

SEWAGE TREATMENT DEVICE AND METHOD WITH ON-LINE MONITORING FUNCTION

Technical Field

The present invention relates to the technical field of sewage treatment, and particularly relates to a sewage treatment device and method with on-line monitoring function.

Background

Water is the source of life, but the pollution of urban water resources is becoming more and more serious. The pollution problem of rivers and lakes has been further highlighted while industrialization is vigorously developed, in which the discharge of harmful substances in urban sewage poses a particularly significant threat to rivers and natural environment. The prevention and control of urban sewage is urgent, and as one of the main means of water resource management and water environment pollution control, sewage monitoring is playing an irreplaceable role. The traditional sewage monitoring relies on manual sampling, which has high working strength, complicated process, poor timeliness and long sewage quality monitoring period, resulting in high monitoring cost. In recent years, with the maturity and development of wireless communication and network technologies, the sewage monitoring system based on the wireless sensor network has become one of the research hotspots in this field.

The data collected by the wireless sensors can be analyzed according to the fuzzy theory to generate a fuzzy semantic set about description of sewage, and since feature description often requires multiple fuzzy semantic sets, each of which corresponds to different fuzzy rules, and the increase of fuzzy semantic sets will not only increase the computational complexity, but also increase the competition among fuzzy models and reduce the performance of the algorithm. On the other hand, since the wireless sensors have service failure, the data collected by some wireless sensors may have huge deviation or the data acquired by some wireless sensors is abnormal, such data easily causes the failure of the sewage monitoring terminal to identify the meaning thereof, and failure to delete such abnormal data will easily lead to the transmission of abnormal information, which directly results in excessive energy consumption and affects the network lifetime.

Summary

The present invention overcomes the defects of the prior art, and provides a sewage treatment device and method with on-line monitoring function.

To achieve the above purpose, the present invention adopts the following technical solution:

The first aspect of the present invention provides a sewage treatment device with on-line monitoring function, comprising:

A plurality of wireless sensors, wherein the wireless sensors are used for collecting a preset type of data information of sewage and transmitting the preset type of data information to a remote monitoring terminal through the wireless transmission technology;

A data analysis module, wherein the data analysis module is used for converting the preset type of data information to acquire the parsed data information and processing the parsed data information to eliminate the parsed redundant data;

A sewage monitoring module, wherein the sewage monitoring module is used for monitoring the data of sewage, the wireless sensors are arranged in the sewage monitoring module, and the sewage monitoring module performs dynamic monitoring according to the internal sewage operation;

The sewage monitoring module comprises a treatment tank and an adjustment module, the bottom of the treatment tank is provided with an aerator pipe, the aerator pipe is used for supplying oxygen, and the sewage monitoring module performs dynamic control through the adjustment module according to the working condition of the aerator pipe.

Further, in a preferred embodiment of the present invention, the operation of converting the preset type of data information to acquire the parsed data information specifically comprises:

Acquiring the relevant feature information of sewage through big data, and describing the feature information according to the fuzzy theory to generate a fuzzy semantic set;

Constructing a corresponding membership function according to the fuzzy semantic set, constructing a semantic rule base, and inputting the membership function into the semantic rule base;

Inputting the preset type of data into the semantic rule base to acquire the membership function of the current preset type of data, and generating parsed data information according to the membership function of the current preset type of data.

Further, in a preferred embodiment of the present invention, the operation of processing the parsed data information also comprises the following steps:

Calculating the correlation information entropy of the fuzzy semantic set through the correlation information entropy metrics to obtain the correlation information entropy, and judging whether the correlation information entropy is the preset correlation information entropy;

If the correlation information entropy is the preset correlation information entropy, performing sequential search on the current fuzzy semantic set by the feature ordering CMFS algorithm to select one piece of feature information from the fuzzy semantic set;

Performing extended ordering on the fuzzy semantic set based on the feature information to obtain an extended set, and acquiring redundant information in the fuzzy semantic set according to the extended set;

Readjusting the fuzzy semantic set according to the redundant information to generate a final fuzzy semantic set.

Further, in a preferred embodiment of the present invention, after the parsed data information is processed, the operation specifically comprises the following steps:

Acquiring feature data information according to the parsed data information, and judging whether the feature data information has data information of exceptions;

If the feature data information has data information of exceptions, acquiring the monitoring node where the data information of exceptions exists, and acquiring the operating wireless sensors in the monitoring node according to the monitoring node;

Acquiring feature data information corresponding to the operating wireless sensors in the monitoring node, and counting the frequency of the corresponding feature data information;

Acquiring the data information with the maximum frequency as the final parsed data information, replacing the data information of exceptions with the final parsed data information to generate replaced data information, and outputting the replaced data information.

Further, in a preferred embodiment of the present invention, the operation of judging whether the feature data information has data information of exceptions specifically comprises the following steps:

Constructing an exception identification model based on a neural network, dividing the pre-trained feature data information into a test set and a training set, inputting the training set into the exception identification model for training, and adjusting the parameters of the exception identification model;

When the parameters of the exception identification model meet the requirements of the preset parameters, using the test set to test the exception identification model, and if the test result of the exception identification model meets the preset conditions, obtaining the trained exception identification model;

Inputting the feature data information into the exception identification model to obtain an identification result, and judging whether the identification result is greater than the preset identification result;

If the identification result is greater than the preset identification result, outputting the feature data information as the data information of exceptions.

Further, in a preferred embodiment of the present invention, the adjustment module comprises a supporting top plate, the lower surface of the supporting top plate is provided with a plurality of telescopic rods which are sheathed with a plurality of springs, the other end of each telescopic rod is connected with a flexible push plate, the flexible push plate is provided with a screw rod, the other end of the screw rod is provided with a fan, the fan is arranged in the supporting top plate, and the supporting top plate is arranged in the treatment tank.

Further, in a preferred embodiment of the present invention, the treatment tank is provided with a water inlet pipe and a water outlet pipe, the aerator pipe is arranged at the bottom of the treatment tank and connected with an oxygen supply pump, a plurality of oxygen concentration sensors are arranged in the treatment tank, the oxygen concentration sensors are used for acquiring the oxygen concentration in the treatment tank, and when the oxygen concentration is lower than the preset oxygen concentration, the operation of the oxygen supply pump is controlled by the remote monitoring terminal.

The third aspect of the present invention provides a treatment method for a sewage treatment device with on-line monitoring function, comprising the following steps:

Converting the preset type of data information to acquire the parsed data information and processing the parsed data information to eliminate the parsed redundant data;

Acquiring the relevant feature information of sewage through big data, and describing the feature information according to the fuzzy theory to generate a fuzzy semantic set;

Constructing a corresponding membership function according to the fuzzy semantic set, constructing a semantic rule base, and inputting the membership function into the semantic rule base;

Acquiring the preset type of data through the wireless sensors, inputting the preset type of data into the semantic rule base to acquire the membership function of the current preset type of data, and generating parsed data information according to the membership function of the current preset type of data.

In the present embodiment, the operation of processing the parsed data information also comprises the following steps:

Calculating the correlation information entropy of the fuzzy semantic set through the correlation information entropy metrics to obtain the correlation information entropy, and judging whether the correlation information entropy is the preset correlation information entropy;

If the correlation information entropy is the preset correlation information entropy, performing sequential search on the current fuzzy semantic set by the feature ordering CMFS algorithm to select one piece of feature information from the fuzzy semantic set;

Performing extended ordering on the fuzzy semantic set based on the feature information to obtain an extended set, and acquiring redundant information in the fuzzy semantic set according to the extended set;

Readjusting the fuzzy semantic set according to the redundant information to generate a final fuzzy semantic set.

In the present embodiment, after the parsed data information is processed, the operation specifically comprises the following steps:

Acquiring feature data information according to the parsed data information, and judging whether the feature data information has data information of exceptions;

If the feature data information has data information of exceptions, acquiring the monitoring node where the data information of exceptions exists, and acquiring the operating wireless sensors in the monitoring node according to the monitoring node;

Acquiring feature data information corresponding to the operating wireless sensors in the monitoring node, and counting the frequency of the corresponding feature data information;

Acquiring the data information with the maximum frequency as the final parsed data information, replacing the data information of exceptions with the final parsed data information to generate replaced data information, and outputting the replaced data information.

