**Data -** **Volcanoes**

**Exploratory**

* My data set has 3 feature column (V1, V2, and V3) and 1 target column (Class).
* All my data variables are numerical data and the target column has ordinal data.
* Converted the numbers into variance.
* Plotted the Boxplot and histogram of all the variables.
* Data is splitted into training and test data.

**Logistic Regression:**

* Logistic Regression Model is trained on the training data set
* The trained data is applied on the test data.
* Now the accuracy of the model is found to be-> **90%,** which is good
* Draw the heat map for the confusion matrix
* Then the confusion matrix is plotted, wherein ***False positive*** is **1.11%** and **False Negative** is **90 %**

**Logistic Regression for Binary output:**

* Converted the Class output as 0 and 1(taking <0.5 as 0 and >0.5 as 1)
* Now the accuracy of the model is found to be-> **99%,** which is excellent
* Draw the heat map for the confusion matrix
* Then the confusion matrix is plotted, wherein ***False positive*** is **1%** and **False Negative** is **99 %**

**Comparison for Logistic Regression**:

The comparison between the original class and the binary output the accuracy of the Binary output is more

**Neural Network for Binary output :( hidden layers 20 & 10)**

* Converted the Class output as 0 and 1(taking <0.5 as 0 and >0.5 as 1)
* Now the accuracy of the model is found to be-> **98%,** which is excellent
* Draw the heat map for the confusion matrix
* Then the confusion matrix is plotted, wherein ***False positive*** is **1%** and **False Negative** is **99 %**

**Neural Network -1 (2 hidden layers of size 20 & 10 respectively)**

* Model is trained on the training data set, and applied on the test data
* Now the accuracy of the model is found to be-> 90%
* Then the confusion matrix is plotted, wherein ***False positive*** is **1%** and ***False Negative*** is **98%**

**Neural Network -2 (4 hidden layers of size 200,225,250 and 275respectively)**

* Model is trained on the training data set, and applied on the test data
* Now the accuracy of the model is found to be-> 76%
* Then the confusion matrix is plotted, wherein ***False positive*** is **7.8%** and ***False Negative*** is **83%**

**Neural Network -3 (6 hidden layers of size 5, 10, 30 ,40, 50, 60 & 70 respectively)**

* Model is trained on the training data set, and applied on the test data
* Now the accuracy of the model is found to be-> **90%**
* Then the confusion matrix is plotted, wherein ***False positive*** is **1.11%** and ***False Negative*** is **90%**

**Neural Network -4 (8 hidden layers of size 50,100,150,200,250,300,350 and 400 respectively)**

* Model is trained on the training data set, and applied on the test data
* Now the accuracy of the model is found to be-> **90%**
* Then the confusion matrix is plotted, wherein ***False positive*** is **1.11%** and ***False Negative*** is **90%**

**Neural Network -5 (2 hidden layers of size 5 & 10 respectively)**

* Model is trained on the training data set, and applied on the test data
* Now the accuracy of the model is found to be-> **86%**
* Then the confusion matrix is plotted, wherein ***False positive*** is **6.9%** and ***False Negative*** is **71%**

**Comparison for Neural Networks:**

While comparing the four neural networks, NN which has 2, 6, 8 layers was accurate when compare to 4 hidden layer NN.