

TRAFFIC PATTERN DETERMINATION METHOD, ELECTRONIC DEVICE AND STORAGE MEDIUM

Cross-Reference to Related Applications

The present disclosure claims the priority of Chinese patent application CN 202010949750.9 entitled “traffic pattern determination method, electronic device and storage medium” and filed on September 10, 2020, the content of which is incorporated herein by reference in its entirety.

Field

The present disclosure relates to the field of communication technology, and in particular to a traffic pattern determination method, an electronic device and a storage medium.

Background

A fifth generation mobile communication technology (5G, i.e., 5th Generation Mobile Networks) enhances data throughput of a network by providing the following three aspects: more spectrum, higher spectrum efficiency and more-intensive networking. At the same time, the fifth generation mobile communication technology may provide a customized network slice technology for different requirements of users, which may specifically meet differentiated requirements of vertical industries. Different network slices correspond to different network traffic patterns. However, in an existing network slice technology, one class of users generally corresponds to one network slice, that is, this class of users always uses a network traffic pattern corresponding to this network slice. Such mode is not flexible enough to ensure traffic service for the users in a cell when the traffic service in the cell changes, and sometimes user experience can be even influenced.

Summary

The present disclosure provides a traffic pattern determination method, an electronic device and a storage medium, which may provide a more flexible network traffic service.

In a first aspect, the present disclosure provides a traffic pattern determination method. The method includes: determining an estimated traffic value corresponding to a current time, according to historical traffic information; determining preset traffic values corresponding to respective traffic patterns included in a traffic pattern set, respectively, the preset traffic value corresponding to the current time; and determining a target traffic pattern corresponding to the current time from the traffic pattern set, according to the estimated traffic value and the preset traffic values corresponding to the respective traffic patterns included in the traffic pattern set.

In a second aspect, the present disclosure further provides an electronic device including a memory and a processor. The memory is configured to store a computer program. The processor is

configured to execute the computer program and to implement the above traffic pattern determination method when executing the computer program.

In a third aspect, the present disclosure further provides a computer-readable storage medium which stores a computer program, and when the computer program is executed by a processor, the processor is caused to implement the above traffic pattern determination method.

Brief Description of the Drawings

In order to more clearly illustrate the technical solution of the present disclosure, the drawings which are required for the description of the embodiments will be briefly introduced in the following. Obviously, the drawings described in the following are only some embodiments of the present disclosure. For one of ordinary skill in the art, other drawings may be further obtained based on these drawings without creative effort.

Fig. 1 is a schematic flow chart of a traffic pattern determination method provided in an embodiment of the present disclosure;

Fig. 2 is a schematic flow chart of another traffic pattern determination method provided in an embodiment of the present disclosure;

Fig. 3 is a schematic block diagram of a structure of an electronic device provided in an embodiment of the present disclosure.

Detailed Description of the Embodiments

Hereafter, the technical solutions in the embodiments of the present disclosure will be clearly and completely described in combination with the accompanying drawings. Obviously, the described embodiments are only some embodiments, but not, all, of the present disclosure. Based on the described embodiments of the present disclosure, all the other embodiments which are obtained by one of ordinary skill in the art without creative efforts fall into the scope of protection of the present disclosure.

The flow charts shown in the accompanying drawings are only used for exemplary illustration, which neither include all the contents and operations/steps, nor are performed in the order described. For example, some operations/steps may be further decomposed, combined or partially merged, and thus an actual order in which the operations/steps are performed may be varied according to actual situations.

It should be understood that, the terms used in the description of the present disclosure are only for the purpose of describing specific embodiments and are not intended to limit the present disclosure. As used in the description of the present disclosure and the appended claims, the singular form “a”, “an” and “the” include plural references unless the context clearly dictates otherwise.

It should also be further understood that, the term “and/or” used in the description and the

appended claims of the present disclosure refers to any combination of one or more of the items as listed and all the possible combinations, and includes these combinations.

The embodiments of the present disclosure provide a traffic pattern determination method, an electronic device and a storage medium. Hereafter, some implementations of the present disclosure will be described in detail in combination with the accompanying drawings. The following embodiments and the features in the embodiments may be combined with each other without confliction.

Referring to Fig. 1, Fig. 1 shows a schematic flow chart of a traffic pattern determination method provided in an embodiment of the present disclosure. As shown in Fig. 1, the traffic pattern determination method specifically includes the following steps S101 to S103.

At S101, an estimated traffic value corresponding to a current time is determined according to historical traffic information.

