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Support Vector Machine Algorithm in Water Pollution Prevention Measures

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Abstract: With the rapid development of modern science and industrial technology, people's material living standards have been greatly improved, and at the same time, the social economy has been developed with higher quality. However, in this early stage of development, enterprises and residents in some regions have not yet had a good awareness of environmental protection, which leads to a rapid increase in the degree of environmental pollution in the process of social and economic development. On the other hand, water resources have always been the most basic but also the most important part of the ecological environment, and water resources are also polluted by various industrial wastes in the process of rapid industrial development. This kind of pollution not only makes the water resources in some areas gradually exhausted, but also brings about soil erosion and water pollution problems. Pure water resources have always been a necessity for the development of people and society. However, the pollution of water resources in the process of disorderly industrial development makes it difficult for people to obtain pure water resources easily. Therefore, it is necessary to optimize and upgrade the existing water pollution prevention and control measures. This optimization and upgrading is not only the update of the existing water pollution treatment technology, but also the simplification of the work flow in the existing water pollution prevention and control measures, so as to significantly improve the work efficiency of the water pollution prevention and control measures and provide better support for the residents' life and social economy. First of all, this paper analyzed the support vector machines (SVM) algorithm in artificial intelligence (AI) technology, and determined the various models of this SVM algorithm model applied in current real life, so as to study whether the SVM algorithm can be applied in the optimization of water pollution prevention measures. After that, based on the SVM algorithm model, a new type of water pollution prevention and control measure was constructed, and the performance of this new type of water pollution prevention and control measure was improved by about 23.9% on average.

1. Introduction

With the further development of social industry and agriculture, the pollution degree of various wastes generated in the process of its development to water resources in various regions is also further deepened. In addition, due to the lack of environmental awareness of the residents, the types of magazines in the current water sources are also increasing rapidly, and the types and proportion of organic substances are increasing rapidly. However, this situation also makes the water purification work more difficult. The existing water pollution control measures composed of various technologies in water pollution treatment can no longer meet the needs of social development.

At present, some researchers have studied the pollutants in the existing water resources, hoping to determine the main categories of pollutants through the analysis of the current situation of water pollution. Lyu Yizheng analyzed the pollution of pollutants produced in the industrial production process in a regional industrial park on the surrounding water sources, and determined the impact of industrial production on the life cycle of water pollution in the region [1]. Hanif M A explored the impact of the pollution of rivers and water sources in a certain region on the health and environment of residents in the region, and determined that the pollution degree of water sources has great harmfulness [2]. Qi Ji explored the distribution of enterprises and the proportion of industrial development in water pollution in a certain region, and determined that the unrestricted development of enterprises and industries can promote the progress of water pollution [3].

Wu Gaojie explored the management mode of water pollution in a region, and confirmed the feasibility of this mode through the analysis of the water pollution situation in the region [4]. Wang Shuming explored the pollution of water source during the operation of the wharf for loading and unloading raw materials in a thermal power plant in a certain area, and determined the degree of pollution [5]. Singh Upma explored the pollution of water sources caused by the disorderly discharge of wastes in the process of industrial development in a region, and determined the pollution degree of water sources caused by this behavior [6]. Tang Yankui analyzed some emerging pollutants in the current water environment and determined the sources of these pollutants [7]. Although such researchers have conducted research on a large number of water source samples, due to the diversity of water pollution, they have not obtained a more reasonable pollutant category.

Other researchers are studying the treatment mode of water pollution, hoping to propose a more perfect water pollution treatment mode through this research. Li Xiang explored the role of magnetic nanomaterials in the treatment of water pollution in a certain area. Through the study of the characteristics of such magnetic nanomaterials, he confirmed its reliability for water pollution treatment [8]. Martini Sri explored a membrane technology to control water pollution, and confirmed the feasibility of this membrane technology in water pollution treatment through the study of membrane technology and mixing mechanism [9]. Li Z H O U explored a model for controlling pollutants in the process of agricultural development, and determined the role of this model in water pollution control [10]. Sharma Rakesh K explored the role of a metal in the background of a nano-catalyst in the purification of pollutants in water pollutants, and determined the feasibility of this scheme [11]. He Mingjing explored a sustainable derived biochar for water pollution control and determined its role in water pollution control [12]. However, due to the low popularity of some technologies at present, it is not possible to determine a more complete water pollution control model based on the study of existing water pollution control.

