Python-based Research on the Impact of the New Crown Epidemic on Financial Markets

Zhuoqun Li*

School of computing, Beijing Information Science & Technology University, Beijing, China.
Email: lizhuoqun0123@163.com

ABSTRACT

With the continuous spread of the new crown pneumonia epidemic, the real economy has suffered the worst impact since the 20th century, and the financial market has also suffered a significant impact. This paper studies data acquisition, data cleaning, and data visualization in the process of data mining based on Python, uses the real-time update data of the new crown epidemic and financial market data as the data basis, and uses Python3.9 and other commonly used package libraries related to data processing and analysis as technical implementation tools, studies the impact of the new crown pneumonia epidemic on financial markets.

Keywords*: new crown pneumonia epidemic, financial market, Python*

1. INTRODUCTION

In early 2020, the outbreak and spread of the novel coronavirus pneumonia (COVID-19) around the world caused global panic. In the short term, various activities were stagnant, and the overall economy declined [1]. The panic and stagnation of economic activity caused by the new crown pneumonia epidemic has caused volatility in global financial markets [2-4]. Governments have introduced a number of countermeasures to stabilize financial markets and promote economic recovery [5].

An efficient financial market under the COVID-19 epidemic can better reflect people's behavior and future economic expectations in a timely manner. How the superposition of various negative shocks and favorable policies will affect the financial market deserves in-depth study [5].

2. RESEARCH BACKGROUND

In response to this epidemic, relevant international institutions have released real-time data, such as (1) the global epidemic data big screen of Johns Hopkins University in the United States (2) the epidemic situation released by China's Baidu according to the data interface of the National Health and Health Commission map.

Through data exploration and comprehensive consideration from the perspectives of data authority, availability, and data completeness, it is decided that the foreign epidemic data involved in this research data source uses News Break release data, and the domestic epidemic data uses Baidu epidemic map data.

3. RESEARCH COMPONENTS

This research is based on the real-time update data of the new crown epidemic at home and abroad and the stock market changes of the financial market that have been publicly released since the beginning of 2020 and uses Python3.9 and common packages related to data processing and analysis as technical implementation tools to realize data mining. basic process. The main elements of this research include the following:

3.1. Crawling of Network Data

The Request package is used as the basic toolkit and its method is called to obtain the source file of the webpage. Since the data is updated in real time, the crawler method in this study selects two methods: daily regular collection and offline crawling from offline webpage source files.

3.2. Analysis and Cleaning of Crawled Data

First, through the Pandas package and Beautiful Soup package combined with Python's dictionary, list and set data operations, the financial data in Json format

is separated from the web page source file as the original data source, and then domestic and foreign data items are separated from it. The specific contents include: Closing price, yield, growth rate, market capitalization, market share, price index, etc., domestic data is accurate to prefecture-level cities, foreign data, the United States is accurate to states and major cities, and other countries are accurate to countries; then use the method in the Pandas package The data is normalized and cleaned, including: exclusion of invalid values, format changes, sorting and grouping, etc., so as to obtain standardized and fully structured data suitable for mining and analysis [2].

3.3. Basic Data Statistics

Use the statistical methods provided by the Pandas package to complete statistical operations such as mean, standard deviation, median, quantile, kurtosis, skewness, extreme value, etc., so as to base the stock market change data of each country and region on a time window basis sex statistic.

3.4. Static Visualization of Data

Using the display graphics method provided by the Matplotlib package, the above data items are used to generate the numerical change curves of absolute and relative indicators over time, and the data can be fully displayed from different angles through graphs such as vertical curves over time and horizontal comparisons in units of countries. Fundamentals.

3.5. Dynamic Visualization of Data

Using the map data and related graphical methods provided in the Pyecharts package, according to the aforementioned absolute and relative indicators, the timeline carousel multi-map, national heat map, etc. are generated, so as to dynamically display the changes in the stock market of different countries due to changes in the epidemic.

3.6. Implement Data Mining Algorithm Application

Using the data mining method provided in the Scikit-learn package, the relevant factors of the financial market size are examined through regression analysis, the development trend of various indicators over time is examined through predictive analysis, and the similarities and differences in the financial market conditions of various countries are examined through cluster analysis. different grades.

3.7. Data Analysis

Through the data statistics and data mining results of

the aforementioned indicators, from the perspective of comparative analysis, analyze the differences in financial market changes between China and the United States, China and Europe, and China and other countries and regions in the world, and dig deeper into the differences. Therefore, based on objective data and scientific mining and analysis, sufficient system confidence, cultural confidence, and development confidence can be established [2].

4. PYTHON-BASED FINANCIAL DATA COLLECTION AND ANALYSIS RESEARCH

4.1. Python-based financial data collection

As an open-source language, Python has rich collection tools. It can use C language to write expansion modules or use third-party libraries. It has good flexibility. Therefore, using Python for financial data collection can obtain more accurate data content. Financial data refers to the useful information involved in the financial market, covering macroeconomic indicators, industry indexes, and company data. The general classification includes daily closing prices, financial news, historical data, stocks, real-time data, raw data, processing later data, etc.

