The Dynamic Detection of Water Quality Monitoring and Pollution Prevention and Control

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Abstract. With the development of society, the material living standard of our people has been significantly improved, but we sacrificed the environment in the course of development, which led to the current number of environmental problems in our country is particularly large, so that now we need to pick up the tone of protecting the environment, so now the overall tone of the country is to protect the environment, adhere to the green water green mountain is the basic strategy of Jinshan Yinshan, play a good pollution prevention and control of the three major battles, care for the environment, protect the environment. And in the environment water is the most important, it carries everything, the purpose of this paper is to study based on water quality monitoring and pollution prevention and control of dynamic detection technology. In order to conduct the experiment better, after consulting the literature on water quality monitoring and pollution prevention and control, and dynamic detection technology, we used a variety of algorithms to construct a corresponding dynamic detection technology system to monitor water quality and conduct real-time surveys of pollutants, and obtain relevant experimental data to complete the experiment. The experimental results show that the improved adaptive parameter DBSCAN clustering algorithm is better than the AdaBoost algorithm and the genetic algorithm, so we finally choose to build a dynamic detection technology system using the improved adaptive parameter DBSCAN clustering algorithm.

Keywords: Water Quality Monitoring, Pollution Prevention and Control, Dynamic Monitoring Technology, Environmental Protection.

1. Introduction
At present, more and more attention has been paid to environmental monitoring in China. In this regard, the state has specially set up a central environmental protection supervision group to supervise and rectify the environmental problems existing in various places [1]. Moreover, more and more attention has been paid to the environmental monitoring of enterprises. All enterprises that cause serious pollution to the environment are ordered to shut down for rectification. Only those enterprises that meet the national emission standards are allowed to continue to operate. For areas with serious environmental damage, the state will conduct special supervision, order all enterprises to withdraw from the area and close the area, to ensure the health of the environment and ecology [2-3]. Therefore, in recent years, the news of closing lakes and mountains is often heard in local news, which is the consequence of too serious environmental damage [4].

However, the phenomenon of environmental damage still exists today [5]. This is because the cost of environmental protection is too high, a series of environmental treatment facilities and a large
number of experimental reagents need a lot of money to purchase and replace. Therefore, at present, only the large and medium-sized enterprises in China have enough money to carry out reasonable environmental prevention and control, while the general small and medium-sized enterprises cannot support, either go bankrupt and merge, or they will be driven by the interests of the disorderly disposal, resulting in environmental pollution [6]. Therefore, the state now designs relevant laws and regulations for the environment, sets up corresponding industry rules for various industries, and severely punishes enterprises that violate regulations, so as to ensure the health of the environment and ecology [7].

Among all kinds of pollution, water pollution and gas pollution are the most serious for human beings [8]. Because water and gas can be converted to each other, and can also penetrate into soil and modern industrial products, causing sustained damage to human beings. For example, in the Chernobyl nuclear power plant incident in the Soviet Union, the Soviet Union spent hundreds of thousands of people to prevent its harm, but the nuclear cloud formed by the nuclear dust still floated to Western Europe 2000 kilometers away [9-10]. Therefore, the current Fukushima nuclear waste water incident in Japan has the same hazard level as the Chernobyl incident in the Soviet Union. Therefore, the nuclear waste water has posed a huge threat to human life and health. Once the nuclear waste water is discharged into the sea, under the effect of water cycle, it will do great harm to all human beings and the global ecology, that's why people all over the world denounce Japan for trying to pour nuclear waste water into the sea [11]. Therefore, we need to strictly monitor the water to prevent similar pollution incidents. Therefore, we need to study the dynamic detection technology of water quality monitoring and pollution prevention to protect the environment [12].