The present invention solves the defects in the background, and has the following beneficial effects:

The present invention converts the data acquired by the wireless sensors according to the fuzzy theory, further judges the combination effect between features by using the correlation information entropy metrics, proposes to use the feature ordering CMFS algorithm to reduce the redundant information between the features, and realizes the adaptive activation and termination of the multi-feature fuzzy semantic set, so as to perform sequential search on the fuzzy semantic set for the overlapping information by the feature ordering CMFS algorithm to acquire redundant information in the fuzzy semantic set. The method can effectively eliminate redundant information, further improve the data processing capability of the remote monitoring terminal, effectively increase the processing efficiency of the remote monitoring terminal on the data acquired by the wireless sensors, and effectively enhance the operational robustness of the sewage remote monitoring terminal. On the other hand, when the data acquired by the sewage remote monitoring terminal has exceptions such as data errors and missing data, the method can effectively eliminate the data of exceptions, so as to improve the intelligence of the sewage remote monitoring terminal in data processing, and thus enhance the operational robustness of the remote monitoring terminal.

Description of Drawings

To more clearly describe the technical solutions in the embodiments of the present invention or in the prior art, the drawings required to be used in the description of the embodiments or the prior art will be simply presented below. Obviously, the drawings in the following description are merely some embodiments

of the present invention, and for those ordinary skilled in the art, drawings of other embodiments can also be obtained according to the drawings without contributing creative labor.

Fig. 1 is a structural schematic diagram of a sewage treatment device with on-line monitoring function.

Fig. 2 is a flow chart of one treatment method for a sewage treatment device with on-line monitoring function;

Fig. 3 is a flow chart of another treatment method for a sewage treatment device with on-line monitoring function;

Fig. 4 is a structural schematic diagram of a sewage monitoring module.

Detailed Description

To understand above purposes, features and advantages of the present invention more clearly, the present invention is further detailed below in combination with drawings and specific embodiments. It should be explained that if there is no conflict, embodiments in the present application and the features in the embodiments can be mutually combined.

Many details are elaborated in the following description for convenience of understanding the present invention. However, the present invention can also be implemented in other modes different from those described herein. Therefore, the protection scope of the present invention is not limited by specific embodiments disclosed below.

As shown in Fig. 1, the first aspect of the present invention provides a sewage treatment device with on-line monitoring function, comprising:

A plurality of wireless sensors, wherein the wireless sensors are used for collecting a preset type of data information of sewage and transmitting the preset type of data information to a remote monitoring terminal through the wireless transmission technology;

A data analysis module 1, wherein the data analysis module is used for converting the preset type of data information to acquire the parsed data information and processing the parsed data information to eliminate the parsed redundant data;

A sewage monitoring module 2, wherein the sewage monitoring module is used for monitoring the data of sewage, the wireless sensors are arranged in the sewage monitoring module, and the sewage monitoring module performs dynamic monitoring according to the internal sewage operation;

The sewage monitoring module 2 comprises a treatment tank 201 and an adjustment module 202, the bottom of the treatment tank 201 is provided with an aerator pipe 203, the aerator pipe 203 is used for supplying oxygen, and the sewage monitoring module 2 performs dynamic control through the adjustment module 202 according to the working condition of the aerator pipe 203.

It should be noted that the present invention converts the data acquired by the wireless sensors according to the fuzzy theory, further judges the combination effect between features by using the correlation information entropy metrics, proposes to use the feature ordering CMFS algorithm to reduce the redundant information between the features, and realizes the adaptive activation and termination of the multi-feature fuzzy semantic set, so as to perform sequential search on the fuzzy semantic set for the overlapping information by the feature ordering CMFS algorithm to acquire redundant information in the fuzzy semantic set. The method can effectively eliminate redundant information, further improve the data processing capability of the remote monitoring terminal, effectively increase the processing efficiency of the remote monitoring terminal on the data acquired by the wireless sensors, and effectively enhance the operational robustness of the sewage remote monitoring terminal. On the other hand, when the data acquired by the sewage remote monitoring terminal has exceptions such as data errors and missing data, the method can effectively eliminate the data of exceptions, so as to improve the intelligence of the sewage remote monitoring terminal in data processing, and thus enhance the operational robustness of the remote monitoring terminal.

