sector, our paper attempts to investigate the ramifications of covid outbreak on S&P 500 companies. We have developed a website application that segregates the major companies into sectors and analyse their listing close price over the five years span to indicate the chain of events that lead to series of increase and decrease in stock price. This application is utilised to make study better in terms of variations in the stock indices due to the outbreak and the imposed lockdown policies adopted by various governments.

The third wave of the COVID-19 pandemic has hit the arising economy most significantly coming about the decline in business transactions. This catastrophic shock builds the risk-averse nature which expands the financial expenses. Latin America is impacted most due to its reliance on outer financing. Because of the limitation on transport, import export industry has declined. Limitation in the global development has hampered the travel industry area prompting a decline in revenue. Hyun-Jung (2020) has made a review on the securities exchange of South Korea, one more driving nation of the arising economies. In his examination, it was observed that the economy has shown a roller-coaster ride. The monthly trades depicts a downwards trend in January, worked on in February, on the other hand plunged down in March and June. The nation's commodity volume has boiled down to 11.2% point in contrast with the earlier year. Topcu and Gulal (2020) have made territorial characterization of the effect of COVID-19 on the financial exchange of arising economy. Their discoveries uncover that the effect of the flare-up has been the most noteworthy in Asian developing business sectors though European developing business sectors have encountered the least. The developing business sector economies face a credit crunch, additionally alluded to as capital streams (Ahmed et al., 2020). Goldberg and Reed (2020) talked about the adverse consequence of COVID-19 on the exchange of arising economy. Subsequently, the financing cost on developing business sector sovereign obligation spiked. Frankel (2020) investigated the financial impact of the pandemic on the arising economy. COVID-19 has diminished the income of those economies by limiting commodity, the travel industry receipts, and settlements of laborers.

There is different writing accessible on the effect of COVID-19 on various areas like Healthcare, Agro-industry, industrialist, exchange and business, however a restricted explicit review affects the financial exchange of the emerging economy. The securities exchange assumes a significant part in the economy. As India is one of the prevailing nations of the arising economy, this paper attempts to decipher the effect of COVID-19 on the important Indian financial exchange scripts as well. Streamlit and Seaborn are a productive instance to test the unpredictability of global stock exchanges. Additionally, there are not many writing that looks at the arrival of the financial exchange previously and during the COVID-19 circumstance. Likewise, our review has additionally made an endeavour to think about the profits of both the securities exchange considering those two referenced time periods.

III. ALGORITHM

This section discusses the analogies we utilised in our application. Here, we've explained throughout procedure in detail about our application workflow.

A. S&P 500 Companies

The S&P 500 financial exchange is the record, kept up by S&P Dow Jones Indices, involves 505 normal stocks gave by 500 huge cap organizations and exchanged on American stock trades (counting the 30 organizations that make the Dow Jones Industrial Average), and incorporates around 80% of the American value market by capitalization. The exchange is weighted by free-float market capitalization, so more significant organizations represent moderately a greater amount of the record. The file constituents and the constituent loads are refreshed consistently utilizing rules distributed by S&P Dow Jones Indices. Despite the fact that called the S&P 500, the list contains 505 stocks since it incorporates two offer classes of stock from 5 of its part organizations.

In light of our audit of the market's advancement – the S&P 500 is up 5.5% since the beginning of the year and 19% in the course of the most recent a year – the Index Committee has changed the market cap rules for the S&P 500, S&P Dow Jones Indices is the biggest worldwide asset for fundamental list-based scripts, information and research, and home to famous monetary market pointers, for example, the S&P 500® what's more the Dow Jones Industrial Average®. More resources are delved into items dependent on our records than relates on some other supplier on the planet. With over 1,000,000 files and over 120 years of involvement building imaginative and straightforward arrangements, S&P Dow Jones Indices characterizes the manner in which financial backers measure and exchange the business sectors.