2. Improved Adaptive Parameter DBSCAN Clustering Algorithm

Typically, in clustering, the mean square integration error function (MISE) is generally selected to optimize bandwidth. The definition is as follows:

\[
MISE(h) = E \int (\hat{f}(x) - f(x))^2 \, dx
\]

Under weak assumptions:

\[
MISE(h) = AMISE(h) + o\left(\frac{1}{nh^5} + h^4\right)
\]

\[
AMISE(h) = \frac{R(K)}{nh} + \frac{1}{4} m_2(K) h^4 R(f''')
\]

thereinto:

\[
R(K) = \int K(x)^2 dx
\]

\[
m_2(K) = \int x^2 K(x) dx
\]

Minimize MISE(h) is equivalent to minimizing, deflecting and making the derivative equal to 0: AMISE(h)

\[
\frac{d}{dh} AMISE(h) = \frac{R(K)}{nh^2} + m_2(K) h^3 R(f''') = 0
\]

\[
h_{AMISE} = \frac{R(K)}{m_2(K)^\frac{1}{2} f'''(\frac{1}{2})^\frac{1}{2} n^\frac{1}{2}}
\]

which \( m, R \) is determined by the nuclear function.
3. Experiments are Established

3.1 Experiment Selection Processing
In order to do the experiment better, we chose a once contaminated water source to do the experiment using the already set up hydrological monitoring station, and has been carrying out data collection, and the data in which the coupling calculation, modeling processing to get the data we need.

3.2 Implementation of the Experiment
For a better experiment, we borrowed some data from the monitoring station and then, by creating a simple system to deal with the monitoring, collected daily data for a step-by-step analysis, and finally came up with the results.

4. Evaluation Results

4.1 Water Quality Testing

| Table 1. On water quality monitoring |
|-------------------------------------|
| March 2020 Cadmium average content mg/L | Silver means content mg/L | Water quality rating |
| March 2020 0.08 | 0.36 | IV |
| April 2020 0.06 | 0.30 | III |
| May 2020 0.05 | 0.21 | III |
| June 2020 0.04 | 0.16 | II |

Based on the data results obtained in Table 1 and Figure 1, we found that: After four months of water quality monitoring and comparison, we found that the water quality has significantly improved, the water heavy metal content has been significantly reduced, and the water quality rating from the initial four to the last is also rated as a second level, indicating that after a certain degree of pollution prevention and control of water quality monitoring can be timely control of water quality, reduce water pollution.
4.2 Pollution Prevention and Treatment

Table 2. On the monitoring of cadmium in water

|                      | Cadmium content exceeds the standard number of days / days | Cadmium content Number of days / days to meet the standard | Maximum excess mg/L | Minimum emissions mg/L |
|----------------------|----------------------------------------------------------|----------------------------------------------------------|---------------------|------------------------|
| September 2019       | 26                                                       | 4                                                        | 0.87                | 0.09                   |
| October 2019         | 19                                                       | 12                                                       | 0.72                | 0.08                   |
| November 2019        | 14                                                       | 16                                                       | 0.51                | 0.08                   |
| December 2019        | 11                                                       | 20                                                       | 0.23                | 0.03                   |

Figure 2. On the monitoring of cadmium in water

Based on the data results from Table 1, we found that: "Using dynamic monitoring technology, we can better monitor water quality in real time, compared to before we can use computer intelligence system in the river set control section to monitor the concentration of pollutants, to prevent pollutant emissions exceeded the standard, because this will cause serious consequences, so we set when the concentration exceeds the standard, the system will issue an alarm warning monitoring station staff to monitor and deal with this."

4.3 Water Quality Monitoring

Water quality testing, as the name implies, is to monitor the types of pollutants in water and their concentration, but also their change trends to monitor. Water quality monitoring is very broad, it can monitor not only contaminated water sources, but also good water sources, as well as a wide variety of industrial drainage. In the water quality monitoring, there are a series of various indicators, respectively, describing the color of water quality, transparency, pollutant content, etc., for this reason, China has specially formulated national standards in order to carry out specific planning of water sources. And with the importance of environmental aspects in recent years, China's water quality monitoring has also been rapid development. However, at present, China's water quality monitoring technology is mainly based on physical chemistry methods. Because physical chemistry and other monitoring methods after years of development has a more mature system, but in recent decades, there
are also new biological monitoring and remote sensing monitoring technology, they use microorganisms and laser remote sensing to monitor water quality. The advantage is that it does not cause secondary pollution to the environment like physical and chemical methods, and it absorbs impurities and pollutants from water better. But their drawback is that the technology is not yet mature enough to cause more serious pollution if not used well. After all, there are so many organisms that we haven't identified how all organisms respond to pollutants, but in previous experiments we've also found that some microorganisms can be used for monitoring, such as cadmium absorption using E. coli. The more advanced remote sensing monitoring technology mainly uses the physical and chemical properties of water to observe and observe the refractive angle of water quality under light to detect the distribution of impurities in water. The advantages of this technique are the wide range of monitoring, the speed and the low cost.