In order to further enhance the operational robustness of the remote monitoring terminal, further, in a preferred embodiment of the present invention, the operation of converting the preset type of data information to acquire the parsed data information specifically comprises:

Acquiring the relevant feature information of sewage through big data, and describing the feature information according to the fuzzy theory to generate a fuzzy semantic set;

Constructing a corresponding membership function according to the fuzzy semantic set, constructing a semantic rule base, and inputting the membership function into the semantic rule base;

Inputting the preset type of data into the semantic rule base to acquire the membership function of the current preset type of data, and generating parsed data information according to the membership function of the current preset type of data.

It should be noted that the feature data acquired by the wireless sensors can be described according to the fuzzy theory, for example, heavy metal with mercury content greater than 0.05 mg/L will be labeled as having heavy metal pollution, which can be set according to the integrated wastewater discharge standard, wherein the fuzzy semantics can be, for example, the membership function of mercury, where the membership function of mercury can contain a fuzzy semantic set of low-level mercury heavy metal pollution and a fuzzy semantic set of medium-level mercury heavy metal pollution, each membership function can correspond to one or more fuzzy semantic sets so that the preset type of data can be parsed according to the fuzzy theory.

In order to further enhance the operational robustness of the remote monitoring terminal, further, in a preferred embodiment of the present invention, the operation of processing the parsed data information also comprises the following steps:

Calculating the correlation information entropy of the fuzzy semantic set through the correlation information entropy metrics to obtain the correlation information entropy, and judging whether the correlation information entropy is the preset correlation information entropy;

If the correlation information entropy is the preset correlation information entropy, performing sequential search on the current fuzzy semantic set by the feature ordering CMFS algorithm to select one piece of feature information from the fuzzy semantic set;

Performing extended ordering on the fuzzy semantic set based on the feature information to obtain an extended set, and acquiring redundant information in the fuzzy semantic set according to the extended set;

Readjusting the fuzzy semantic set according to the redundant information to generate a final fuzzy semantic set.

It should be noted that since feature description often requires multiple fuzzy semantic sets, each of which corresponds to different fuzzy rules, and the increase of fuzzy semantic sets will not only increase the computational complexity, but also increase the competition among fuzzy models and reduce the performance of the algorithm. The redundant information between features is reduced by the method

using the feature ordering CMFS algorithm to realize the adaptive activation and termination of the multi-feature fuzzy semantic set. When the correlation information entropy is equal to 1 or 0, the fuzzy semantic set has overlapping information (i.e., semantic redundancy), sequential search is performed on the fuzzy semantic set for the overlapping information by the feature ordering CMFS algorithm to acquire redundant information in the fuzzy semantic set. The method can effectively eliminate redundant information in the fuzzy semantic set, improve the data processing capability of the remote monitoring terminal, effectively increase the processing efficiency of the remote monitoring terminal on the data acquired by the wireless sensors, and effectively enhance the operational robustness of the sewage remote monitoring terminal.

In order to further enhance the operational robustness of the remote monitoring terminal, further, in a preferred embodiment of the present invention, after the parsed data information is processed, the operation specifically comprises the following steps:

Acquiring feature data information according to the parsed data information, and judging whether the feature data information has data information of exceptions;

If the feature data information has data information of exceptions, acquiring the monitoring node where the data information of exceptions exists, and acquiring the operating wireless sensors in the monitoring node according to the monitoring node;

Acquiring feature data information corresponding to the operating wireless sensors in the monitoring node, and counting the frequency of the corresponding feature data information;

Acquiring the data information with the maximum frequency as the final parsed data information, replacing the data information of exceptions with the final parsed data information to generate replaced data information, and outputting the replaced data information.

It should be noted that since the wireless sensors have service failure, the data collected by some wireless sensors may have huge deviation or the data acquired by some wireless sensors is abnormal, such as missing of data collected by the wireless sensors, which can be manifested as intermittent feature data collected by the remote monitoring terminal, and since a plurality of wireless sensors are generally arranged in the actual monitoring node, the method can effectively eliminate the abnormal data, so as to improve the intelligence of the sewage remote monitoring terminal in data

processing, and thus enhance the operational robustness of the remote monitoring terminal.