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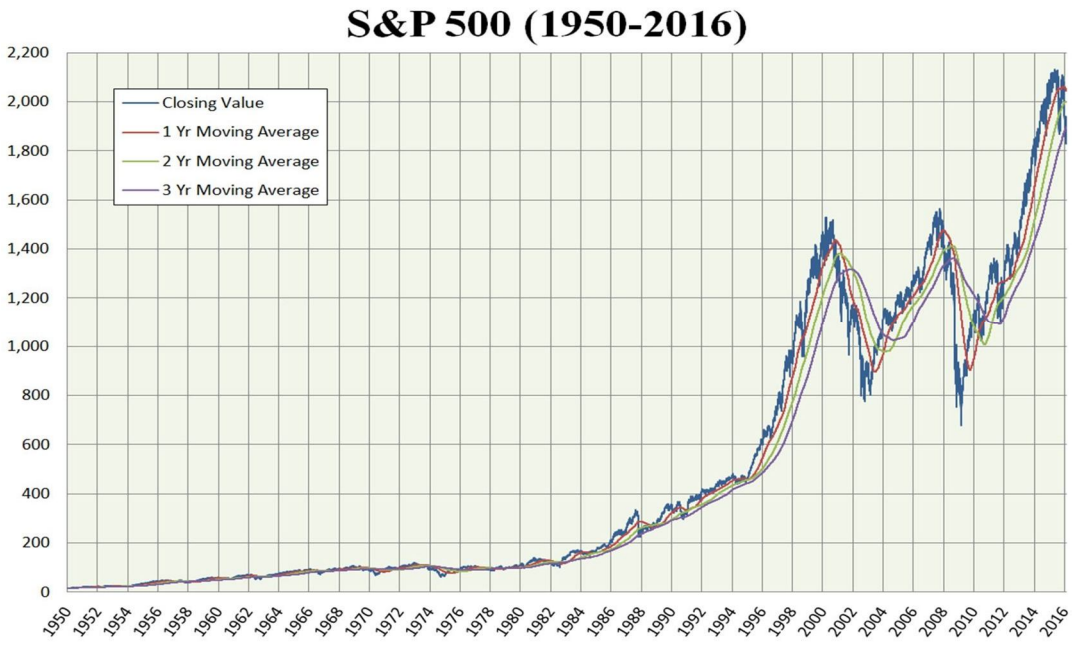


Figure 2 – Growth Of S&P 500 Companies

B. Streamlit Library

Streamlit is an open-source Python library that makes web-application simple to make and share beautiful, custom web applications for AI and data science. Here we utilised this library to develop a web application to analyse major GICS Sector company stock prices over a defined daily time period pre and post covid outbreak. This library supports python and integrates website functionality in a seamless transaction. The ease of frontend and backend operations provided by streamlit increased the pace of the deployment on network.

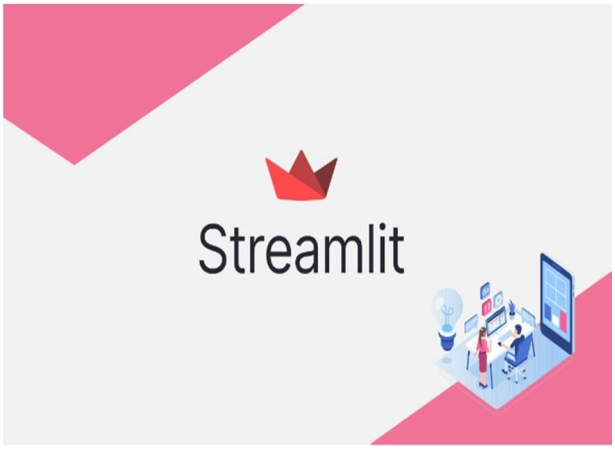


Figure 3 – Streamlit Integration

C. Matplotlib

Matplotlib is a stunning statistical representation library in Python for 2D plots of arrays. Matplotlib is a multi-stage data visualisation library based on NumPy arrays and intended to work with the more extensive SciPy stack. It was developed by John Hunter in the year 2002.