At present, with China and the global attention to the environment, especially for water quality. Therefore, the current water quality monitoring technology development speed is fast. Then in the future there will be more people will devote themselves to this field and make more effective and small environmental pollution technology. Because water quality monitoring is a branch of environmental monitoring, it belongs to the common discipline of environmental monitoring, so in the water quality monitoring, we need to do a few steps to divide. First we need to determine the monitoring program, then we need to find our own monitoring purposes, monitoring objects, monitoring locations, monitoring time, as well as sampling and preservation programs, experimental methods, data processing and other plans; then when monitoring water quality, we need to set up multiple control sections and a background section, so that we can more reasonably monitoring of water quality. During the monitoring process, we record the experimental data at any time, and then compare the experimental data and observe the abnormality of the data and find out the main causes. If it is due to experimental record error, then exclude it, if it is due to some pollution caused by the river current, we need to promptly notify the relevant departments for further monitoring of the river section to find the real cause. That's what we need to do for water quality testing.

4.4 Pollution Prevention and Control
Pollution prevention and control is mainly aimed at the various substances discharged by human beings into the water body, after exceeding the limit of the water body's own purification effect, it is treated and prevented. Because our country in the early industrial development process too fast pursuit of industrial development and economic development, so that many enterprises for the enterprise itself caused by pollution has not been timely treatment, thus polluting the environment of the water body. And in the later period did not get timely control, resulting in huge environmental pollution. So, we need to pollute the water. Moreover, pollution is divided into two categories, one is natural pollution, one is man-made pollution. In general, natural pollution is due to the earth's crustal movement and various types of convection caused by extreme adverse weather conditions caused by a region of pollutants exceeding the standard and thus polluting the water body, but such a situation is less, so the main pollution is still man-made pollution. Because people in social activities will produce a large number of pollutants, such as domestic water, industrial water, these polluted water bodies if not treated and discharged directly into the natural water body, then will further pollute the entire water body. In the prevention and control of pollution, we must first start from the source and find the source of pollution of the polluted water body. Then we know what causes the pollution, whether it is due to the non-compliance of industrial discharge sewage, or because of domestic water and industrial water and other types of water mix caused by pollutants exceeding the standard. After identifying the causes of pollution, we design the corresponding pollution prevention and control program. Because there was more polluted water in the early stages, we are still treating previously contaminated water bodies most of the time, and for uncontaminated water bodies, we mainly take monitoring measures to prevent further pollution of water bodies. For the prevention and control of water bodies, we need to increase the intensity of monitoring and punishment, and remind local places to make an annual environmental quality bulletin to prove the quality of their water bodies. And we need to send people
to conduct field trips at any time to prove the authenticity of the report and make EIA really useful. Because we are doing water quality testing and pollution prevention and control are to be able to make the water body to get better purification treatment, to ensure our health.

5. Conclusion
With the development of the times, people's material living standards are getting higher and higher. Now we not only want to blindly pursue the speed of the economy, more importantly, the pursuit of environmental protection, because only environmental governance, in order to fundamentally improve our material standard of living. And in this process, water as the source of life, good water, will make our health worry-free. Once contaminated water is eaten by the human body, it can cause irreversible damage to the body. Therefore, we need to increase the water quality monitoring and pollution prevention and control of dynamic detection technology research, to ensure that all water quality studies can be carried out in the future. Let every water source be regulated and all sources of drinking water that meet national standards.

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