**Artificial and Computational Intelligence**

**Assignment 2**

**Cryotherapy Data**

**Group Name: 015**

**Statement:**

The cryotherapy data contains details of patients who took this treatment with the following attributes:

Sex, Age, Time, Number of warts, Type, Area and the result of treatment (1 successful and 0 not successful).

**Contribution Table:**

**Contribution** (This table should contain the list of all the students in the group. Clearly mention each student’s contribution towards the assignment. Mention “No Contribution” in cases applicable.)

|  |  |  |  |
| --- | --- | --- | --- |
| **Sl. No.** | **Name (as appears in Canvas)** | **ID NO** | **Contribution** |
| **1** | **Amit Sharma** | **2020fc04812** | **100%** |
| **2** | **Dipali Thakur Dhande** | **2020fc04818** | **100%** |
| **3** | **Pravin Prakash Koshti** | **2020fc04406** | **100%** |
| **4** | **Shweta Patel** | **2020fc04414** | **100%** |
| **5** | **Vikram Singh** | **2020fc04293** | **100%** |

**Solution:**

**Question 1: Python**

1. Construct a Bayesian Belief Network for the given data.: [20% WEIGHTAGE] Use appropriate methods to predict the following:

* We have used pomegranate library for Bayesian Network Model. Here, first we have implemented the Decision Tree for the given dataset. Once we have the splits for respective attributes based upon the (Entropy score), we converted the continuous values into discrete values.
* For conversion we have used bins, which will group together same category data into single unit. For example, if we refer fig 1.0 (attached below, we have root node = Time. For time attribute, we have converted values into below bins
  + 0.25 to 8.125 -> bin 1
  + 8.126 to 12 -> bin 2

**code variable bins for Time:**

Time: [ 0.25 8.125 12. ]

**Same we have created for different attributes based upon the decision tree result.**

Age: [15. 16.5 20. 52. 67. ]

Area: [ 4. 15. 27.5 750. ]

Warts: [ 1. 4.66666667 8.33333333 12. ]

* Then, we have applied the bins to all applicable attributes.
* Once we complete with data preparations, we have built the Bayesian Network model based on data.

1. Predict whether the treatment was successful or not using the following data: [10% WEIGHTAGE]. Female Patient who is 33 years old with 12 number of type 3 warts.
2. Infer the probability for the data with the following properties: A male aged 67 who has type 1 wart in area 51 and had a successful treatment: [10% WEIGHTAGE]
3. Find the probability of the patient with the following data: Age 15, Gender Male, Number of warts 5, Type 2, Area 100 and Treatment unsuccessful. [10% WEIGHTAGE]