The historical traffic information may include a first traffic value actually used by a user at each time in a past historical time interval. The first traffic value actually used by the user at each time depends on a network behavior of the user at this time. For example, if a download operation is performed by the user at a time and has a download speed of 10 megabytes per second (Mbps), the first traffic value actually used by the user at the current second is 10 megabytes per second.

A base station will set a traffic pattern for each user, and each traffic pattern will have a corresponding preset traffic value. The first traffic value actually used by the user at each time will generally not exceed the preset traffic value corresponding to the traffic pattern set by an operator for the user. For example, if the preset traffic value is 10 megabytes per second, the first traffic value actually used by the user at each time is not more than 10 megabytes per second. The user may be a user accessing the same network slice, and the number of the user(s) may be one or more.

According to the historical traffic information, the first traffic value actually used by the user at each time in the past may be determined, and then a user's usage habit for the first traffic value may be determined. For example, some users have a usage habit of a relative high first traffic value, while other users have a usage habit of a relatively low traffic value. Therefore, a first traffic value that may be used at the current time may be predicted as the estimated traffic value according to the historical traffic information.

At S102, preset traffic values corresponding to respective traffic patterns included in a traffic pattern set is determined, and a preset traffic value corresponds to the current time.

The traffic pattern set may include traffic patterns corresponding to network slices preset by the base station. Different network slices correspond to different traffic patterns. A corresponding network slice may be configured according to internet access needs of different users, that is, a network service of a corresponding traffic pattern may be provided for the user.

The traffic pattern set may include a plurality of traffic patterns, and each of the plurality of traffic patterns has its corresponding preset traffic value. The preset traffic value may be a first traffic

value, which is an upper limit that the user may use at each time. The preset traffic value of the traffic pattern may be a fixed value, that is, the preset traffic value may be the same value at any time. The preset traffic value may alternatively be a non-fixed value, which may change over time.

The preset traffic values corresponding to the respective traffic patterns at the current time may be determined, respectively. If the preset traffic value corresponding to one traffic pattern is a fixed value, the preset traffic value corresponding to the current time is this fixed value. If the preset traffic value corresponding to one traffic pattern changes over time, the preset traffic value at the current time may be determined.

In an embodiment, the traffic pattern set includes a ratio ensurance scheduling pattern and a rate ensurance scheduling pattern. The above operation in which a preset traffic value corresponding to each traffic pattern included in the traffic pattern set is determined may be implemented as follows.

A total first traffic value corresponding to the current time is determined, and a product of a preset ratio and the total first traffic value is determined as a preset traffic value in the ratio ensurance scheduling pattern; and a preset rate traffic is determined as a preset traffic value in the rate ensurance scheduling pattern.

The total first traffic value may be a first traffic value divided for a region. A plurality of users are included in the region. The total first traffic value may be the sum of the preset traffic values of all the users in the region. The total first traffic value will change over time, such that the total first traffic value at the current time may be determined. The total first traffic value may be divided by the base station, such that the total first traffic value corresponding to the current time may be directly acquired.

For example, a region may be a cell including a plurality of users, and each of the plurality of users has its own preset traffic value. The total first traffic value of the region may change due to the influence of external factors, such that the preset traffic values of the users in the region will change. For example, when channel quality is good, the total first traffic value of the region may reach 1000 megabytes per second, that is, the total first traffic value of 1000 megabytes per second is used by the users in the region. When the channel quality becomes poor, the total first traffic value of the region may be only 500 megabytes per second, such that only 500 megabytes per second may be used by the users in the region, and accordingly, the preset traffic values of the users will also change.

The ratio ensurance scheduling pattern may be a traffic pattern in which a first traffic value corresponding to the preset ratio based on the total first traffic value is determined as the preset traffic value, according to the preset ratio. Therefore, after the total first traffic value at the current time is determined, the product of the preset ratio and the total first traffic value is determined as the preset traffic value in the ratio ensurance scheduling pattern. For example, if the total first traffic value is 1000 megabytes per second and the preset ratio is 10%, the preset traffic value

corresponding to the ratio insurance scheduling pattern is 100 megabytes per second; and if the total first traffic value is 500 megabytes per second, the preset traffic value corresponding to the ratio insurance scheduling pattern is 50 megabytes per second.

The rate insurance scheduling pattern may be a traffic pattern in which a fixed preset rate traffic is used as the preset traffic value. The rate insurance scheduling pattern is independent of the total first traffic value, and thus the preset rate traffic may be determined as the preset traffic value in the rate insurance scheduling pattern. For example, if the preset rate traffic in the rate insurance scheduling pattern is 80 megabytes per second, the preset traffic value in the rate insurance scheduling pattern will always be 80 megabytes per second at any time.