At first, this paper analyzed the existing water pollution prevention and control measures at a deep level, and determined various parts of the existing water pollution prevention and control measures that can be optimized through various analysis models. After that, the SVM algorithm was analyzed. Through a comprehensive study of the multiple advantages in the existing SVM

algorithm and some parts of the existing water pollution control measures that can be optimized, this paper determined the feasibility of the SVM algorithm model for application in water pollution control measures. The new water pollution prevention measures combined with SVM algorithm not only further improve the work efficiency, but also make the performance of water pollution treatment better.

2. Exploration of Water Pollution Prevention Measures

The current water pollution sources can generally be divided into three types, namely, water pollution caused by industrial development, pollution caused by agricultural development and pollution caused by residents' life [13]. Most of the pollutants caused by industry to water resources are some wastes in the process of industrial production and construction, and the relevant industrial enterprises dispose of these production wastes in disorder, resulting in deep pollution of the water resources in the area where they are located. At the same time, the operators would not take certain filtering measures during the discharge of industrial waste to water resources, resulting in a variety of pollutants in water resources pollution caused by industry, which further increases the complexity and difficulty of water resources treatment. Then there is the pollution of water resources caused by agricultural development. In this process, the fertilizer in the field and some pollution generated in the agricultural planting process are discharged into the water source without restriction, thus causing pollution to the water source. The general type of pollution caused by agriculture is relatively single, and the difficulty of water pollution treatment is relatively low. Among many kinds of water pollution, the most difficult to control is the water pollution in life, which contains a large number of various pollutants. The existing water environment management system is shown in Figure 1.

