**Task 2 Neural Networks**

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| Sec:7 | 20201701136 | محمود نورالدين عبدالله محمد |
| Sec:3 | 20191700831 | جابريل مارك انطون |
| Sec:6 | 20191700810 | محمد بهاء الدين محمد يس |
| Sec:6 | 20191700500 | محمد اسامه حامد حفني |
| Sec:2 | 20201700179 | باسم عاطف السيد محمد |
| Sec:3 | 20201701070 | حسان جمال حسان حسني |

## Data Cleaning:

The first step we’ve done is to ensure no nulls nor invalid data were in the dataset.

to do that we replaced each null or invalid cell with the mean of the selected feature of the same class.

Now we made sure that no nulls in the data.

## Data Preparation:

Our data consists of five features (Area, Perimeter, MajorAxisLength, MinorAL, roundess), that are classified into 3 categories (Bombay, Cali, Sira)

We applied stratified sampling to make your our random selection from each class isn’t biased, with 80% tain, 20% test

Then we normalize the data using min-max normalization to avoid divergence.

## Model Creation:

MLP class describes a neaural network that consists of (1 input layer, 1 hidden layer, 1 output layer),

Input Layer: 5 neurons

Hidden Layer: 3 nerons

Output Later: 3 neurons

The class implements forward propagation using gradient desecent over a specifed number of epochs

Backpropagation

Sigma(i) is calculated as

## Model Evaluation:

After retrieving the weights from the model, we used a function that takes the weights and testing dataset

then creates a pairplot to evaluate the performance of the model,

Taking each feature as X and our 3 classes as Y, we visualized the data as both frequencies and plot graphs

With all features except roundess showing great correlation between them and certain classes

Here are the outputs of the models:

## Insights:

