

Research on macroeconomic forecasting system based on time series

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Abstract: With the organic integration of computer science, artificial intelligence and mathematical statistics, Data mining (DM) technique has developed by leaps and bounds, which greatly promotes the improvement of time series DM technique. DM is a process of extracting non trivial, hidden, unknown and potentially useful information from large-scale data. As a branch of mathematical statistics, time series analysis has been widely studied since s. In recent years, many practical problems require modeling, analysis and prediction of time series data. At present, domestic macroeconomic time series forecasts mostly use current specific data, that is, the final revised data that researchers can get when doing research. However, this data is not a representation of the initial state of the real macro-economy, but has undergone regular and comprehensive revisions after the initial release, including the interference of some new information. It is of great significance to study the macroeconomic forecasting system based on time series.

1. Introduction

At present, the global economic structure is undergoing profound adjustment, international competition is becoming more intense, and society is in an important economic transition period. In order to prevent the impact of various aspects on the uncertainty of social and economic growth, it is necessary to predict macroeconomic variables in a "real-time" manner, so as to provide technical support for the decision-makers of macroeconomic regulation [1]. Both government departments and the public are very concerned about the future macroeconomic improvement of the society in order to formulate more appropriate macroeconomic policies, monetary policies and investment and consumption policies [2]. The choice of predictors will have an important impact on the macroeconomic prediction effect. Scholars look for potential variables that can predict the macroeconomic from production, consumption, investment, finance and other aspects. The decision-making process of macroeconomic policy depends on the analysis and prediction of the current macro-economy. It is necessary to collect real-time information of economic status and make real-time prediction of future economic conditions. Therefore, real-time prediction of current major macroeconomic variables becomes more and more important [3]. The construction of prediction model is an indispensable and important step in macroeconomic prediction research, and the model structure will also have an important impact on the prediction effect. Time series can well eliminate the interference of future time information on a specific time point in the past. It has the characteristics of immediacy and does not contain noise information [4]. Using time series for empirical research can reduce the influence of other time point interference factors and improve the accuracy of prediction results. At present, time series widely exist in economic, financial and social life. The variable range can be described by the lower limit and upper limit of the variable in a specific time period. It has rich data information advantages, and the interval prediction results obtained by the time series model are more valuable [5].

2. Macroeconomic forecast and time

2.1. Macroeconomics

Macroeconomic models and economic forecasts are important research areas of quantitative economics, as well as the research focus of international econometrics [6]. Facing the current downward trend of the domestic economy, it is of great significance to analyze the national

macroeconomic improvement based on the macroeconomic prediction theory. The transformation and upgrading of enterprises is a systematic project, which needs to actively create a good external environment, find both the market and the "mayor", make full use of public resources, strive for government policy support and support, and promote the transformation and upgrading of ports [7]. The most general definition of economic cycle refers to the regular expansion and contraction of economic activities along the overall trend of economic improvement, which generally includes four stages: prosperity, recession, depression and recovery. The early study of economic cycle theory was mainly accompanied by the germination and improvement of capitalism in western countries. Previously, during the period when the natural economy was dominant, due to the limitation of the level of economic improvement, there was no theory about the economic cycle system. Since then, although the productivity of capitalist countries has developed rapidly, the emergence of economic fluctuations and economic crises has made the economic environment unstable, In this context, the economic cycle theory was born, which is to explain the new economic phenomena. Macroeconomic policies are shown in Figure 1.