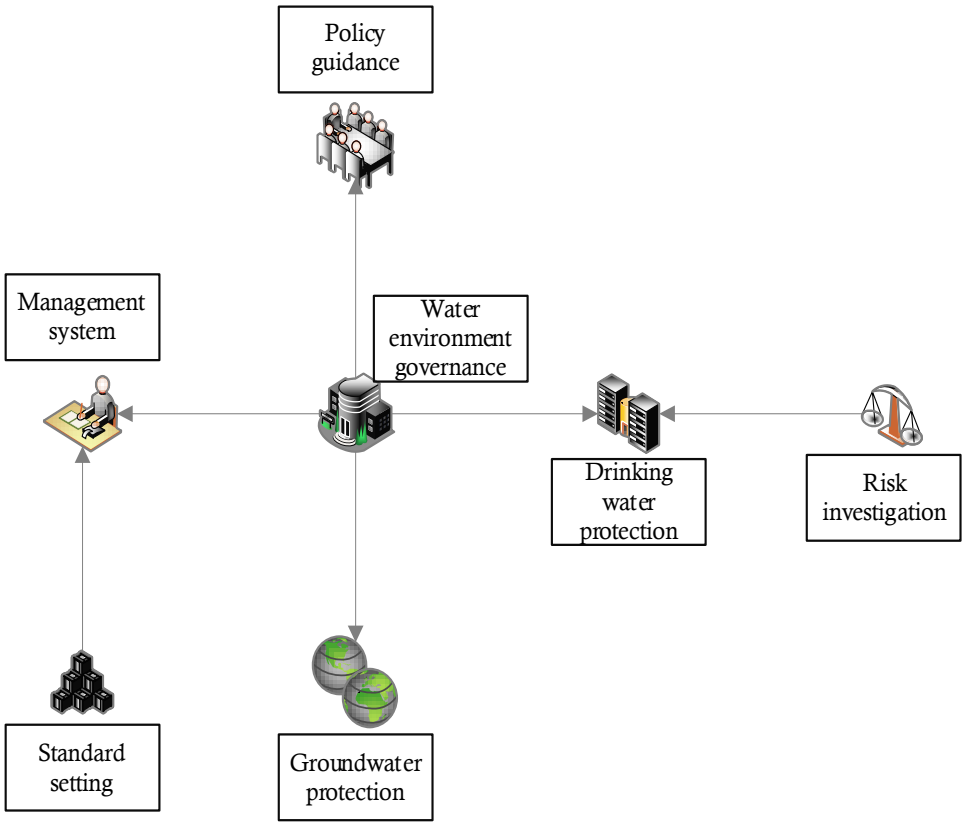


Figure 1. Existing water environment governance system

The existing water pollution prevention and control measures are generally divided into several steps. First, it is necessary to train the relevant staff on the principles of water pollution prevention and control, and help the staff of pollution prevention and control understand the importance of water pollution prevention and control. At the same time, this step needs to consider the protection of the surrounding ecological environment of water pollution, and strive to avoid too much impact on the surrounding ecological environment in the process of preventing and controlling water pollution, which is also the basis for achieving sustainable development. Next is the further improvement of the monitoring system of water resources quality. In the process of improving the monitoring system of water resources quality, some intelligent sensing devices would be built into the water quality monitoring instruments, thus saving a lot of labor costs. Next is the optimization and upgrading of the current water pollution treatment technology, which also includes the optimization of the water pollution treatment process. On the one hand, it has improved the performance of water pollution treatment; on the other hand, it has greatly improved the efficiency of water pollution treatment. General water pollution prevention measures are shown in Figure 2.

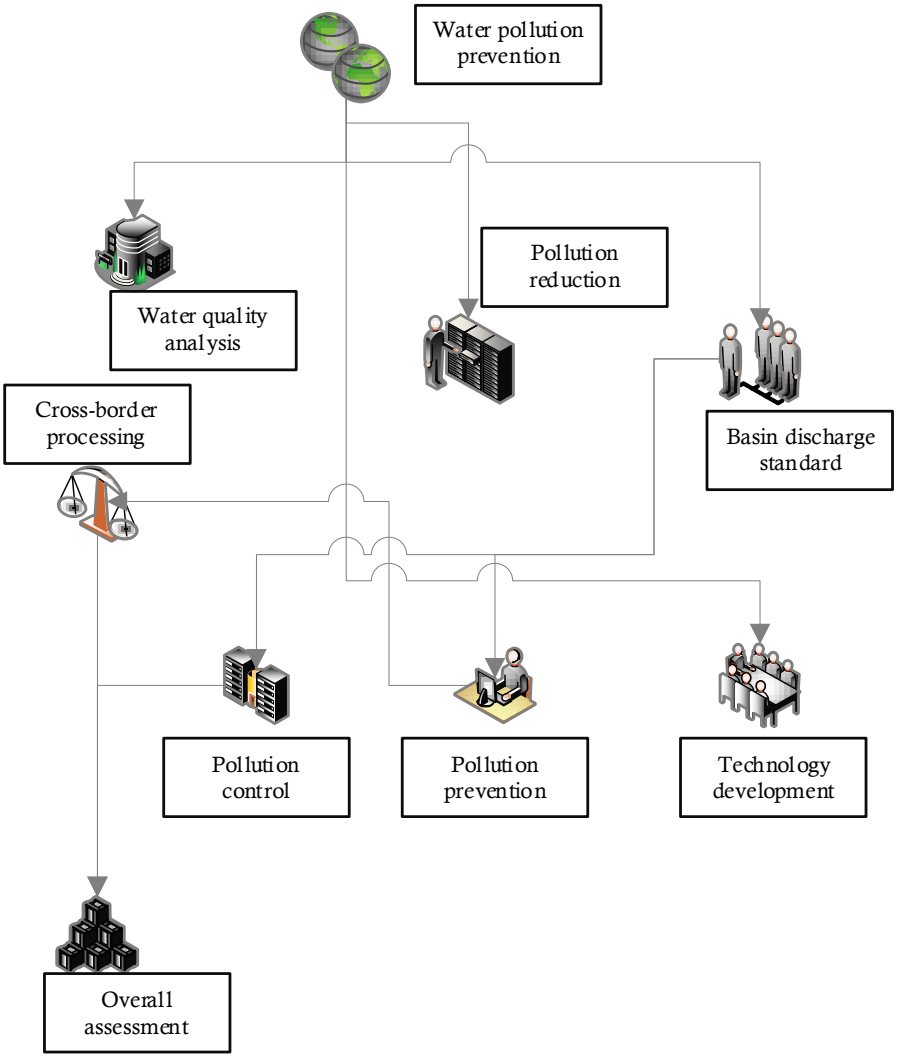


Figure 2. Schematic diagram of general water pollution prevention and control measures