After segmentation of S&P 500 companies into different categories, there is translation of segmented plots into a visualization window using the Show plots button. The overall performance of Stock in terms of its closing rate is visualised by the plot functions. The plot is deterministic in nature and suggests the trend in the volatility of the stock over the duration of covid. The matplotlib supports the vivid plot transaction by aiding legend functionality such as marking the axis, establishing title and tickers in the plot for clear justification of the analysis in the plot.

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D. Website Scraping

Web scraping is a term used to depict the utilization of a program or code to retrieve and handle a lot of information from the web. In this paper we have utilised an important python library "panda" that is infamous for handling structured data that is in the form of array, lists, URLs, csv files and many more. This library supports data extraction from open servers such as Wikipedia, data mart, etc for html retrieval using URL. In the similar fashion we implemented public listed S&P 500 companies database from Wikipedia for this research using the html table scrapping through correct indexing and python data frame.

S&P 500 component stocks [edit]

Symbol	Security	SEC filings	GICS Sector	GICS Sub-Industry	Headquarters Location	Date first added	CIK	Founded
MMM	3M	reports	Industrials	Industrial Conglomerates	Saint Paul, Minnesota	1976-08-09	0000066740	1902
ABT	Abbott Laboratories	reports	Health Care	Health Care Equipment	North Chicago, Illinois	1964-03-31	0000001800	1888
ABBV	AbbVie	reports	Health Care	Pharmaceuticals	North Chicago, Illinois	2012-12-31	0001551152	2013 (1888)
ABMD	Abiomed	reports	Health Care	Health Care Equipment	Danvers, Massachusetts	2018-05-31	0000815094	1981
ACN	Accenture	reports	Information Technology	IT Consulting & Other Services	Dublin, Ireland	2011-07-06	0001467373	1989
ATVI	Activision Blizzard	reports	Communication Services	Interactive Home Entertainment	Santa Monica, California	2015-08-31	0000718877	2008
ADBE	Adobe	reports	Information Technology	Application Software	San Jose, California	1997-05-05	0000796343	1982

```
import pandas as pd
def load_data():
    url = 'https://en.wikipedia.org/wiki/List_of_S%26P_500_companies'
    html = pd.read_html(url, header = 0)
    df = html[0]
    return df
```

```
df = load_data()
df
```

	Symbol	Security	SEC filings	GICS Sector	GICS Sub Industry	Headquarters Location
0	MMM	3M Company	reports	Industrials	Industrial Conglomerates	St. Paul, Minnesota
1	ABT	Abbott Laboratories	reports	Health Care	Health Care Equipment	North Chicago, Illinois

Figure 4 – Website Scrapping From Wikipedia

E. Website Application

A web application is coined as an application program that is in demand for a web server, dissimilar to PC based algorithmic programs that are run locally on the working framework (OS) of the system. Web applications are implemented by the client through an internet browser with a functioning network association. In the similar fashion we have deployed our explorative data analysis web application on streamlit server hosted by local host during prototype version and further deployed to Heroku for establishing the website application functionalities such as scroll side bars, visualisation plots, sector selection database integration and many more.