In order to further enhance the operational robustness of the remote monitoring terminal, further, in a preferred embodiment of the present invention, the operation of judging whether the feature data information has data information of exceptions specifically comprises the following steps:

Constructing an exception identification model based on a neural network, dividing the pre-trained feature data information into a test set and a training set, inputting the training set into the exception identification model for training, and adjusting the parameters of the exception identification model;

When the parameters of the exception identification model meet the requirements of the preset parameters, using the test set to test the exception identification model, and if the test result of the exception identification model meets the preset conditions, obtaining the trained exception identification model;

Inputting the feature data information into the exception identification model to obtain an identification result, and judging whether the identification result is greater than the preset identification result;

If the identification result is greater than the preset identification result, outputting the feature data information as the data information of exceptions.

It should be noted that the data of exceptions can be trained through the present embodiment, and when the identification result is greater than the preset identification result, the remote monitoring terminal can identify the data of exceptions.

As shown in Fig. 4, in order to further improve the stability in use of the device, further, in a preferred embodiment of the present invention, the adjustment module 202 comprises a supporting top plate 201, the lower surface of the supporting top plate 201 is provided with a plurality of telescopic rods 202 which are sheathed with a plurality of springs 203, the other end of each telescopic rod 202 is connected with a flexible push plate 204, the flexible push plate 204 is provided with a screw rod 205, the other end of the screw rod 205 is provided with a fan 206, the fan 206 is arranged in the supporting top plate 201, and the supporting top plate 201 is arranged in the treatment tank 201.

Further, in a preferred embodiment of the present invention, the treatment tank 201 is provided with a water inlet pipe 207 and a water outlet pipe 208, the aerator pipe 203 is arranged at the bottom of the treatment tank 201 and connected with an

oxygen supply pump 204, a plurality of oxygen concentration sensors are arranged in the treatment tank 201, the oxygen concentration sensors are used for acquiring the oxygen concentration in the treatment tank 201, and when the oxygen concentration is lower than the preset oxygen concentration, the operation of the oxygen supply pump 204 is controlled by the remote monitoring terminal.

It should be noted that in the present embodiment, the present embodiment is suitable for aerobic treatment of sewage, and because aerobic bacteria can decompose organic matters in sewage, when the oxygen concentration sensors detect that the concentration of dissolved oxygen in the treatment tank 201 is lower than the preset oxygen concentration, more oxygen can be dissolved in sewage within a preset time by introducing a certain amount of oxygen within the preset time, so as to provide such oxygen concentration for aerobic bacteria, then improve the decomposition rate of organic matters in sewage by aerobic bacteria, and increase the sewage purification efficiency. During the operation of the aerator pipe 203, when the air or oxygen emitted by the aerator pipe 203 acts on sewage, the sewage will erupt, which is not conducive to the operation stability of the device and the data collection stability of the wireless sensors; and in the case of eruption, the erupting sewage will produce some potential energy and act on the flexible push plate 2024 so that the flexible push plate 2024 can drive the screw rod 2025 to rotate to a certain degree, so as to make the fan 2026 rotate, so that part of the potential energy of the erupting sewage is converted to the kinetic energy of the fan, so as to alleviate the phenomenon of sewage eruption and maintain the stability in use of the device. When the flexible push plate 2024 is moved for a certain distance, part of the potential energy can also be converted to the elastic potential energy of the spring 2023, which can keep the surging sewage in the preset range. When the potential energy of the surging sewage is lower than the elastic potential energy of the spring 2023, the spring 2023 returns to normal. Through the control, when the sewage injects oxygen into the aerator pipe 203, the kinetic energy of the surging sewage can be converted to the elastic potential energy of the spring 2023 and the kinetic energy of the fan, so as to weaken the potential energy of the surging sewage, so that the device can maintain certain operating stability while ensuring a certain amount of dissolved oxygen to keep the surging sewage in the preset range.

The third aspect of the present invention provides a treatment method for a sewage treatment device with on-line monitoring function, comprising the following steps:

Converting the preset type of data information to acquire the parsed data information and processing the parsed data information to eliminate the parsed redundant data;

Acquiring the relevant feature information of sewage through big data, and describing the feature information according to the fuzzy theory to generate a fuzzy semantic set;

Constructing a corresponding membership function according to the fuzzy semantic set, constructing a semantic rule base, and inputting the membership function into the semantic rule base;

Acquiring the preset type of data through the wireless sensors, inputting the preset type of data into the semantic rule base to acquire the membership function of the current preset type of data, and generating parsed data information according to the membership function of the current preset type of data.

