**ACI Assignment 2**

**Water Quality Classification**

Water quality data is provided along with this file and contains the following attributes

Attributes Information:

1. ph: pH of 1. water (0 to 14).

2. Hardness: Capacity of water to precipitate soap in mg/L.

3. Solids: Total dissolved solids in ppm.

4. Chloramines: Amount of Chloramines in ppm.

5. Sulfate: Amount of Sulfates dissolved in mg/L.

6. Conductivity: Electrical conductivity of water in μS/cm.

7. Organic\_carbon: Amount of organic carbon in ppm.

8. Trihalomethanes: Amount of Trihalomethanes in μg/L.

9. Turbidity: Measure of light emitting property of water in NTU.

10. Potability: Indicates if water is safe for human consumption. Potable -1 and Not potable -0

You are required to do the following:

Question 1: Python

1. Construct a Bayesian Belief Network for the given data. [30% weightage]

Use appropriate methods to predict the following:

1. Predict the water quality for the following data: [10%weightage]

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| ph | Hardness | Solids | Chloramines | Sulfate | Conductivity | Turbidity |
| 3.72 | 204.89 | 20791.32 | 7.3 | 368.5 | 564.30 | 2.96 |

1. Infer the probability for the data with the following properties: [10%weightage]

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| ph | Hardness | Solids | Chloramines | Sulfate | Conductivity | Organic carbon | Trihalomethanes | Turbidity | Potability |
| 10. | 248. | 28749 | 7.5 | 393 | 283 | 13.78 | 84.6 | 2.67 | 1 |

1. Find the probability of the quality of water being good and the attributes take the following values: low ph, high in hardness, with high presence of solids, and other chemicals. [10%weightage]

Question 2: Prolog

1. Use Any of the decision tree algorithms to build a decision tree for the given data [10%weightage]
2. Create rules from the decision tree.[10%weightage]
3. Code the rules into a Prolog Knowledge base. [20%weightage]
4. Get water properties as input from the user and classify whether water is potable or not. [10%weightage]