

SafeSip

By Team Meta4

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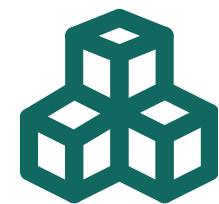
Overview

- Problem Statement
- Tool That We Used
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6 CLEAN WATER AND SANITATION



Sustainable Development Goal



Clean Water and Sanitation - Ensure availability and sustainable management of water and sanitation for all.

Problem Statement



A machine learning model to monitor water quality in real-time using sensor data from various sources. The solution should detect contaminants and ensure access to safe drinking water and Proper Resource Allocation by Govt.

Rationale Behind It



India faces significant water and sanitation problems due to its large population. In addition, the country has problems with efficient distribution of resources due to insufficient availability of data.

Tool That We Used:

AutoAI in Watson Studio

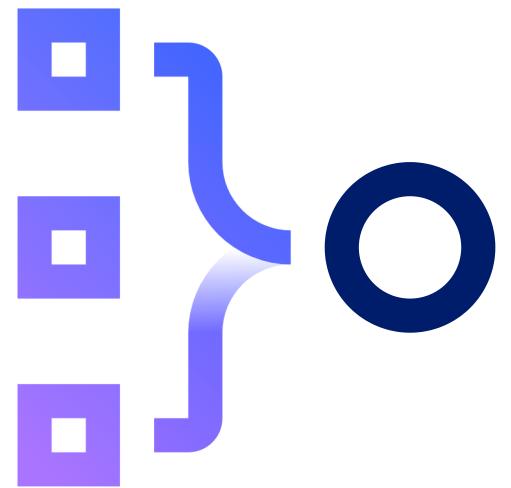
Next Js



AutoAI automates the entire process of applying machine learning, allowing us to quickly build and deploy models.

It helps in data preparation, model selection and hyperparameter optimization and ensures the best possible model performance.

WebApp is developed using Next Js to enhance User Experience and Interface. ML Model is integrated with this WebApp to get Results displayed.



How Our Model Will Be Able To Solve The Problem?

01

Real-time data collection

The model continuously collects data from sensors installed at various locations to monitor water quality parameters in real time.

02

User Experience

Model is integrated with a WebApp made with Next Js to ensure better User Experience and Interface

03

Resource Need Analysis

The model analyzes the data to identify regions with critical resource needs and ensure proper Resource allocation.

04

Informed Resource Planning

By providing actionable insights, the government can plan resource allocation more effectively and take significant action to effectively address water and sanitation issues.

Why Do We Think It Will Work?

01

Accurate and timely information

The model uses sensor data and advanced machine learning techniques in real-time, ensuring accurate and up-to-date information for decision-making.

02

Comprehensive analysis

It is trained on a complex data set, allowing it to accurately predict whether the water is drinkable or not.

03

Optimal allocation of resources

We can identify areas of greatest need, the model ensures that resources are used effectively and efficiently, preventing waste and maximizing impact.

04

Scalability and adaptability

The model is designed to scale across multiple regions and can integrate new sensors and contaminants, ensuring continuous improvement and long-term effectiveness.

Data And The Data Source

The dataset contains 3276 entries with 10 columns representing water quality parameters such as pH, hardness, solids, chloramines, sulfates, conductivity, organic carbon, trihalomethanes, and turbidity. It contains a binary Potability column indicating whether the water is potable or not.



The following data is taken from Kaggle.

Link to the Data:

<https://drive.google.com/file/d/1e4AC1tsXOWEyYr7g2L2mNcksWnTg5JBt/view?usp=sharing>

Links To The Model:

Public Endpoint:

<https://us-south.ml.cloud.ibm.com/ml/v4/deployments/1fb5754c-dcf3-4b64-aca0-ea1a6ae57a22/predictions?version=2021-05-01>

Private Endpoint:

<https://private.us-south.ml.cloud.ibm.com/ml/v4/deployments/1fb5754c-dcf3-4b64-aca0-ea1a6ae57a22/predictions?version=2021-05-01>

Deployment url:

https://dataplatform.cloud.ibm.com/ml-runtime/deployments/1fb5754c-dcf3-4b64-aca0-ea1a6ae57a22?space_id=e8d9d8c8-8909-4bb0-93dd-0defaa905030&context=cpdaas

Link to WebApp:

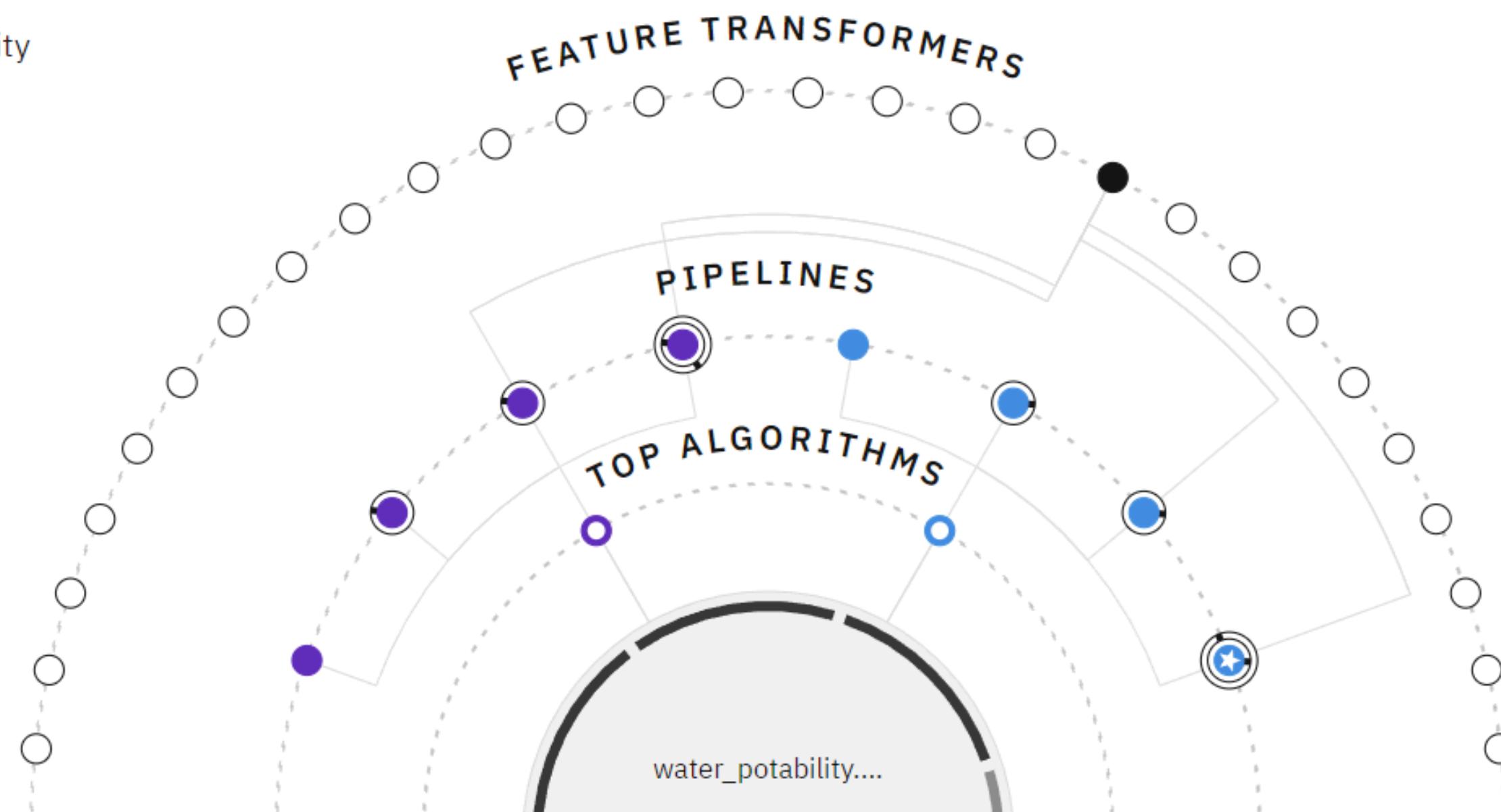
<https://water-quality-prediction-black.vercel.app/>

Source code to get Prediction:

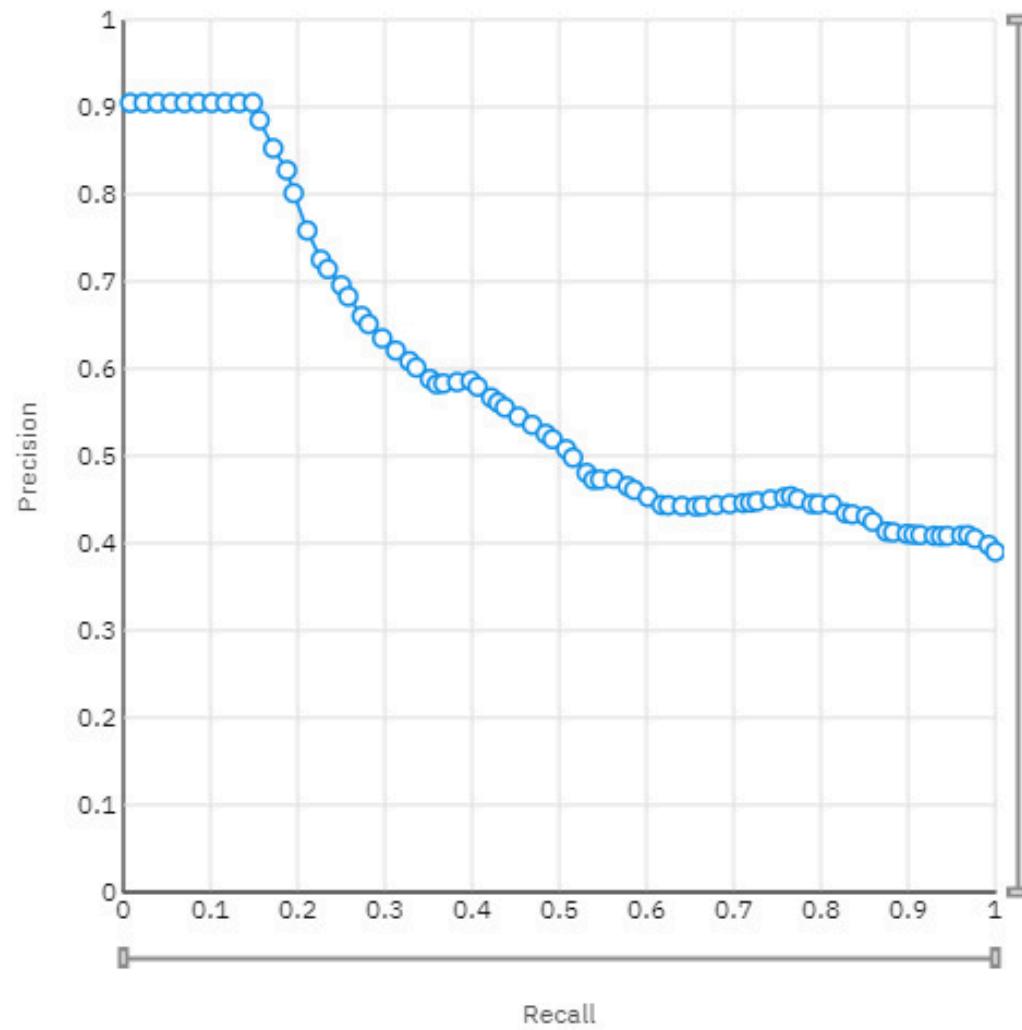
<https://drive.google.com/file/d/1BfjV1z61j4T3Q9qYIkB4CXJVwqlAzTk/view?usp=sharing>

Experiment ran Successfully and the best pipeline is chosen (Pipeline 8)

