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Analysis

Baseline Algorithm:

This algorithm base accuracy is:

```
Epoch: 300.00% Baseline: 58.54% (10.59%)
```

I planned to change parameters like Epoch, batch-size, activation function, number of neurons and layers

I started with epoch number where I used grid function to test several values of epoch.

Result:

```
Epoch: 300.00% Baseline: 58.54% (10.59%)
Epoch: 310.00% Baseline: 55.29% (3.50%)
Epoch: 320.00% Baseline: 61.15% (7.38%)
Epoch: 330.00% Baseline: 65.00% (9.62%)
Epoch: 340.00% Baseline: 59.01% (7.03%)
```

Also, lower values of epoch were tested but it doesn't improves the accuracy that we are able to achieve with epoch value of 330

Further, I tried making changes in activation function for binary classification with epoch as 330.

- First Layer: Used tanh activation function instead of relu

  ```
  Epoch: 330.00% Baseline: 72.99% (5.76%)
  ```

- Second Layer: Used tanh activation function instead of relu

  ```
  Epoch: 330.00% Baseline: 75.49% (7.59%)
  ```

- Output Layer: Used tanh activation function instead of Sigmoid

  ```
  Epoch: 330.00% Baseline: 55.73% (5.53%)
  ```

- First Layer: Used tanh activation function instead of relu

  ```
  Epoch: 330.00% Baseline: 79.30% (7.30%)
  ```

- First Layer: selu activation function, second Layer: tanh activation function

  ```
  Epoch: 330.00% Baseline: 79.30% (7.90%)
  ```

Result: We can see that I got the best accuracy with Selu activation function for first layer and Tanh for the second layer, along with epoch value as 330. Increasing or decreasing the number of neurons does not have any effect on accuracy. So best accuracy that we have is 79.90

Dropout Hidden Algorithm :

Similar analysis were performed to improve the efficiency over here. However, along with other parame ters, dropout value is also tuned to improve the results.

The base algorithm results are:

```
Hidden: 82.11% (7.32%)
```

Started the analysis by making changes to number of epochs.

- Epoch Value = 330

```
Hidden: 82.11% (7.32%)
```

Further, made changes to dropout value and here are the results:

```
First Dropout: 0.3
Hidden: 81.21% (7.19%)

Second Dropout: 0.3
Hidden: 81.23% (7.19%)

First Dropout: 0.15
Hidden: 81.73% (7.39%)

First dropout: 0.1 Second: 0.2
Hidden: 84.09% (5.78%)
```

Results: As we can see, first dropout was set to 0.1 and second droput was set to 0.2, which resulted in highest accuracy along with epoch value as 330. Tried several activation functions which did not resulted in better accuracy than 84.09%

Dropout Visible Algorithm:

Base accuracy for this algorithm is following:

```
Visible: 84.63% (5.50)
```

Tried several Dropout values and activation functions:

```
Dropout: 0.3
Visible: 81.21% (3.58%)

Dropout: 0.15
Visible: 85.61% (5.11%)

Dropout: 0.1
Visible: 80.71% (5.41%)
```

```
Dropout: 0.15 first layer: tanh
Visible: 83.16% (5.76%)

Dropout: 0.15 first layer: selu
Visible: 80.25% (5.61%)

Dropout: 0.15 second layer: tanh
Visible: 83.68% (6.72%)

Dropout: 0.15 second layer: selu
Visible: 83.18% (4.87%)
```

Result: Over here, I was able to achieve highest accuracy with dropout value as 0.15. Accuracy is 85.61%