Application of Statistical Analysis Tools in Historical Research

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Abstract. Statistics is a scientific method of collecting, organizing, and analyzing statistical data. Its purpose is to explore the inherent regularity of data in order to achieve a scientific understanding of objective things. Statistics provides a set of methods for exploring the inherent laws of data. Using statistical methods, it is possible to explore its inherent quantitative laws. Statistical data is a quantitative expression of objective things.

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1. Methods of historical research
When we describe and analyze ancient or contemporary human society, we inevitably use numbers and quantities. If we want to study the history of population development, then the number of population, the growth rate of the population, and the distribution of the population are all characteristics that we must understand. Measurements such as population and growth rate are clearly quantitative[1-2]. Only by collecting, organizing and statistical historical data, and comparing and comparing the total population of each historical period, can we discover the trends and laws of population development. Only through accurate calculation can we accurately measure the growth of the population. Here, we use the statistical analysis method.

In contrast, the other forms of measurement and description we use in historical research are non-quantitative or qualitative. For a long time, historians have liked and were good at using description methods to explain history[3-4]. Many historical phenomena have not been measured at all, or are only a very rough calculation, and some are subjective estimates. A qualitative analysis of history using descriptive methods can reveal many essential characteristics of historical phenomena, but there are also significant limitations. (1) Although descriptive analysis can reveal the essential characteristics of historical phenomena to some extent, it cannot express their quantity; although it can reveal the connections and effects between historical phenomena, it cannot explain the extent of such
connections or effects.

Descriptive analysis is expressed in words, but there is an insurmountable problem in explaining history with words, that is, the ambiguity and ambiguity of language. Coupled with the fact that historical research is a dialogue between the contemporary and the past, this problem is particularly prominent[5-6]. Different understandings of some key concepts and words have caused many controversial issues in historical research.

In the history of history, many historical things are also quantitatively regulated to varying degrees, such as the number and frequency of historical events, especially in the fields of economic history and population history. Can't explain the nature of things. Therefore, it is necessary to use statistical analysis methods for historical research.

2. Status and problems of Chinese historical research

More than 30 years after the founding of the People's Republic of China, China's academia has been in a closed and semi-closed state. The real introduction of measurement history in China has been in the late 1970s.

For the study of metrological history in China, the situation from 1979 to 1990 can be found in "Basics of Metrological History" edited by Professor Huo Junjiang, pages 58-61. The situation from 1991 to 1993 is unknown. The author was retrieved according to the Chinese academic journal network in the year, and the article mentioned a total of 184 articles on "history of metrology", two of which are specifically about metrology history. In this case, Chinese historians are prone to problems when using data.

First, the usage data is inaccurate. When the author counts the frequency of disasters in each century, it is based on historical data in the "Records of the Famine of China" edited by Professor Meng Zhaohua. Professor Meng quoted Deng Tuo's statistical data in his book to analyze the disaster situation of each dynasty. However, after the author's re-counting, it was found that the data re-stated based on historical data in the book did not match the cited data. Taking the statistics of the Ming and Qing Dynasties as an example (see Table 1), we can find that the differences between the two are very large, but this has not caught the attention of historians.

|        | flood | drought | earthquake | hail | wind | locust | apology | famine | Snow and frost | total |
|--------|-------|---------|------------|------|------|--------|---------|--------|----------------|-------|
| Ming   | Deng  | 196     | 174        | 165  | 112  | 97     | 94      | 93     | 64             | 16    | 1011      |
|        | Meng  | 176     | 149        | 159  | 83   | 27     | 49      | 133    | 21             | 40    | 840       |
| Qing   | Deng  | 192     | 201        | 169  | 131  | 97     | 93      | 90     | 74             | 74    | 1121      |
|        | Meng  | 207     | 239        | 221  | 159  | 218    | 94      | 85     | 218            | 99    | 1540      |

Second, Chinese historians lack the necessary and in-depth analysis when using data, and generally only make simple quantitative descriptions. Taking the study of the history of famine in China as an example, although the statistics of Mr. Deng Tuo are quoted in Professor Meng Zhaohua's "The History of Famine in China", other than that, the description of the disaster situation is basically the listing and accumulation of historical data. The purpose of our study of history is to learn from history and serve reality. If it is just a list and accumulation of historical data or data without in-depth analysis, what value is there for such research?
3. Application of statistical analysis in historical research

In order to further illustrate the importance of statistical analysis to historical research, here is an example of the application of statistical analysis methods in historical research. I mentioned earlier that Mr. Deng Tuo used statistical methods when studying the history of famine in China, but there are many imperfections in data processing.

First of all, a systematic collation and statistics of the existing records of disasters is a necessary prerequisite to understand the truth of the past disasters.

When re-stating, the statistical caliber was consistent with that of Mr. Deng Tuo. premise. Therefore, the author tabulates the frequency of various disasters in each century as follows:

| Century | Flood | drought | locust | hail | wind | epidemic | earthquake | frost | hunger | total |
|---------|-------|---------|--------|------|------|----------|------------|-------|--------|-------|
| 10 century | 49    | 55      | 24     | 18   | 20   | 7        | 8          | 6     | 3      | 190   |
| 13 century | 57    | 70      | 36     | 47   | 31   | 7        | 25         | 13    | 26     | 322   |
| 15 century | 73    | 61      | 27     | 26   | 21   | 15       | 51         | 11    | 57     | 342   |
| 18 century | 83    | 97      | 38     | 69   | 79   | 40       | 86         | 39    | 91     | 622   |

From the table above, we can clearly and intuitively see the general development trends and characteristics of natural disasters: We study the history of famine in China, not only to explore the occurrence of famine, but also to provide useful guidance for today's disaster prevention, resistance, and relief.

Based on the statistical data in "The History of China's Famine Relief" by Mr. Deng Tuo, and based on the historical data in "The History of Famine in China" edited by Professor Meng Zhaohua.

Statistical analysis can also be used in political history, economic history, cultural history and many other fields. For example, Professor Qiao Guoliang used statistical analysis to determine the historical fact of "Confucius' Spring and Autumn".

The Soviet historian of metrology Д.В. Geopik used "descriptive statistics" to study the "authentic years" of the twelve males in "Spring and Autumn", and concluded that Confucius did not make "Spring and Autumn". Professor Qiao used the "probability and statistics method" to establish a mathematical model that describes the changing law of

From the above examples, we can see that, unlike traditional descriptive historical research methods, statistical analysis methods not only overcome the ambiguity of language expressions to make historical research more scientific, but also open up many new ones for historical research. Therefore, we can say that the use of statistical analysis methods (quantitative analysis methods) for historical research will enhance the comprehensive ability of historians to interpret and analyze history.

First, the statistical analysis studies the quantitative characteristics and regularity of the phenomenon as a whole, not the individual quantity. From another perspective, this is different from the traditional research that limited the object of historical research to personal and event-centered political history.

Second, statistical analysis makes historical research more accurate. First of all, the historical statistics are quantified to overcome the pale weakness and pan-cavity which are easy to appear in qualitative analysis and explanation. They can provide accurate quantitative basis for the qualitative
analysis of research objects. Secondly, the statistical analysis method will also affect the changes in the historian's thinking, causing researchers to change in the interpretation of history, presentation methods, etc., which will cause historians to change in historical epistemology and methodology. Third, statistical analysis provides many new research ideas and perspectives for historical research, which opens up many new fields that were not valued or used well in the past. Fourth, the use of electronic computers provides modern technical means for historical research. The use of computers can store, organize, and retrieve a large amount of historical data, and also provides the necessary technical conditions for the processing and analysis of large amounts of historical data. The historical models are used to perform operational analysis on the prediction and decision of historical trends. They enable historical research more convenient and faster.

4. Accurate positioning of statistical analysis in historical research

Statistical analysis methods can help other disciplines to explore the inherent quantitative regularity, and the interpretation of this quantitative regularity and further study of the internal regularity of each discipline can only be completed by each discipline. The statistical analysis method is only a useful quantitative analysis tool and cannot solve all the problems you want to solve. Whether statistical analysis can be used to solve specific problems depends on whether the correct statistical method is selected.

In the field of Chinese historiography, we have always paid more attention to qualitative macro analysis, but have been lagging behind in quantitative analysis for a long time. There is a lack of historical data and research methods required for quantitative analysis. In this case, it is very important and necessary to introduce statistical analysis (quantitative analysis) method. Because of its importance, we must pay attention to the principles of consciousness, science, and rationality when using it. We must not go to extremes, especially the tendency to exaggerate statistical analysis methods. We must organically combine quantitative analysis and qualitative analysis to promote historical research.

Regarding the methods of historical research, we must emphasize complementarity and integration. As long as it is beneficial to historical research, it does not matter whether it is a liberal arts or a science subject, whether it is Chinese or foreign. With all kinds of rivers and seas, you have great capacity, and with this spirit of tolerance, China's historical development will surely have a brighter tomorrow.

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