Relationship map ⓘ
Prediction column: Potability

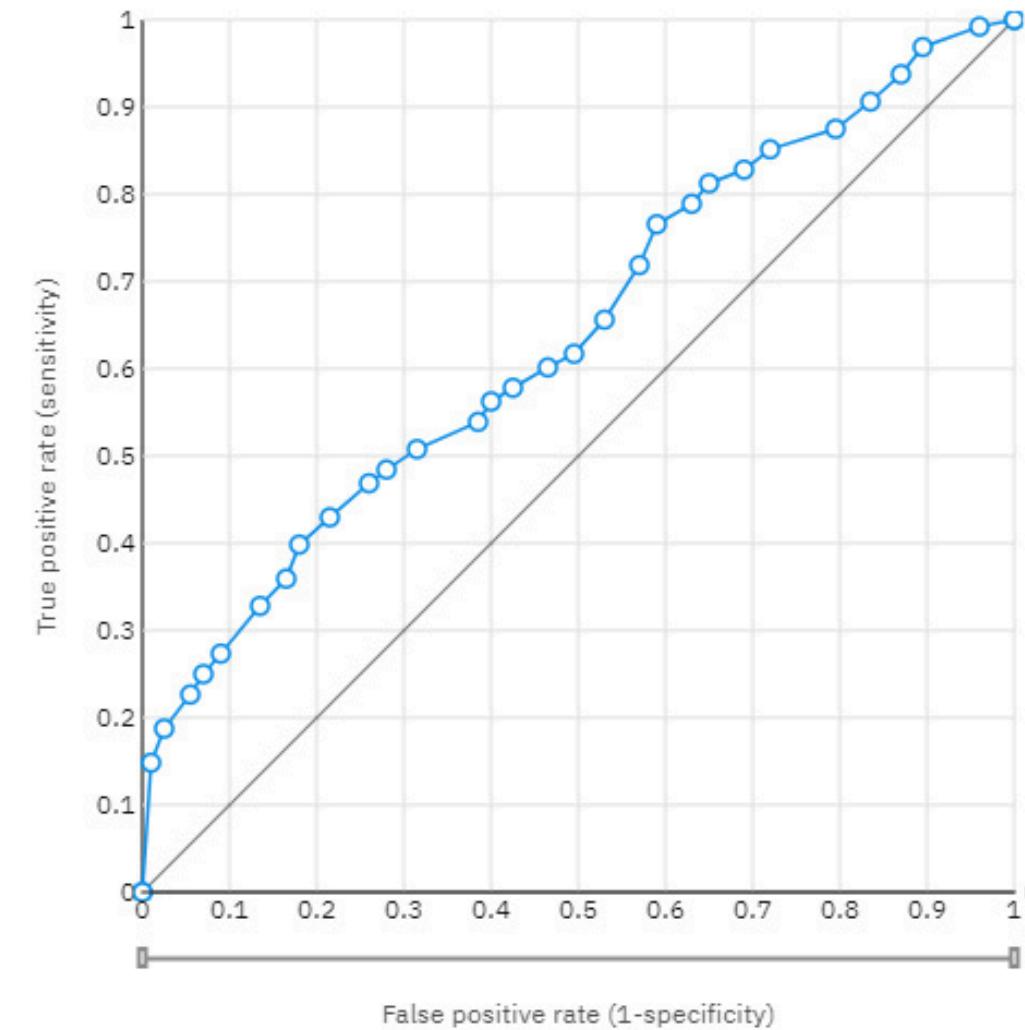


Precision-Recall Curve



Precision decreases as recall increases,
Indicating trade-off

ROC Curve



Curve closer to top-left
Indicates better performance.

Confusion Matrix:

Observed	Predicted		Percent correct
	1	0	
1	65	63	50.8%
0	63	137	68.5%
Percent correct	50.8%	68.5%	61.6%

Illustrates the classification performance, showing correct and incorrect predictions for observed classes 1 and 0, with overall accuracy percentages.

Saved as Model:

Model information ⓘ

Experiment parameters

Prediction column	Potability
Algorithm	LGBM Classifier
Number of features	17
Number of evaluation instances	328
Created on	7/3/2024, 1:00:15 PM

IBM Watson Studio Search in your workspaces Upgrade ⓘ Gantyada Tejesh Kumar'... Dallas GK ⋮

Deployments / SafeSip / SafeSip - P8 LGBM Classifier - M... /

SafeSip ✓ Deployed Online

API reference Test

Direct link

Private endpoint

<https://private.us-south.ml.cloud.ibm.com/ml/v4/deployments/1fb5754c-dcf3-4b64-aca0-ea1a6e> ⓘ

Bearer <token> ⓘ

IAM

Public endpoint

<https://us-south.ml.cloud.ibm.com/ml/v4/deployments/1fb5754c-dcf3-4b64-aca0-ea1a6e> ⓘ