As shown in Fig. 2, in the present embodiment, the operation of processing the parsed data information also comprises the following steps:

S202: calculating the correlation information entropy of the fuzzy semantic set through the correlation information entropy metrics to obtain the correlation information entropy, and judging whether the correlation information entropy is the preset correlation information entropy;

S204: if the correlation information entropy is the preset correlation information entropy, performing sequential search on the current fuzzy semantic set by the feature ordering CMFS algorithm to select one piece of feature information from the fuzzy semantic set;

S206: performing extended ordering on the fuzzy semantic set based on the feature information to obtain an extended set, and acquiring redundant information in the fuzzy semantic set according to the extended set;

S208: readjusting the fuzzy semantic set according to the redundant information to generate a final fuzzy semantic set.

It should be noted that since feature description often requires multiple fuzzy semantic sets, each of which corresponds to different fuzzy rules, and the increase of fuzzy semantic sets will not only increase the computational complexity, but also

increase the competition among fuzzy models and reduce the performance of the algorithm. The redundant information between features is reduced by the method using the feature ordering CMFS algorithm to realize the adaptive activation and termination of the multi-feature fuzzy semantic set. When the correlation information entropy is equal to 1 or 0, the fuzzy semantic set has overlapping information (i.e., semantic redundancy), sequential search is performed on the fuzzy semantic set for the overlapping information by the feature ordering CMFS algorithm to acquire redundant information in the fuzzy semantic set. The method can effectively eliminate redundant information in the fuzzy semantic set, improve the data processing capability of the remote monitoring terminal, effectively increase the processing efficiency of the remote monitoring terminal on the data acquired by the wireless sensors, and effectively enhance the operational robustness of the sewage remote monitoring terminal.

As shown in Fig. 3, in the present embodiment, after the parsed data information is processed, the operation specifically comprises the following steps:

S302: acquiring feature data information according to the parsed data information, and judging whether the feature data information has data information of exceptions;

S304: if the feature data information has data information of exceptions, acquiring the monitoring node where the data information of exceptions exists, and acquiring the operating wireless sensors in the monitoring node according to the monitoring node;

S306: acquiring feature data information corresponding to the operating wireless sensors in the monitoring node, and counting the frequency of the corresponding feature data information;

S308: acquiring the data information with the maximum frequency as the final parsed data information, replacing the data information of exceptions with the final parsed data information to generate replaced data information, and outputting the replaced data information.

It should be noted that since the wireless sensors have service failure, the data collected by some wireless sensors may have huge deviation or the data acquired by some wireless sensors is abnormal, such as missing of data collected by the wireless sensors, which can be manifested as intermittent feature data collected by the remote monitoring terminal, and since a plurality of wireless sensors are generally arranged

in the actual monitoring node, the abnormal data and redundant information can be effectively eliminated by the method by acquiring the data from the wireless sensors in the same monitoring node, avoiding the phenomenon of excessive energy consumption directly caused by transmission of redundant information, so as to improve the intelligence of the sewage remote monitoring terminal in data processing, and thus improve the accuracy of data and enhance the operational robustness of the remote monitoring terminal.

In addition, for identification of abnormal data, the method also can comprise the following steps:

Acquiring data information collected by wireless sensors, and extracting features of the data information to acquire situation data information corresponding to the data information;

Acquiring the historical data information of the wireless sensors under various abnormal data conditions through big data network, and constructing a historical information database according to the historical data information;

Inputting the situation data information corresponding to the data information into the historical information database to obtain the exception similarity, and judging whether the exception similarity is greater than the preset exception similarity;

If the exception similarity is greater than the preset exception similarity, marking the data information collected by the wireless sensors as abnormal data information, and using the abnormal data information as a training set and a test set.

It should be noted that the method can identify and extract features of the abnormal data information, and when the wireless sensors collect a lot of redundant information during operation, such data is used as training data in the historical information database, which further expands the training sample set in the historical database. The method can filter redundant data, improve the accuracy of the data, and further improve the accuracy of identifying the data of exceptions.