3. SVM Technology

With the continuous development of modern information technology, more and more new

technologies have been proposed and widely used in all walks of life, including AI technology. In this paper, through in-depth analysis of SVM algorithm under AI technology, the feasibility of the application of this algorithm model in the optimization process of water pollution control measures was determined. SVM algorithm is a classification algorithm, which can analyze the interval of data in the feature space, thus completing the perception and classification of data [14]. At present, SVM has become a popular algorithm model for solving quadratic programming or nonlinear problems [15]. In this paper, the optimization process of existing water pollution control measures by SVM is mainly to optimize the parameter structure and combination mode of the technology through some algorithms in SVM, so as to further improve the treatment effect and work efficiency of water pollution. The operation flow of SVM algorithm is shown in Figure 3.

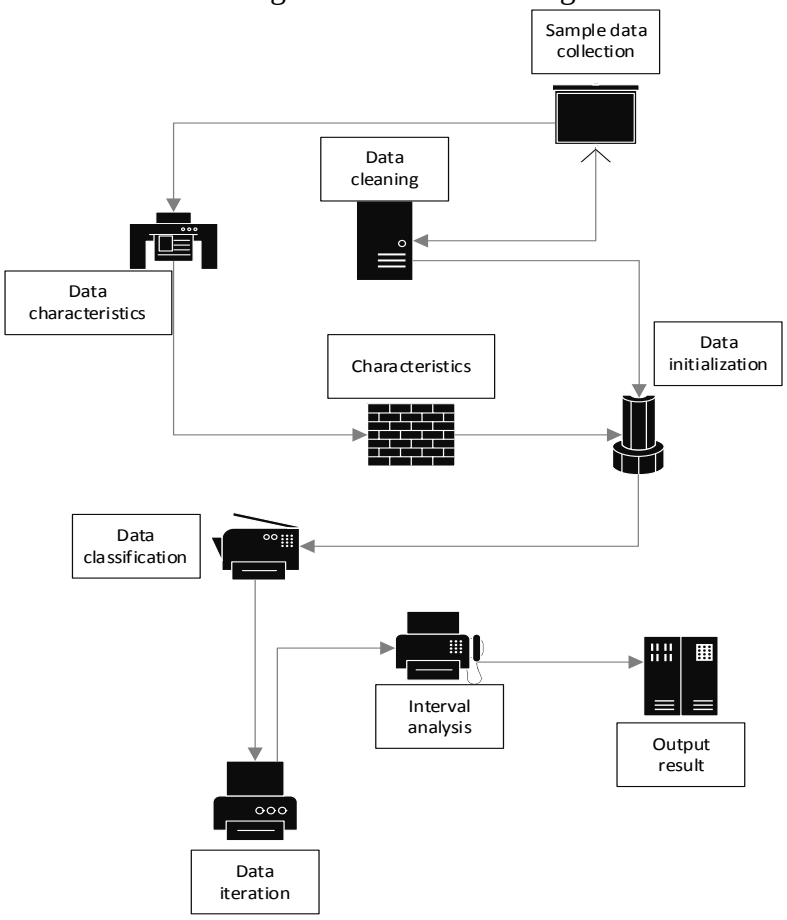


Figure 3. Schematic diagram of the SVM algorithm flow under normal conditions

4. SVM Algorithm

Water resources have always been the most basic and indispensable resources in modern society, and this situation has also made the importance of water resources rise sharply. However, with the continuous development of society, the pollution problem of water resources is also deepening. This situation is affected by the pollution of human industrial activities on the one hand, and is also a manifestation of the lack of environmental protection awareness of residents. In the existing water pollution prevention and control measures, many traditional algorithms and models are generally used to allocate various technologies in the whole process, which greatly affects the efficiency and effectiveness of water pollution prevention and control. In addition, with the further development of modern information technology, the emergence of AI technology has also brought many new

algorithms to society, and these algorithms also have many applications in people's daily life, especially SVM algorithm. In this paper, SVM algorithm was further integrated into water pollution prevention and control measures to optimize existing water pollution prevention measures, which can improve its efficiency and performance.