At S103, a target traffic pattern corresponding to the current time is determined from the traffic pattern set, according to the estimated traffic value and the preset traffic values corresponding to the respective traffic patterns included in the traffic pattern set.

The estimated traffic value represents a first traffic value that may need to be used by the user at the current time. The preset traffic values corresponding to the respective traffic patterns included in the traffic pattern set represent an upper limit of the first traffic value that each traffic pattern may provide for the user.

When the first traffic value that the user actually needs to use is relatively high, if a relatively low preset traffic value is provided, the normal use of the user may be influenced. When the first traffic value that the user needs to use is relatively low, if a relatively high preset traffic value is provided, a waste for the first traffic value will be caused, and at the same time, the first traffic value of other users in the same region may be occupied.

Therefore, a suitable traffic pattern may be determined, as the target traffic pattern corresponding to the current time, from the traffic pattern set according to the estimated traffic value and the preset traffic values corresponding to the respective traffic patterns included in the traffic pattern set. After the target traffic pattern corresponding to the current time is determined, the base station may configure a network slice corresponding to the target traffic pattern for the user, and further provide the user with the preset traffic value corresponding to the target traffic pattern.

In an embodiment, the above operation in which a target traffic pattern corresponding to the current time is determined from the traffic pattern set, according to the estimated traffic value and the preset traffic value corresponding to each traffic pattern included in the traffic pattern set may be implemented as follows.

The target traffic pattern corresponding to the current time is determined from the traffic pattern set, according to a ratio of the estimated traffic value and the preset traffic values corresponding to the respective traffic patterns included in the traffic pattern set.

According to the ratio of the estimated traffic value and the preset traffic value corresponding to each traffic pattern included in the traffic pattern set, the traffic patterns which have the preset traffic values greater than the estimated traffic value and the traffic patterns which have the preset traffic

values less than the estimated traffic value may be determined, and then a traffic pattern corresponding to an appropriate estimated traffic value may be selected therefrom as the target traffic pattern.

In an embodiment of the present disclosure, the estimated traffic value is determined, a first traffic value that the user may need to use at the current time may be determined according to the estimated traffic value, and then a more appropriate traffic pattern may be selected from the traffic pattern set as the target traffic pattern according to the estimated traffic value and the preset traffic value actually provided by each traffic pattern, such that when the traffic service of the cell changes, a traffic use experience of the user may be ensured, and the waste for the first traffic value may be avoided, thereby providing a more flexible network traffic service.

In an embodiment, the above operation in which the target traffic pattern corresponding to the current time is determined from the traffic pattern set, according to a ratio of the estimated traffic value and the preset traffic values corresponding to the respective traffic patterns included in the traffic pattern set may be implemented as follows.

If the estimated traffic value is greater than the preset traffic values corresponding to the traffic patterns included in the traffic pattern set, a traffic pattern corresponding to a largest preset traffic value among the preset traffic values corresponding to the traffic patterns is determined as the target traffic pattern corresponding to the current time.

If the estimated traffic value is less than the preset traffic values corresponding to the traffic patterns included in the traffic pattern set, a traffic pattern corresponding to a smallest preset traffic value among the preset traffic values corresponding to the respective traffic patterns is determined as the target traffic pattern corresponding to the current time.

if the estimated traffic value is not greater than the preset traffic values corresponding to all the traffic patterns included in the traffic pattern set, or if the estimated traffic value is not less than the preset traffic values corresponding to all the traffic patterns included in the traffic pattern set, a traffic pattern corresponding to a preset traffic value which is greater than the estimated traffic value among the preset traffic values corresponding to the respective traffic patterns as the target traffic pattern corresponding to the current time

If the estimated traffic value is greater than the preset traffic values corresponding to the traffic patterns included in the traffic pattern set, that is, an estimated first traffic value that a user may need to use at the current moment is very high, and the preset traffic values corresponding to all the traffic patterns in the traffic pattern set are less than the estimated traffic value, so that the traffic pattern corresponding to the largest preset traffic value in the traffic pattern set is selected as the target traffic pattern, thereby minimizing the influence on network traffic experience of the user.

If the estimated traffic value is less than the preset traffic values corresponding to the respective traffic patterns included in the traffic pattern set, that is, an estimated first traffic value that the user may need to use at the current moment is relatively low, all the preset traffic values

corresponding to all the traffic patterns in the traffic pattern set are greater than the estimated traffic value, and thus any one of the traffic patterns may meet the use need of the user. Therefore, the traffic pattern, corresponding to the smallest preset traffic value, in the traffic pattern set is selected as the target traffic pattern, which may avoid the waste of traffic caused by the use of a relatively high preset traffic value. At the same time, the saved first traffic value may be used by other users in the region, such that the total first traffic value in the region may be more reasonably allocated, and frequency spectrum utilization efficiency is enhanced.