Learn more about the 2021-05-01 version query parameter

About this deployment

Name ⓘ

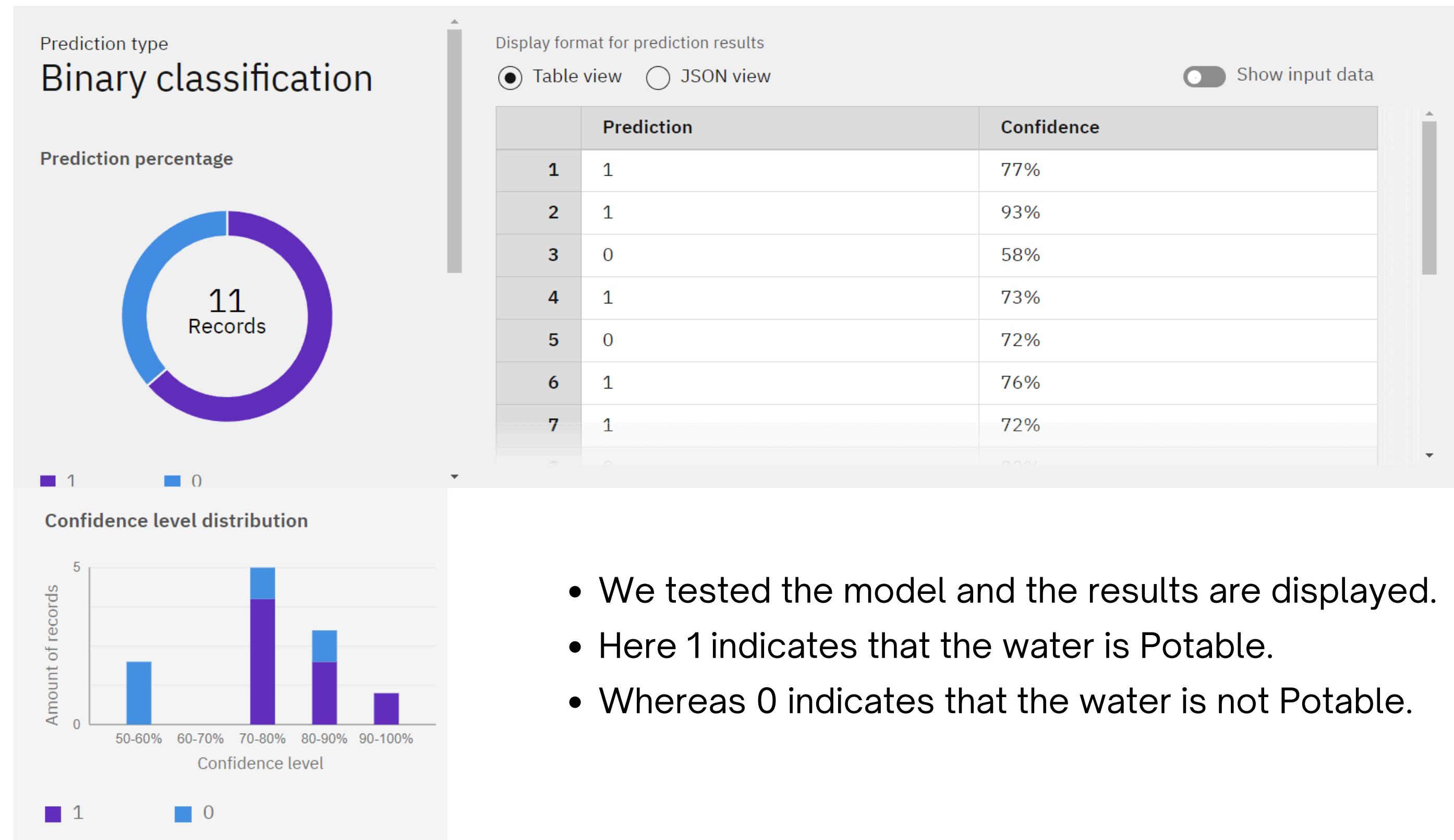
SafeSip

Description ⓘ

This project develops machine learning models to monitor water quality in real-time and predict suitability for drinking based on sensor data. It helps ensure safe drinking water by identifying contaminants, supports efficient resource allocation by highlighting areas that need more intervention, and strengthens public health and water resources management.

Deployed the Model

Prediction Results:



- We tested the model and the results are displayed.
- Here 1 indicates that the water is Potable.
- Whereas 0 indicates that the water is not Potable.

Exclusive WebApp:

(powered by IBM Watson)

- We have integrated the model into a WebApp to have better User Experience.
- This WebApp Shows the Prediction whether the Water is Drinkable or not.
- It also shows the Contamination level of the water.
- On Basis of the Contamination Level, Government can allocate resources accordingly.

Link to WebApp:

[Click to open](#)

<https://water-quality-prediction-black.vercel.app/>

Water Quality Prediction

Model Name : SafeSip

By - Meta4

Prediction: Water is Drinkable

contamination Level: 7.11%

Water Quality Prediction

Model Name : SafeSip

By - Meta4

Prediction: Water is not Drinkable

contamination Level: 71.85%

Our Team



G Tejesh Kumar



Soumya Ranjan



Chirag Agrawal



Swastideepa

Thank You