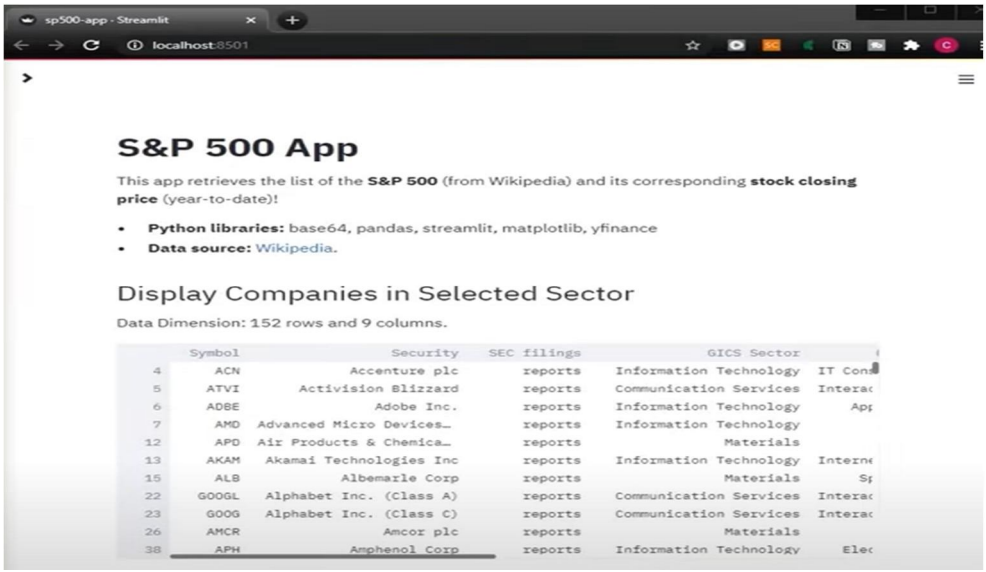


Figure 5 – Website Application Hosted on Local Host

IV. CONCLUSION AND FUTURE SCOPE

The COVID-19 outbreak has disintegrated the foundation of the stock market. To support the financial exchange appropriate policy measures should be taken by the public authority. Without some phenomenal approach, the emergency would have been exceedingly terrible. Appropriately, liquidity infusion estimates should be taken. Reserve bank of India (RBI), the central monetary authority has cut its key scheme rate by 115 points premise focuses throughout the last 3 months. It likewise declared a liquidity infusion of around Rs 8 lakh crore in the monetary business sectors since its first declaration on March 27, 2020. Albeit this pandemic carries the whole world to lockdown abrasion, the casualty rate is extremely low.

Numerous financial patrons can feel that this will be a short-run peculiarity and when the economy recuperates it will be hard for them to purchase stocks at the current costs. As per George (2020), during this recuperation period liquidity will push stock costs up. This strife is a decent chance for long haul financial backers. For debt markets, financial bodies need to cut the rate. There prevails vulnerability in the market as of now. So, the financial patrons should move their speculation from a dreary possibility to the splendid one to adjust their work and stay away from the hazard. In this viewpoint, the pharma area is looking alluring as of now. To keep up with comprehensive and maintainable development homegrown strategies should be planned. Monetary assistance should be provided by the supreme authority to the annihilated required areas.



Figure 6 – GICS Sector Selection Functionality

In most of the cases we will get an accurate result by using this exploratory data analysis online system at the same time there can be a possibility that the stock price captured is missing grey market volatility and insider trading scam. Although, in most of the cases we will get a definitive trend. When our application is scrapping sector relevant data for uncertainty in share price over the period of five years on daily interval there are chances of 5% ambiguity. Using cutting edge visualization techniques, we will lead to a conclusive trend in the exchange trade over the years. There is a drawback as there few stocks whose price contain irregular frames and those frames can also be detected that can cause problem to get a conclusive result. In favor of odd there might be a slight possibility that matplotlib doesn't provide the accurate plot for data analysis.



Figure 7- EDA On Sector Stocks

Although, in turn the algorithm would improvise the explorative data analysis system and develop a sense of economic correction in the ongoing process in the automation sector of financial exchanges. In future this explorative analysis tool could be modified by integrating reinforcement learning that could analyse the market trends and provide a justifiable theory from the upcoming scenario. Additionally, the software could be interfaced with internet of things enabled device for live updates on volatility of major stock exchange. This tool could be a play ground for developing sandbox to explore the economic recessions and the impact on the sectors listed in the indices.