If the estimated traffic value is not greater than the preset traffic values corresponding to all the traffic patterns included in the traffic pattern set, or if the estimated traffic value is not less than the preset traffic values corresponding to all the traffic patterns included in the traffic pattern set, that is, among the preset traffic values corresponding to a plurality of traffic patterns included in the traffic pattern set, some preset traffic values are greater than the estimated traffic value, and other preset traffic values are less than the estimated traffic value. If a preset traffic value smaller than the estimated traffic value is selected, the normal use of the user may be influenced. Therefore, a traffic pattern corresponding to the preset traffic value larger than the estimated traffic value is selected as the target traffic pattern, thereby ensuring the normal use of the user.

If three or more traffic patterns are included in the traffic pattern set, and there are two or more traffic patterns with a preset traffic value greater than the estimated traffic value, a traffic pattern with the smallest preset traffic value, among the traffic patterns corresponding to the preset traffic values greater than the estimated traffic value, as the target traffic pattern. If only two traffic patterns are included in the traffic pattern set, a traffic pattern corresponding to the preset traffic value greater than the estimated traffic value may be directly selected as the target traffic pattern.

By way of example, assuming that the traffic pattern set includes a ratio insurance scheduling pattern and a rate insurance scheduling pattern, the preset traffic value in the ratio insurance scheduling pattern is represented as $y_{promotion}$, the preset traffic value in the rate insurance scheduling pattern is represented as y_{rate} , and the estimated traffic value is represented as y_{filter} .

When the y_{filter} is greater than the $y_{promotion}$ and the y_{filter} filter is greater than the y_{rate} , if the $y_{promotion}$ is greater than the y_{rate} , the ratio insurance scheduling pattern will be determined as the target traffic pattern corresponding to the current time; and if the $y_{promotion}$ is less than the y_{rate} , the rate insurance scheduling pattern will be determined as the target traffic pattern corresponding to the current time.

When the y_{filter} is greater than the $y_{promotion}$ and the y_{filter} filter is less than the y_{rate} , the rate insurance scheduling pattern is determined as the target traffic pattern corresponding to the current time.

When the y_{filter} is less than the $y_{promotion}$ and the y_{filter} filter is greater than the y_{rate} , the ratio insurance scheduling pattern is determined as the target traffic pattern corresponding to the current time.

When the y_{filter} is less than the $y_{promotion}$ and the y_{filter} filter is less than the y_{rate} , if the $y_{promotion}$ is greater than the y_{rate} , the rate ensurance scheduling pattern will be determined as the target traffic pattern corresponding to the current time; and if the $y_{promotion}$ is less than the y_{rate} , the ratio ensurance scheduling pattern will be determined as the target traffic pattern corresponding to the current time

In an embodiment, as shown in Fig. 2, the above operation in which an estimated traffic value corresponding to a current time is determined according to historical traffic information may be implemented through the following steps including S201 to S202.

At S201, a time-traffic relation formula is determined according to the historical traffic information, and the time-traffic relation formula is a relation formula between each time and a first traffic value corresponding to the each time.

The historical traffic information may include a first traffic value actually used by the user at each historical time in the past historical time interval, that is, the historical traffic information includes multiple historical times and the first traffic values corresponding to the multiple historical times respectively. Each user has his own specific network habit, and thus there will be a certain relationship between the historical time and the first traffic value corresponding to the historical time. Therefore, a relation formula between each time and the first traffic value corresponding to each time may be determined as the time-traffic relation formula according to the historical traffic information. By way of example, the first historical traffic values may be analyzed by a linear regression method to determine the time-traffic relation formula.

At S202, a first traffic value corresponding to the current time is determined according to the time-traffic relation formula, and the estimated traffic value corresponding to the current time is determined according to the first traffic value corresponding to the current time.

The time-traffic relation formula represents the relationship between each time and the first traffic value corresponding to the each time. Therefore, the first traffic value corresponding to the current time may be determined according to the time-traffic relation formula, and the estimated traffic value may be further determined therefrom. For example, the first traffic value corresponding to the current time which is determined according to the time-traffic relation formula may be used as the estimated traffic value.

In an embodiment, the above operation in which a time-traffic relation formula is determined according to the historical traffic information may be implemented as follows.