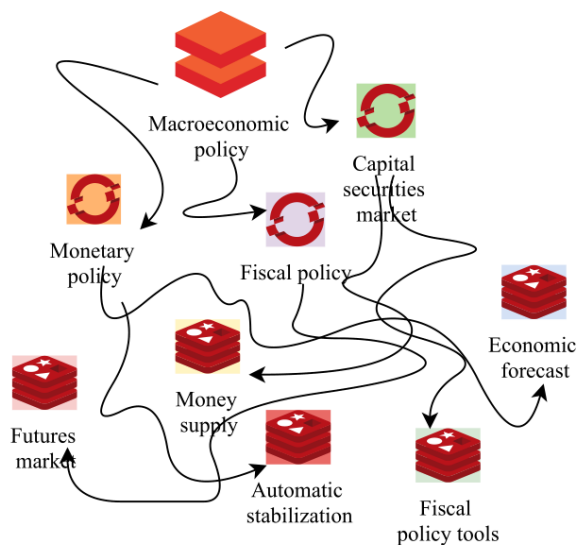


Figure 1 Macroeconomic policies

How to view the overall situation of macroeconomic operation is the most heated issue in macroeconomic discussions in various periods [8]. "Rational expectation" is a model that assumes that economic entities improve the efficiency of information use through optimization when expectations are formed. Rational expectation can return to the research field of economic field because of the prevalence of economic liberalism [9]. Rational expectation has two important characteristics: first, when making decisions, economic people should try to use all effective information, not just rely on past data to judge economic improvement trends; Second, the economic expectation does not deny the expectation formed by the interference of uncertain factors in the actual economic behavior on brokers, which makes our expectation deviate from the actual forecast, so as to avoid systematic errors.

2.2. Time series

Time series refers to a series formed by arranging the values of a statistical index of a phenomenon at different times in chronological order. Time series analysis is an important means to analyze social and economic data. A time series is a set of numerical sequences in chronological order. Time series analysis is to use this series of numbers and apply mathematical statistical means to predict the improvement of future things [10]. Time series analysis is one of the quantitative prediction means. Its basic principle is to recognize the continuity of the improvement of things (by applying the past data, we can predict the improvement trend of things); Considering the randomness of the improvement of things (the improvement of any thing may be affected by accidental factors, so the weighted average means in statistical analysis should be used to process

historical data) [11]. Social and economic improvement evolves with time, so the information and data reflecting, describing and recording social economy must be closely related to time. Whether the economy is growing steadily or achieving sudden disasters, and the relationship between social and political stability and economic improvement can be reflected in historical data.

In fact, time is changing continuously. Unlike industry and meteorology, economic data can be recorded synchronously with time. The data we can get can only be the value of a certain time point or the value of a certain period (such as the annual output value). Therefore, the economic aspect is concerned with the analysis means of discrete time series. In mathematics, the discrete is usually called a sequence, and the continuous is called a process. Therefore, the time series itself takes the discrete data as the object. Ensure the comparability of the index values of each period in the series, and the period length should be consistent; The overall scope should be consistent; The economic content of indicators should be unified.

3. Big data and macroeconomic forecast

3.1. Big data to macroeconomic forecasting system

We are now enjoying the huge dividends of the improvement of Internet technique and experiencing the convenience of the Internet age. In the Internet age, the requirements of computer data collection and processing capacity are increasing day by day. Under the background of the exponential growth of information, data has become one of the most important resources in today's society. With the improvement of macroeconomic theory, macroeconomic prediction has become another important aspect of empirical analysis and the application of economic model analysis. The core idea of traditional macroeconomic prediction means is to find the internal law of statistical data through specific models and means, and use this law to predict the future. As an important part of the Internet technique system, big data has unique advantages in data collection and data analysis, and can put forward better solutions to problems such as the huge amount of data information and the diversification of data types. Big data also plays an important role in macroeconomic prediction and analysis, making economic analysis and prediction more diversified and efficient. The theory driven structural model is mainly based on the macro-economic theory, builds a mathematical analysis model, and then "statisticalizes" to form an econometric model, estimates parameters using statistical data, and analyzes the quantitative relationship between macro-economic variables and forecasts the concerned variables. The classification diagram of Web DM is shown in Figure 2.