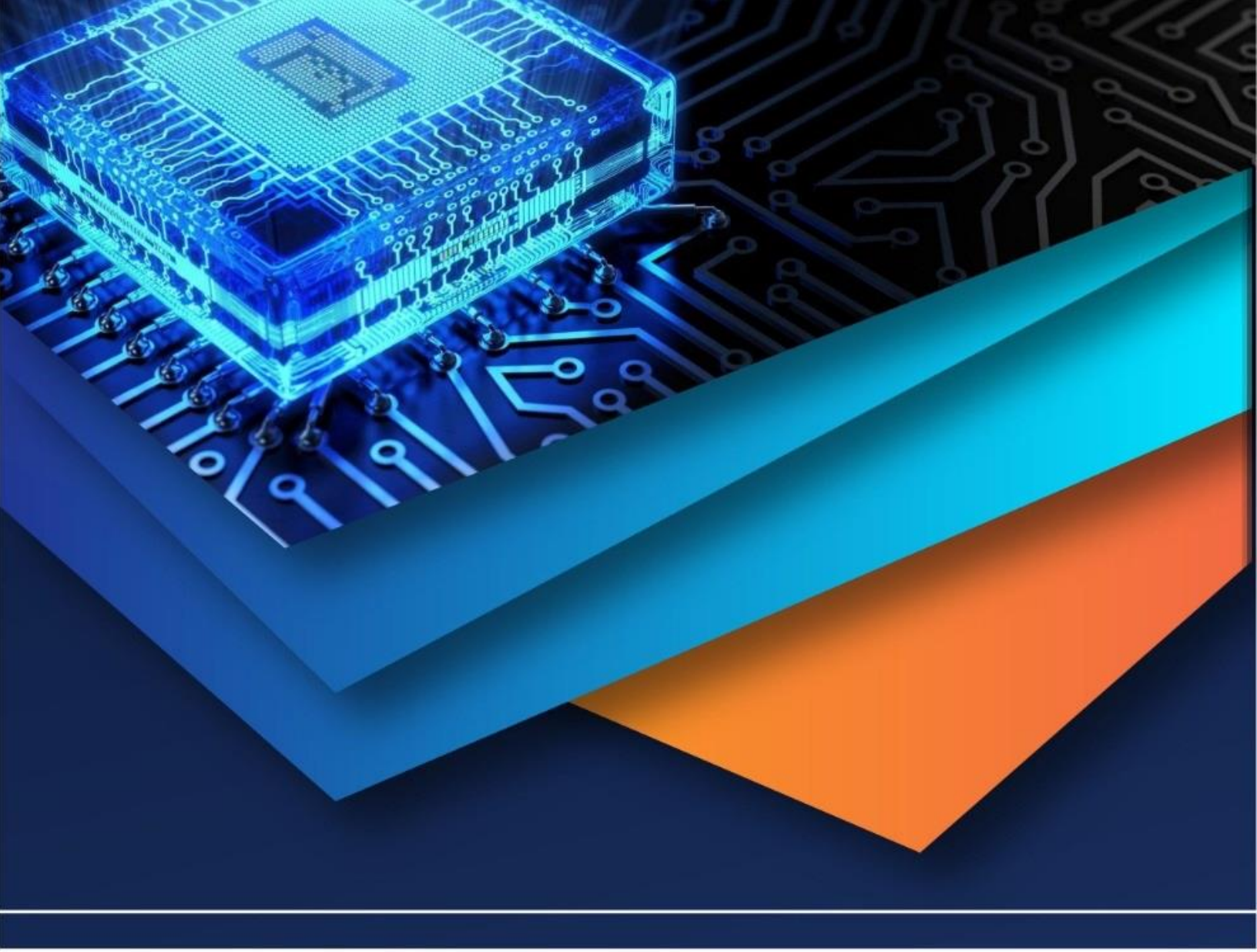
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