In the SVM algorithm, the most important thing is to determine the hyperplane where most of the data is located based on the analysis of the data. In this plane, appropriate lines are selected to divide the plane, so as to analyze and classify the sample data. The main calculation formula is shown in Formula (1).

$$f(x) = a_w x + b \tag{1}$$

Among them, b represents the value of an offset term of the plane, and a_w represents the normal vector of the plane. After that, the distance from any data in the plane to the plane itself is calculated. In this process, the main task is to analyze and classify various pollutants in water pollution. The main calculation formula is shown in Formula (2).

$$R = \frac{a_w x + b}{a_w} \tag{2}$$

Finally, the final result is calculated by the loss value in the SVM algorithm model and the optimization algorithm. The formula is shown in Formula (3).

$$L(x) = \frac{1}{2} a_w^2 + \sum_{i=1}^{n} a_w (1 - y_i (a_i x + b)) \tag{3}$$

Among them, y_i mainly represents the loss value in the calculation process, and a_i represents the weight value of the data. By using the above SVM algorithm model, it can not only further improve the efficiency of existing water pollution prevention measures, but also improve the comprehensive ability of existing water pollution prevention measures.

5. Experiment on New Water Pollution Prevention Measures

At present, the deep pollution of water resources in society is not only the main reason for the deterioration of the ecological environment in many regions, but also has a great impact on the supply of drinking water for the daily life of residents in many regions. If this situation continues, it would cause serious harm to the public health in many regions. Therefore, there is an urgent need to improve and control water pollution. In this process, it is also necessary to cultivate the people's awareness of environmental protection. The interaction of the two can improve the current water pollution situation and further promote the high-quality development of social economy. In the process of optimizing water pollution prevention and control measures, the first thing to be clear is that the most basic goal of improving the quality of water resources is to realize the two-way sustainable development method of ecological environment and social economy in a certain area. Although many regions have recognized the importance of water pollution prevention and control, and in order to balance the relationship between the socio-economic development of the region and the pollution control and improvement of water resources, a variety of schemes have been put forward to treat water pollution, but these methods can not meet people's needs better. Therefore, this paper carried out experimental research on the performance of a new water pollution prevention and control measure combined with SVM algorithm, so as to clarify the performance of this new water pollution prevention and control measure and determine the reliability of this scheme.

The first is to analyze the effects of various prevention and treatment schemes in the process of

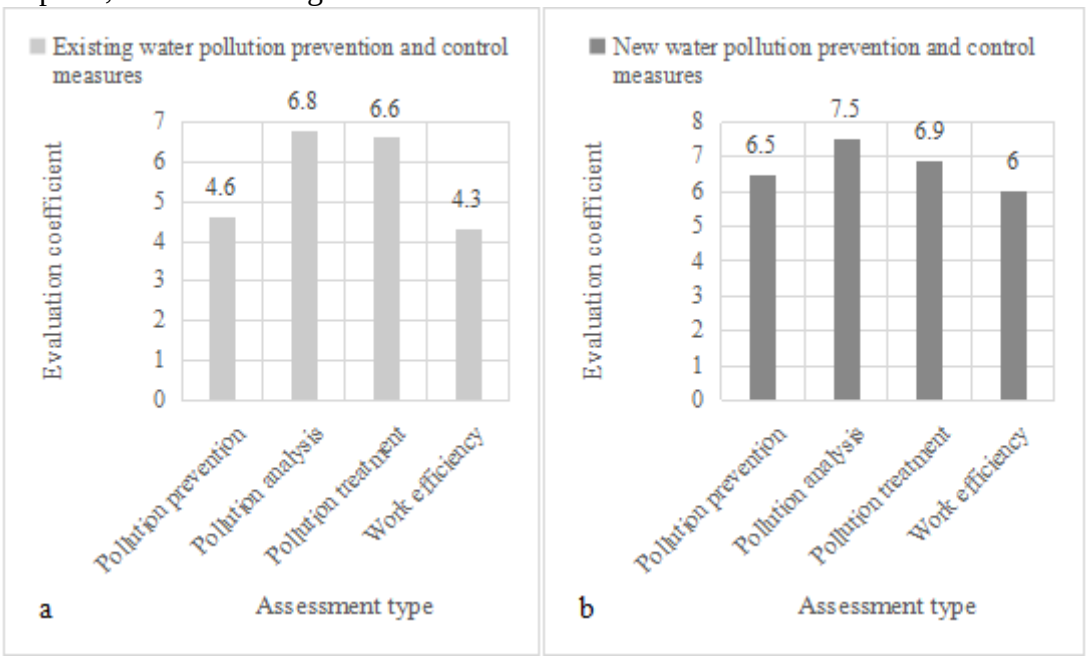
water pollution prevention and treatment in a certain area, as shown in Table 1.