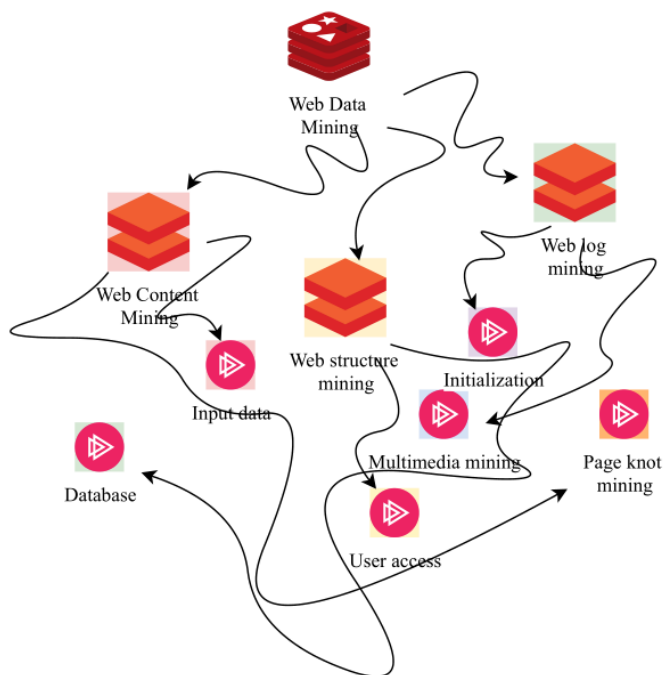


Figure 2 Classification diagram of Web Data Mining

The field of macro-economic analysis is very large, involving numerous academic and professional contents, and the factors affecting macro-economy are also very diverse, which indicates that macro-economic prediction analysis is a highly professional academic field. Data driven time series model mainly refers to modeling based on the internal laws of data without relying on any economic theory. Such models do not emphasize the inherent logic of economic theory, pay more attention to the change characteristics of variables themselves and the continuity in the time dimension, and use the internal change mode of this data to predict the future. In the traditional macro-economic forecast and analysis, due to the factors such as poor comprehensiveness of data content acquisition and low timeliness of data acquisition, there is often a certain deviation in the final forecast and analysis results, which affects the economic operation. Entering the era of big data, these problems have been more or less solved. Relevant analysis departments can further improve the speed of collecting major macroeconomic data and broaden the scope of these macroeconomic data collection by using Internet technique.

3.2. Macroeconomic forecast

Under the trend of economic globalization, the deepening of international economic integration not only promotes the rapid improvement of the world economy, but also inevitably brings the potential risk of its own stability decline. Local fluctuations in the economies of different countries or regions sometimes cause strong chain reactions. Especially in the context of economic depression, the linkage or contagion effect between economies often evolves into a global economic crisis, causing serious damage to the economies of all countries in the world. Prediction means that people make reasonable analysis based on the historical data of things and their mutual relations and improvement, and make advance analysis and inference on the future improvement trend of things by using the scientific means they have mastered.

In short, prediction is to scientifically estimate and infer the future improvement trend of things based on historical and current data. Relevant research on the economic crisis has found that these special extreme economic phenomena have their own laws, and these laws are often hidden behind the complex market appearance for a long time. If we can establish relevant analysis and prediction models through data and find the potential objective laws behind them as soon as possible, we can send early warning signals in time through model judgment to reduce or avoid the occurrence of large-scale economic disasters. Economy is a complex and huge system with high uncertainty under the comprehensive influence of many factors. Especially in the economic and economic environment where the international economic innovation is changing with each passing day and the system uncertainty is increasing, the analysis and Research on the underlying laws of economy are more challenging.

4. Conclusions

Since the s, the competition of economic environment has become increasingly fierce, and the dependence and sensitivity of analysis and decision-making on data have become increasingly high. In this context, many enterprises and institutions began to use more advanced information technique and intelligent decision support technique to conduct in-depth analysis of the massive data accumulated in the business system in order to find valuable laws. The macro-economic interval prediction means extends the traditional point value macro-economic prediction model meansology, and the interval data model can make full use of the data information to make its advantages in statistical inference and interval prediction modeling, so as to give more accurate interval prediction results, which has important theoretical value and practical significance for grasping the future improvement trend of social macro-economy. In the economic field, the vast majority of data are time series, and the mining of time series is a main content of economic DM.

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