Historical times included in the historical traffic information and first traffic values corresponding to the historical time are determined; coordinate positions of the historical times and the first traffic values corresponding to the historical times in a preset coordinate system are determined; and a fitting is performed according to the coordinate positions to obtain a fitting equation, and the fitting equation is determined as the time-traffic relation formula.

The time may be used as an abscissa and the first traffic value may be used as an ordinate to

establish a preset coordinate system. One coordinate position may be determined in the coordinate system according to the historical time and its corresponding first traffic value, and multiple coordinate positions may be determined in the preset coordinate system according to multiple historical times and the first traffic values corresponding to multiple historical times.

The fitting means that a smooth line is determined based on multiple points, and the line may connect the multiple points together. A fitting equation with respect to multiple coordinate positions may be determined according to the fitting method, a smooth line may be determined according to the multiple coordinate positions, and the smooth line may connect the multiple coordinate positions together. In a case, all the multiple coordinate positions are located on the line; and in another case, some coordinate positions among the multiple coordinate positions are located on the line, and other coordinate positions are kept relatively close to the line. For example, the line may be a curve or a straight line.

The fitting equation obtained by fitting may reflect a functional relationship between the time and the first traffic value, so as to predict the first traffic value corresponding to the current time.

In an embodiment, the above operation in which a fitting is performed according to the coordinate positions to obtain a fitting equation and the fitting equation is determined as the time-traffic relation formula may be implemented as follows.

A straight line fitting is performed according to the coordinate positions to obtain a straight line fitting equation, and the straight line fitting equation is determined as the time-traffic relation formula.

The base station is calculating the estimated traffic value all the time. In order to ensure calculation efficiency, the straight line fitting may be selected to be performed to obtain a straight line fitting equation as the time-traffic relation formula.

For example, the straight line fitting may be performed by least square method to obtain a linear regression equation, i.e., a straight line fitting equation. A fitting equation, in which a quadratic sum of differences between estimated first traffic values at historical times determined therefrom and actual first traffic values at the historical times is the smallest, may be determined as the straight line fitting equation.

For example, the straight line fitting equation is $\hat{y}_i = \alpha + \beta x_i$, where x_i is the time; $\hat{y}_i$ is the first traffic value corresponding to the time, i.e., the estimated first traffic value at the time x_i ; α and β are regression coefficients; $i=(1,2, \dots, n)$, that is, $x_1, x_2, \dots$ respectively represent different times; and n is the number of historical times included in the historical traffic information. The regression coefficients α and β may be determined according to the least square method, as shown in the following formula:

$$\sum_{i=1}^n (y_i - \hat{y}_i)^2 = \sum_{i=1}^n [y_i - (\alpha + \beta x_i)]^2 \quad (1)$$

where y_i is the first traffic value actually used at the time x_i , i.e., the first traffic value

corresponding to the historical time x_i , and the following formula may be obtained by differential method:

$$\begin{cases} \sum y_i = n\alpha + \beta \sum x_i \\ \sum x_i y_i = \alpha \sum x_i + \beta \sum x_i^2 \end{cases} \quad (2)$$

$$\begin{cases} \beta = \frac{\sum (x_i - \bar{x})(y_i - \bar{y})}{\sum (x_i - \bar{x})^2} = \frac{n \sum x_i y_i - \sum x_i \sum y_i}{n \sum x_i^2 - (\sum x_i)^2} \\ \alpha = \frac{\sum y_i}{n} - \beta \frac{\sum x_i}{n} = \bar{y} - \beta \bar{x} \end{cases} \quad (3)$$

Then the regression coefficients α and β may be obtained via solution. The regression coefficients α and β are substituted into $\hat{y}_i = \alpha + \beta x_i$, to further obtain the time-traffic relation formula.

In an embodiment, the above operation in which a first traffic value corresponding to the current time is determined according to the time-traffic relation formula and the estimated traffic value corresponding to the current time is determined according to the first traffic value corresponding to the current time may be implemented as follows.

The first traffic value corresponding to the current time is determined according to the time-traffic relation formula; a first traffic value corresponding to a previous time is determined; and the estimated traffic value corresponding to the current time is determined according to the first traffic value corresponding to the current time and the first traffic value corresponding to the previous time.

There may be a distortion in the first traffic value at the current time obtained by performing estimation of the first traffic value according to the time-traffic relation formula, that is, the difference between the first traffic value at the current time and the first traffic value at the previous time is too large. In this case, the first traffic value corresponding to the previous time may be obtained, and the estimated first traffic value at the current time may be smoothed according to the first traffic value corresponding to the previous time to obtain the estimated traffic value at the current time.

