Time Series Analysis Process of Dynamic Data in Internet of Things System

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Abstract: Time series analysis is a dynamic data analysis and processing method. The biggest characteristic of time series analysis is that the successive observations are not independent. When the observation series are correlated, the autocorrelation between the observation data can be used to establish the dynamic model of the data series. Thus, the existing observation data can be used to predict the future data. Time series analysis is an effective tool to deal with dynamic observation data.

1. overview of data analysis of Internet of things system

In the process of application and development of Internet of things technology, batch data will be produced. Data is undoubtedly an important indicator to measure an Internet of things system. Data refers to the final result of the whole production process of a system and its auxiliary equipment in a certain period of use. Data is considered to be the best indicator to measure the operation status of a system. This indicator can not only measure the input and output scale of the Internet of things system as a whole, It can also measure the data fluctuation and the periodic state of the data as a whole, and become the most concerned actual data in the overall control. It is considered to be an important index to measure the data reliability of the Internet of things system and to judge the operation status of the system.

There are many ways to benefit from big data in the Internet of things. Some valuable data can only be obtained after in-depth data processing. The data collected by networking devices can be used for real-time operation and timing analysis. Measurement of temperature in home or office, tracking of physical activity (counting steps, monitoring movement), etc.; real time monitoring is widely used in health care; it has also been successfully applied in manufacturing (for controlling production equipment), agriculture (for monitoring cattle and crops) and other industries.

When dealing with the data generated by the Internet of things, we can obtain valuable information from these data, identify trends, reveal hidden patterns, and discover hidden information and relevance. The sensor data provides a lot of useful information. Through the analysis, the important problems affecting the system performance and system optimization process are revealed.

2 basic data analysis

The accurate data acquisition and data analysis and prediction of the Internet of things system has important theoretical and practical significance. Time series is a group of digital sequences of the same phenomenon in different time. Time series analysis is an important method of dynamic data analysis and processing. Based on the theory of probability and statistics, it analyzes random data series or dynamic data series, establishes mathematical models for them, and further applies them to prediction, adaptive control and many other aspects. It is an application research field with high practical value, The rule is extended to the future, so as to predict the future of the system data. The application of
time series analysis method in the Internet of things system is mainly deterministic time series analysis method, mainly including exponential smoothing method, moving average method, time series decomposition and so on. With the development of Internet of things technology, many uncertain factors have more and more influence in the Internet of things system, which must cause people's extensive attention.

There are two main quantitative methods in forecasting: time series analysis and causality analysis. Time series analysis method refers to the method of using a series of methods to analyze the past data and finally determine a predictive value. This method assumes that the future system model is consistent with the past, the system conditions are relatively stable, and the historical data are true and reliable. It is usually used in short-term forecast, but not in medium and long-term forecast. Causality analysis refers to a method of analyzing and forecasting through the causality between the demand of a product and natural variables. The common causality analysis methods include regression analysis, economic model, input-output model, etc.

2. application examples of time series analysis

Ensure data reliability before analyzing data. It is necessary to ensure that the sensor works normally, the data quality used for analysis is reliable, and will not be damaged due to various factors. Networking devices will produce trillions of bytes of data. It is a difficult task to choose which data to store and which data to remove. What's important is that the value of some data is far from obvious and may be needed in the future. If you decide to store data for the future, the challenge is to do it at the lowest cost. All big data is important, and more in-depth analysis should be carried out at the right time to bring more value.

Based on the operating environment of the Internet of things system, take the 24-hour temperature data change in H District of G city as an example. Two groups of data were selected and analyzed by time series analysis method, and the trend of temperature change in the future was predicted.

A gives two groups of measured temperature data

Data file dd01.dat

Data file dd02.dat

Figure 1 Schematic diagram of time temperature data

Data file dd02.dat

Fig. 2 Schematic diagram of time temperature data
To sum up, for the two groups of temperature detection data, the time series analysis method is used to obtain the basic law of 24-hour temperature change. The overall trend is: 5:00-12:00, the temperature data showed an upward trend. From 12:00 to 5:00, it showed a downward trend. 5:00 and
12:00 are the turning points of temperature data.

3. Conclusion
Time series analysis method and time series analysis technology are the methods to study the change trend of forecast object through the data processing of its own time series. The time series prediction technology is divided into three aspects: deterministic time series analysis method; stochastic time series analysis method; deterministic plus stochastic time series combination model analysis method. The Internet of things system produces a large amount of data for real-time monitoring, analysis, process optimization and predictive maintenance of the system. Get valuable information from massive data.

Time series analysis is a complex process. The data collected by the sensor must work normally, and the data can be transmitted safely and processed effectively. The data generated by the Internet of things system is stored in the data area in its natural format. The original data is collected into the data area. The data is stored in the data area until it can be used in the time series analysis process. The analyzed structured data is stored in the database.

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