**TEAM NO:4**

**TEAM DETAILS:**

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**PROJECT TITLE:**

**Water Quality Prediction using MachineLearning**

**PROJECT OVER VIEW:**

This project aims to develop a machine learning model to predict water quality parameters based on historical data and sensor readings. The goal is to provide accurate predictions of water quality to support informed decision-making for water resource management.

**Project Objectives:**

1. Collect and preprocess historical water quality data and sensor readings.

2. Develop and train a machine learning model to predict water quality parameters.

3. Evaluate the performance of the model using metrics such as accuracy, precision, and recall.

4. Deploy the model as a web application for real-time water quality prediction.

**Methodology:**

1. Data Collection: Collect historical water quality data and sensor readings from various sources.

2. Data Preprocessing: Clean and preprocess the data by handling missing values, removing outliers, and normalizing the data.

5. Model Evaluation: Evaluate the performance of the model using metrics such as accuracy, precision, and recall.

6. Model Deployment: Deploy the model as a web application for real-time water quality prediction.

**Technologies Used:**

1. Python

4. Flask

5. HTML/CSS/JavaScript

**ALGORITHM USED:**

**LINEAR REGRESSION**

**Dataset:**

The dataset used for this project consists of historical water quality data and sensor readings from various sources, including:

1. pH levels

2. Temperature

3. Turbidity

4. Bacteria levels

5. Sensor readings (e.g., pH, temperature, turbidity)

**Model Architecture:**

The model architecture consists of the following layers:

1. Input Layer: Takes in the extracted features from the preprocessed data.

2. Hidden Layer: Consists of multiple layers of artificial neural networks.

3. Output Layer: Produces the predicted water quality parameters.

**Model Evaluation Metrics:**

The model is evaluated using the following metrics:

1. Accuracy

2. Precision

3. Recall

4. Mean Squared Error (MSE)

5. Coefficient of Determination (R-squared)

**ADVANTAGES:**

advantages of water quality prediction:

**Environmental Benefits:**

1. **Improved water management:** Accurate predictions enable effective management of water resources.

2**. Reduced pollution**: Predicting water quality helps identify potential pollution sources, enabling proactive measures.

3. **Enhanced ecosystem health**: Predictions inform conservation efforts, protecting aquatic life and ecosystems.

**Economic Benefits:**

1. **Cost savings:** Predictions help optimize water treatment processes, reducing costs.

2. **Increased efficiency**: Accurate predictions enable utilities to allocate resources effectively.

3**. Improved public health**: Predictions help prevent waterborne diseases, reducing healthcare costs.

**USES:**

**Public Health and Safety:**

1**. Waterborne disease prevention**: Predictions help prevent waterborne diseases by identifying potential health risks.

2. **Public health alerts**: Predictions enable timely public health alerts, protecting communities from waterborne health risks.

**3. Emergency response planning:** Predictions inform emergency response planning, ensuring effective response to waterborne health emergencies.

**Environmental Conservation:**

1**. Watershed management**: Predictions inform watershed management decisions, protecting aquatic ecosystems.

2. **Pollution prevention**: Predictions help identify potential pollution sources, enabling proactive measures to prevent pollution.

3. **Conservation efforts**: Predictions inform conservation efforts, protecting aquatic life and ecosystems**.**

**Conclusion:**

This project demonstrates the use of machine learning for water quality prediction. The developed model shows promising results, with high accuracy and precision. The model can be deployed as a web application for real-time water quality prediction, supporting informed decision-making for water resource management.

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