The first traffic value corresponding to the previous time, that is, an estimated first traffic value corresponding to the previous time, may be determined according to the time-traffic relation formula. Alternatively, the first traffic value corresponding to the previous time may be determined, that is, a first traffic value actually used at the previous time, according to the historical traffic information.

In an embodiment, the above operation in which the estimated traffic value corresponding to the current time is determined according to the first traffic value corresponding to the current time and the first traffic value corresponding to the previous time may be implemented as follows.

The first traffic value corresponding to the current time is multiplied by a first weight to obtain a first data, and the first traffic value corresponding to the previous time is multiplied by a second weight to obtain a second data; and the first data and the second data are added together to obtain the estimated traffic value at the current time.

The first traffic value corresponding to the previous time and the estimated first traffic value at the current time may be multiplied by corresponding weights respectively and then added together, so that there is no distortion between the estimated first traffic value and the first traffic value at the previous time, instead, a certain smoothness will be maintained between the estimated first traffic value and the first traffic value at the previous time. The first weight and the second weight may be preset values, and the sum of the first weight and the second weight may be 1. For example, the weight of the first traffic value corresponding to the previous time is 0.5, and the weight of the first traffic value at the current time is 0.5.

Referring to Fig. 3, Fig. 3 shows a schematic block diagram of a structure of an electronic device provided in an embodiment of the present disclosure. The electronic device may be a base station. Referring to Fig. 3, for example, the electronic device 100 includes a processor 110 and a memory 120 which are connected to each other via a system bus, and the memory 120 may include a non-volatile storage medium and an internal memory.

The non-volatile storage medium may store an operating system and a computer program. The computer program includes program instructions, and the program instructions are executed by the processor to implement any one traffic pattern determination method.

The processor is used to provide computing and control capabilities, so as to support the operation of the entire electronic device.

The internal memory provides an environment for the running of the computer programs in the non-volatile storage medium. When the computer programs are executed by the processor, the processor may be caused to implement any one traffic pattern determination method.

Those skilled in the art should understand that the structure shown in Fig. 3 is only a block diagram of a part of the structure related to the technical solution of the present disclosure, and does not constitute a limitation to the electronic device on which the technical solution of the present disclosure is applied. The electronic device of the present disclosure may include more or fewer components than those shown in the figure, or has some components combined, or has different component arrangement.

It should be understood that the processor may be a central processing unit (CPU), and it may alternatively be other general-purpose processor, a digital signal processor (DSP), an application specific integrated circuit (ASIC), a field programmable gate array (FPGA) or other programmable logic device, a discrete gate or a transistor logic device, a discrete hardware component, etc. The general-purpose processor may be a microprocessor, or the processor may be any conventional processor or the like.

In an embodiment, the processor is configured to execute the computer program stored in the memory to implement the following steps.

An estimated traffic value corresponding to a current time is determined according to historical traffic information.

Preset traffic values corresponding to respective traffic patterns included in a traffic pattern set is determined, respectively, and a preset traffic value corresponds to the current time.

A target traffic pattern corresponding to the current time is determined from the traffic pattern set, according to the estimated traffic value and the preset traffic values corresponding to the respective traffic patterns included in the traffic pattern set.

In an embodiment, the processor may be configured to implement the following steps when an estimated traffic value corresponding to a current time is determined according to historical traffic information.

A time-traffic relation formula is determined according to the historical traffic information, and the time-traffic relation formula is a relation formula between each time and a first traffic value corresponding to the each time.

A first traffic value corresponding to the current time is determined according to the time-traffic relation formula, and the estimated traffic value corresponding to the current time is determined according to the first traffic value corresponding to the current time.

In an embodiment, the processor is configured to implement the following steps when a time-traffic relation formula is determined according to the historical traffic information.

Historical times included in the historical traffic information and first traffic values corresponding to respective historical times are determined.

Coordinate positions corresponding to the historical times and the first traffic values corresponding to the respective historical times in a preset coordinate system are determined.

A fitting is performed according to the coordinate positions to obtain a fitting equation, and the fitting equation is determined as the time-traffic relation formula.

In an embodiment, the processor is configured to implement the following steps when a first traffic value corresponding to the current time is determined according to the time-traffic relation formula, and the estimated traffic value corresponding to the current time is determined according to the first traffic value corresponding to the current time.

The first traffic value corresponding to the current time is determined according to the time-traffic relation formula.

A first traffic value corresponding to a previous time is determined.

The estimated traffic value corresponding to the current time is determined according to the first traffic value corresponding to the current time and the first traffic value corresponding to the previous time.

In an embodiment, the processor is configured to implement the following steps when the estimated traffic value corresponding to the current time is determined according to the first traffic value corresponding to the current time and the first traffic value corresponding to the previous time.