In addition, the method also can comprise the following steps:

Acquiring the data information collected by the current wireless sensor, and judging whether the data information collected by the current wireless sensor has a preset abnormal phenomenon, wherein the abnormal phenomenon is abnormal information that the wireless sensor wrongly sends data;

If the abnormal data information collected by the current wireless sensor has a preset abnormal phenomenon, acquiring the data information acquired by the current wireless sensor within the preset time to generate multiple pieces of data information;

Acquiring the data with the highest frequency collected by the wireless sensors in the current monitoring node, calculating the threshold of deviation between the multiple pieces of data information and the data with the highest frequency collected by the wireless sensors in the current monitoring node, and judging whether the threshold of deviation is greater than the preset threshold of deviation;

If the threshold of deviation is greater than the preset threshold of deviation, using the data information with the threshold of deviation greater than the preset threshold of deviation as redundant data, and eliminating the redundant data.

It should be noted that the method can further filter the redundant data to improve the accuracy of the data, so as to avoid excessive energy consumption directly caused by transmission of the redundant information, which may affect the network lifetime.

In the embodiments provided in the present application, it should be understood that the disclosed equipment and method can be realized in other modes. The equipment embodiment described above is only illustrative; for example, division of the units is only logical function division, and an additional division mode may exist during actual implementation; for example, a plurality of units or assemblies can be combined or can be integrated in another system, or some features can be neglected or cannot be executed. In addition, coupling or direct coupling or communication connection between displayed or discussed components may be indirect coupling or communication connection through a plurality of interfaces, equipment or units, and may be in a form of electrical connection, mechanical connection or other connections.

The units described as separated components may be or may not be separated physically, and components displayed as units may be or may not be physical units, that is, the components can be located at one place or can be distributed on a plurality of network units. The purpose of the solution of the present embodiment can be achieved by selecting some or all units according to actual needs.

In addition, each functional unit in various embodiments of the present invention can be integrated in a processing unit, and each unit can be used as one unit individually, or two or more than two units can be integrated in one unit. The above

integrated unit can be realized in a form of hardware or can be realized in a form of a hardware and software function unit.

Those skilled in the art can understand that all or some steps of the above method embodiment can be implemented through hardware instructed by a program. The foregoing program can be stored in a computer readable storage medium. When the program is executed, the steps including the above method embodiment are executed. The foregoing storage medium includes various media, such as a portable storage device, a read-only memory (ROM), a random access memory (RAM), a magnetic disc or a compact disc, which can store program codes.

Alternatively, if implemented in the form of a software function module and sold or used as an independent product, the integrated unit of the present invention can also be stored in a computer readable storage medium. Based on such understanding, the technical solutions of embodiments of the present invention can be reflected in a form of a software product in essence or in a part of making a contribution to the prior art. The computer software product is stored in a storage medium, including several instructions to enable one computer device (which may be a personal computer, a server or a network device) to execute all or some of the methods of various embodiments of the present invention. However, the foregoing storage medium includes various mediums, such as a mobile storage device, an ROM, an RAM, a magnetic disc or a compact disc, which can store program codes.

The above only describes specific embodiments of the present invention, but the protection scope of the present invention is not limited thereto. Any change or replacement contemplated easily by those skilled in the art familiar with the technical field within the technical scope disclosed by the present invention shall be covered within the protection scope of the present invention. Therefore, the protection scope of the present invention should be determined by the protection scope of the claims.

Claims

1. A treatment method for a sewage treatment device with on-line monitoring function, wherein the sewage treatment device comprises:

a plurality of wireless sensors, wherein the wireless sensors are used for collecting a preset type of data information of sewage and transmitting the preset type of data information to a remote monitoring terminal through the wireless transmission technology;

a data analysis module, wherein the data analysis module is used for converting the preset type of data information to acquire the parsed data information and processing the parsed data information to eliminate the parsed redundant data;

a sewage monitoring module, wherein the sewage monitoring module is used for monitoring the data of sewage, and the wireless sensors are arranged in the sewage monitoring module;

the sewage monitoring module comprises a treatment tank and an adjustment module, the bottom of the treatment tank is provided with an aerator pipe, and the aerator pipe is used for supplying oxygen;

the operation of converting the preset type of data information to acquire the parsed data information specifically comprises:

acquiring the relevant feature information of sewage through big data, and describing the feature information according to the fuzzy theory to generate a fuzzy semantic set;

constructing a corresponding membership function according to the fuzzy semantic set, constructing a semantic rule base, and inputting the membership function into the semantic rule base;

inputting the preset type of data into the semantic rule base to acquire the membership function of the current preset type of data, and generating parsed data information according to the membership function of the current preset type of data;

the operation of processing the parsed data information also comprises the following steps:

calculating the correlation information entropy of the fuzzy semantic set through the correlation information entropy metrics to obtain the correlation information entropy, and judging whether the correlation information entropy is the preset correlation information entropy;

if the correlation information entropy is the preset correlation information entropy, performing sequential search on the current fuzzy semantic set by the feature ordering CMFS algorithm to select one piece of feature information from the fuzzy semantic set;

performing extended ordering on the fuzzy semantic set based on the feature information to obtain an extended set, and acquiring redundant information in the fuzzy semantic set according to the extended set;

readjusting the fuzzy semantic set according to the redundant information to generate a final fuzzy semantic set;

after the parsed data information is processed, the operation specifically comprises the following steps:

acquiring feature data information according to the parsed data information, and judging whether the feature data information has data information of exceptions;

if the feature data information has data information of exceptions, acquiring the monitoring node where the data information of exceptions exists, and acquiring the operating wireless sensors in the monitoring node according to the monitoring node;

acquiring feature data information corresponding to the operating wireless sensors in the monitoring node, and counting the frequency of the corresponding feature data information;

acquiring the data information with the maximum frequency as the final parsed data information, replacing the data information of exceptions with the final parsed data information to generate replaced data information, and outputting the replaced data information;

the operation of judging whether the feature data information has data information of exceptions specifically comprises the following steps:

constructing an exception identification model based on a neural network, dividing the pre-trained feature data information into a test set and a training set, inputting the training set into the exception identification model for training, and adjusting the parameters of the exception identification model;

when the parameters of the exception identification model meet the requirements of the preset parameters, using the test set to test the exception identification model, and if the test result of the exception identification model meets the preset conditions, obtaining the trained exception identification model;

inputting the feature data information into the exception identification model to obtain an identification result, and judging whether the identification result is greater than the preset identification result;

if the identification result is greater than the preset identification result, outputting the feature data information as the data information of exceptions;

also comprising the following steps:

acquiring the data information collected by the current wireless sensor, and judging whether the data information collected by the current wireless sensor has a preset abnormal phenomenon, wherein the abnormal phenomenon is abnormal information that the wireless sensor wrongly sends data;

if the abnormal data information collected by the current wireless sensor has a preset abnormal phenomenon, acquiring the data information acquired by the current wireless sensor within the preset time to generate multiple pieces of data information;

acquiring the data with the highest frequency collected by the wireless sensors in the current monitoring node, calculating the threshold of deviation between the multiple pieces of data information and the data with the highest frequency collected by the wireless sensors in the current monitoring node, and judging whether the threshold of deviation is greater than the preset threshold of deviation;

if the threshold of deviation is greater than the preset threshold of deviation, using the data information with the threshold of deviation greater than the preset threshold of deviation as redundant data, and eliminating the redundant data.

2. The treatment method for a sewage treatment device with on-line monitoring function according to claim 1, wherein the adjustment module comprises a supporting top plate, the lower surface of the supporting top plate is provided with a plurality of telescopic rods which are sheathed with a plurality of springs, the other end of each telescopic rod is connected with a flexible push plate, the flexible push plate is provided with a screw rod, the other end of the screw rod is provided with a fan, the fan is arranged in the supporting top plate, and the supporting top plate is arranged in the treatment tank.

3. The treatment method for a sewage treatment device with on-line monitoring function according to claim 1, wherein the treatment tank is provided with a water inlet pipe and a water outlet pipe, the aerator pipe is arranged at the bottom of the treatment tank and connected with an oxygen supply pump, a plurality of oxygen concentration sensors are arranged in the treatment tank, the oxygen concentration

sensors are used for acquiring the oxygen concentration in the treatment tank, and when the oxygen concentration is lower than the preset oxygen concentration, the operation of the oxygen supply pump is controlled by the remote monitoring terminal.