Table 1. Effect of water pollution prevention and control model in a certain area

	Suspended matter	Organic matter	Inorganic matter
Biofilm	5.4	6.5	5.1
Chemical method	6.3	4.8	6
Microorganism	6.8	7.1	5.5

Through the analysis of the treatment effects of suspended solids, organic pollutants, inorganic pollutants and other pollutants in water resources of various water pollution prevention and treatment schemes in the region in Table 1, it can be determined that microbial methods have better performance in the treatment of suspended solids and organic pollutants, and can remove multiple types of suspended solids and organic pollutants in the target waters. However, this method cannot perform well in the process of removing inorganic pollutants. In the process of removing inorganic pollutants, chemical methods are the best. From this comprehensive point of view, the existing water pollution treatment technologies cannot comprehensively remove multiple types of pollutants, so it is necessary to combine multiple pollutant treatment technologies.

Next, the performance of the new water pollution prevention measures and the existing water pollution prevention measures proposed in this paper combined with SVM algorithm were analyzed in many aspects, as shown in Figure 4.



a. Schematic diagram of comprehensive performance of existing water pollution prevention and control measures

b. Schematic diagram of comprehensive performance of new water pollution prevention and control measures

Figure 4. Schematic diagram of the new water pollution prevention and control measures proposed in this paper combined with the SVM algorithm and the existing control measures

This paper mainly optimized some parts of the existing water pollution prevention and control measures by virtue of the advantages of SVM algorithm for high data processing efficiency, so as to

further promote the progress of the existing water pollution prevention and control measures. By analyzing the performance of the existing water pollution prevention measures in many aspects in Figure 4a, it was determined that their performance in water pollution prevention and work efficiency was poor. However, the analysis and treatment of water pollution pollutants were relatively good, which also reflects that the existing measures for prevention and treatment of water pollution can be optimized, mainly in the prevention of water pollution and the improvement of work efficiency. Through the analysis of the performance of the new water pollution prevention measures combined with SVM algorithm in Figure 4b, it was determined that this new model has been greatly improved in many aspects, which as about 23.9% higher than the existing water pollution prevention measures.

6. Conclusion

Water has always been an important resource for human survival, but with the further development of human civilization, human pollution of water resources is also gradually deepening. The deepening of water pollution has greatly hindered the socio-economic development and human survival in some areas, so researchers in relevant fields have put forward a water pollution prevention measure. In addition, due to the different technical systems in different regions in the current society, the pollution of water resources in the process of industrial development also presents different situations, so different water pollution prevention and control models are needed to treat water pollution in different regions. The area studied in this paper also has a series of characteristics such as uneven distribution of water resources, so the characteristics of these water resources need to be considered during the construction and optimization of water pollution prevention measures. The existing water pollution prevention and control measures generally analyze different types of pollutants in water resources through multiple pollutant treatment technologies, and then remove these pollutants in combination with multiple water pollution treatment technologies to achieve water pollution prevention and control. This paper was to consider a SVM algorithm in AI technology. First, it determined some advantages of the algorithm model, and then it was to consider the application of these advantages in the existing water pollution prevention measures and the feasibility of optimizing the existing water pollution prevention model. After that, the SVM algorithm model was used to optimize various operations and work processes in the existing water pollution prevention measures. This optimization greatly improved the work efficiency and comprehensive performance of water pollution prevention and control, and provided more power for the development of society.

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Data Availability

Data sharing is not applicable to this article as no new data were created or analysed in this study.

Conflict of Interest

The author states that this article has no conflict of interest.

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