The first traffic value corresponding to the current time is multiplied by a first weight to obtain a first data, and the first traffic value corresponding to the previous time is multiplied by a second

weight to obtain a second data.

The first data and the second data are added together to obtain the estimated traffic value at the current time.

In an embodiment, the traffic pattern set includes a ratio ensurance scheduling pattern and a rate ensurance scheduling pattern. The processor is configured to implement the following steps when preset traffic values corresponding to respective traffic patterns included in a traffic pattern set is determined, respectively.

A total first traffic value corresponding to the current time is determined, and a product of a preset ratio and the total first traffic value is determined as a preset traffic value in the ratio ensurance scheduling pattern.

A preset rate traffic is determined as a preset traffic value in the rate ensurance scheduling pattern.

In an embodiment, the processor is configured to implement the following steps when a target traffic pattern corresponding to the current time from the traffic pattern set is determined, according to the estimated traffic value and the preset traffic values corresponding to the respective traffic patterns included in the traffic pattern set.

The target traffic pattern corresponding to the current time is determined from the traffic pattern set, according to a ratio of the estimated traffic value and the preset traffic values corresponding to the respective traffic patterns included in the traffic pattern set.

In an embodiment, the processor is configured to implement the following steps when the target traffic pattern corresponding to the current time from the traffic pattern set is determined, according to a ratio of the estimated traffic value and the preset traffic values corresponding to the respective traffic patterns included in the traffic pattern set.

If the estimated traffic value is greater than the preset traffic values corresponding to the respective traffic patterns included in the traffic pattern set, a traffic pattern corresponding to a largest preset traffic value among the preset traffic values corresponding to the respective traffic patterns is determined as the target traffic pattern corresponding to the current time.

If the estimated traffic value is less than the preset traffic values corresponding to the respective traffic patterns included in the traffic pattern set, a traffic pattern corresponding to a smallest preset traffic value among the preset traffic values corresponding to the respective traffic patterns is determined as the target traffic pattern corresponding to the current time.

If the estimated traffic value is not greater than the preset traffic values corresponding to all the traffic patterns included in the traffic pattern set, or if the estimated traffic value is not less than the preset traffic values corresponding to all the traffic patterns included in the traffic pattern set, a traffic pattern corresponding to a preset traffic value which is greater than the estimated traffic value among the preset traffic values corresponding to the respective traffic patterns is determined as the target traffic pattern corresponding to the current time.

An embodiment of the present disclosure further provides a computer-readable storage medium which stores a computer program. The computer program includes program instructions, and the program instructions are executed by a processor to implement any one traffic pattern determination method as provided in the embodiments of the present disclosure.

The computer-readable storage medium may be an internal storage unit of the electronic device described in the preceding embodiments, such as a hard disk or a memory of the electronic device. The computer-readable storage medium may alternatively be an external storage device of the electronic device, such as a plug-in hard disk, a smart media card (SMC), a secure digital (SD) card, a flash card or the like which are configured on the electronic device.

In the traffic pattern determination method provided in the present disclosure, the estimated traffic value is determined, and the first traffic value that the user may need to use at the current time may be determined according to the estimated traffic value, and then according to the estimated traffic value and the preset traffic value actually provided by each traffic pattern, a more appropriate traffic pattern may be adaptively selected from a traffic pattern set as a target traffic pattern, such that the traffic experience of the user can be ensured, and a waste for the first traffic value is avoided when the traffic service of the cell changes, thereby providing a more flexible network traffic service.

The above content only illustrates the implementation of the present disclosure, but the scope of protection of the present disclosure is not limited thereto. Any one of ordinary skill in the art would readily think of various equivalent modifications or replacements within the technical scope as claimed by the present disclosure, and these modifications or replacements should be encompassed in the scope of protection of the present disclosure. Therefore, the protection scope of the present disclosure shall be subject to the protection scope of the claims.