1. Determine the search strategy. Take a certain URL as the entry, analyze the queue form of the URL, and call the getHTML() and parseHTML() custom methods to obtain and parse the page information respectively.

2. Get HTL page information. The most direct way to obtain HTL page information is to obtain it through the source code of the HTML page, obtain the webpage by calling the get(url) method in the request's library, obtain the resource path through the URL, and store the returned page information. The data is uniformly placed in the Response object, and the text in the object is the HTML page content.

3. Parse HTML documents. After obtaining the page information, it is necessary to extract and analyze the key information of the HTML page content. The entire parsing process should use the HTTP protocol and have a full understanding of the structure of the HTML document.

4. Store information. After the page information is parsed, the information is stored and data analyzed, and the data is stored in CSV, EXCEL and other formatted text forms. It stores in a relational database such as SQL Server or MySQL. All data records have the same field sequence, which can be easily imported into a table or database. Store the collected data in info.csv uniformly, compare the collection results with the original page, and obtain the corresponding relationship between the

two. The results show that using Python to obtain information is faster and more accurate [6].

4.2. Python-based Financial Data Analysis

According to the type of financial data, call the specific interface in the interface package to obtain the data. As a high-level programming language, the Python programming language has powerful computing functions and occupies a place in the field of data analysis. Anaconda is an open-source distribution version of the Python language. Using Anaconda can simplify the development process and facilitate the installation and uninstallation of toolkits. NumPy is a financial data processing tool and a free scientific computing extension data package, which is widely used in a large number of scientific computing data processing; Pandas has stronger data processing functions than NumPy, both of which are artificial intelligence The necessary tools in the field are widely used in data analysis [6-10].

According to the needs of data analysis, filter the original data, and then simulate the trading strategy to calculate the income. The analysis is as follows: (1) Select stocks according to conditions: (2) Trend strategy analysis: The most classic strategy is the moving average strategy. The moving average strategy has the characteristics of stable trend, long time period and stable performance.

5. CONCLUSION

The following conclusions are drawn from this study: First, the COVID-19 outbreak has had a significant adverse impact on the stock market, leading to an increase in risk levels. Under the same time window, the impact of the domestic new crown pneumonia epidemic on the stock market is greater than the impact on the overseas stock market. The impact of the first shock on the stock market is greater than the second shock, and the degree of impact is related to the length of the time window. With the extension of the window, the impact of the epidemic gradually weakened. Second, the outbreak of the new crown pneumonia epidemic also has a significant impact on the cross-market contagion of stock market risks, resulting in an increase in the dynamic correlation coefficient between markets and an increase in the cross-market risk spillover intensity. However, there are differences in the cross-market of stock market risks. The main manifestation is that the outbreak of the epidemic has the greatest impact on the US and Europe, followed by the impact on China and the US, and the least impact on China and Europe. Third, there is a risk-sharing effect between the European and American stock markets, but the risk spillover effect between China and the United States (or China and Europe) has a magnifying effect on

the risk of the US (or European) stock market, that is, the risk of the European and American stock markets increases with the risk of the Chinese stock market. The effect increases and magnifies. Accordingly, the following policy implications are drawn [1].

First, the impact of the new crown pneumonia epidemic on the stock market is more of a short-term and limited impact from panic, and the main driving force that determines the trend of the stock market is still the macroeconomic environment and the development of listed companies themselves [1] . In the long run, the primary task is to provide more substantial help for enterprises to resume work and production.

Second, the market turmoil caused by sudden external shocks such as the new crown pneumonia epidemic may have a domino effect and cause cross-market contagion of risks [1]. Therefore, when foreign emergencies cause financial market turmoil, domestic financial regulators should try to reduce such external shocks as much as possible, and even cut off the source of infection. At the same time, for investors, it is necessary to rationally allocate financial assets and "don't put all eggs in one basket".

Third, under the impact of the new crown pneumonia epidemic, there is a risk-sharing effect between the European and American stock markets, but the risks of the European and American stock markets are further amplified with the increase of the risk spillover effect on the Chinese stock market. In reality, the relationship between European and American economies is closer. Therefore, for a country's government, it is necessary to speed up the construction of an international coordination mechanism, especially in major emergencies, to strengthen cooperation, and to formulate a multi-country coordination system and emergency management system in a targeted manner to prevent emergencies from affecting the financial market impact [1].

In addition to the factorial analysis of financial market data statistics and mining results, this research pays more attention to the connection of data with reality and enhances the ability to use data mining to solve financial problems [2]. The collection and analysis of financial data requires data mining with the help of the Python programming language. As an important part of the development of the industry, big data should adapt to the development of the times and improve data analysis capabilities. With the outbreak of the new crown epidemic and the development of quantitative trading, great changes have taken place in the financial market. As a development process of quantitative trading, financial market data analysis should receive more attention. Analyze financial data and extract information from massive amounts of information. The law is extremely important for both the enterprise and the country. In this context, the Python programming

language is used to realize the processing and analysis of financial data and the visualization of data [6].

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