Claims

1. A traffic pattern determination method, comprising:
 - determining an estimated traffic value corresponding to a current time, according to historical traffic information;
 - determining preset traffic values corresponding to respective traffic patterns comprised in a traffic pattern set, respectively, wherein a preset traffic value corresponds to the current time; and
 - determining a target traffic pattern corresponding to the current time from the traffic pattern set, according to the estimated traffic value and the preset traffic values corresponding to the respective traffic patterns comprised in the traffic pattern set.
2. The traffic pattern determination method of claim 1, wherein determining an estimated traffic value corresponding to a current time, according to historical traffic information comprises:
 - determining a time-traffic relation formula according to the historical traffic information, wherein the time-traffic relation formula is a relation formula between a respective time and a first traffic value corresponding to the respective time; and
 - determining a first traffic value corresponding to the current time according to the time-traffic relation formula, and determining the estimated traffic value corresponding to the current time according to the first traffic value corresponding to the current time.
3. The traffic pattern determination method of claim 2, wherein determining a time-traffic relation formula according to the historical traffic information comprises:
 - determining historical times comprised in the historical traffic information and first traffic values corresponding to respective historical times;
 - determining coordinate positions of the historical times and the first traffic values corresponding to the respective historical times in a preset coordinate system; and
 - performing fitting according to the coordinate positions to obtain a fitting equation, and determining the fitting equation as the time-traffic relation formula.
4. The traffic pattern determination method of claim 3, wherein performing fitting according to the coordinate positions to obtain a fitting equation and determining the fitting equation as the time-traffic relation formula comprises:
 - performing straight line fitting according to the coordinate positions to obtain a straight line fitting equation, and determining the straight line fitting equation as the time-traffic relation formula.
5. The traffic pattern determination method of claim 2, wherein determining a first traffic value corresponding to the current time according to the time-traffic relation formula, and determining the estimated traffic value corresponding to the current time according to the first traffic value corresponding to the current time comprises:

determining the first traffic value corresponding to the current time according to the time-traffic relation formula; and

determining a first traffic value corresponding to a previous time, and determining the estimated traffic value corresponding to the current time according to the first traffic value corresponding to the current time and the first traffic value corresponding to the previous time.

6. The traffic pattern determination method of claim 5, wherein determining the estimated traffic value corresponding to the current time according to the first traffic value corresponding to the current time and the first traffic value corresponding to the previous time comprises:

multiplying the first traffic value corresponding to the current time by a first weight to obtain a first data, and multiplying the first traffic value corresponding to the previous time by a second weight to obtain a second data; and

adding the first data and the second data together to obtain the estimated traffic value at the current time.

7. The traffic pattern determination method of any one of claims 1 to 6, wherein the traffic pattern set comprises a ratio insurance scheduling pattern and a rate insurance scheduling pattern, and determining the preset traffic values corresponding to the respective traffic patterns comprised in the traffic pattern set comprises:

determining a total first traffic value corresponding to the current time, and determining a product of a preset ratio and the total first traffic value as a preset traffic value in the ratio insurance scheduling pattern; and

determining a preset rate traffic as the preset traffic value in the rate insurance scheduling pattern.

8. The traffic pattern determination method of any one of claims 1 to 6, wherein determining a target traffic pattern corresponding to the current time from the traffic pattern set, according to the estimated traffic value and the preset traffic values corresponding to the respective traffic patterns comprised in the traffic pattern set comprises:

determining the target traffic pattern corresponding to the current time from the traffic pattern set, according to a ratio of the estimated traffic value and the preset traffic values corresponding to the respective traffic patterns comprised in the traffic pattern set.

9. The traffic pattern determination method of claim 8, wherein determining the target traffic pattern corresponding to the current time from the traffic pattern set, according to a ratio of the estimated traffic value and the preset traffic values corresponding to the respective traffic patterns comprised in the traffic pattern set comprises:

in a case where the estimated traffic value is greater than the preset traffic values corresponding to the respective traffic patterns comprised in the traffic pattern set, determining a traffic pattern corresponding to a largest preset traffic value among the preset traffic values corresponding to the respective traffic patterns, as the target traffic pattern corresponding to the

current time;

in a case where the estimated traffic value is less than the preset traffic values corresponding to the respective traffic patterns comprised in the traffic pattern set, determining a traffic pattern corresponding to a smallest preset traffic value among the preset traffic values corresponding to the respective traffic patterns, as the target traffic pattern corresponding to the current time; and

in a case where the estimated traffic value is not greater than the preset traffic values corresponding to all the traffic patterns comprised in the traffic pattern set, or in a case where the estimated traffic value is not less than the preset traffic values corresponding to all the traffic patterns comprised in the traffic pattern set, determining a traffic pattern corresponding to a preset traffic value greater than the estimated traffic value among the preset traffic values corresponding to the respective traffic patterns, as the target traffic pattern corresponding to the current time.

10. An electronic device, comprising a memory and a processor; wherein

the memory is configured to store a computer program; and

the processor is configured to execute the computer program and to implement the traffic pattern determination method of any one of claims 1 to 9 when executing the computer program.

11. A computer-readable storage medium, wherein the computer-readable storage medium stores a computer program, and when the computer program is executed by a processor, the processor is caused to implement the traffic pattern determination method of any one of claims 1 to 9.