Single Layer Perceptron

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Aim

Use one hot encoding in class variables instead of numerating them.

In addition to accuracy metric, use F1 score.

Use another dataset.

Draw the loss-iteration and accuracy-iteration plots.

Use SKLearn Algorithm

Dataset Operations

At first, there were class values in my dataset like ever_married, work_type, residence_type and smoking_status.

After one hot encoding operation input values increased to 21 instead of 10.

All the numeric data normalized with min-max normalization.

Plotting

Plotting the loss-iteration and accuracy-iteration graphs in different learning rates and hidden layer numbers.

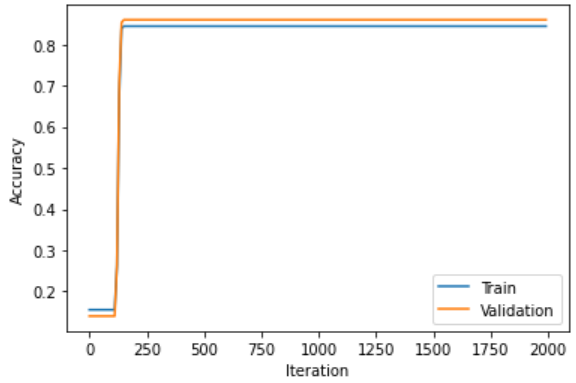
These operations are done on validation data.

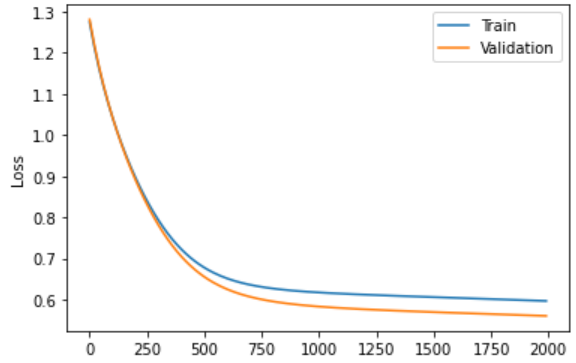
To plot all graphs epoch number is set to 2000.

Hidden Layer Nodes: 2

As you can see in the graphs Prediction accuracies are almost same in low learning rates.

```
LR: 0.01 Layer: 2
Prediction Accuracy:  0.8604026845637583
Prediction F1: 0.4624819624819625
```



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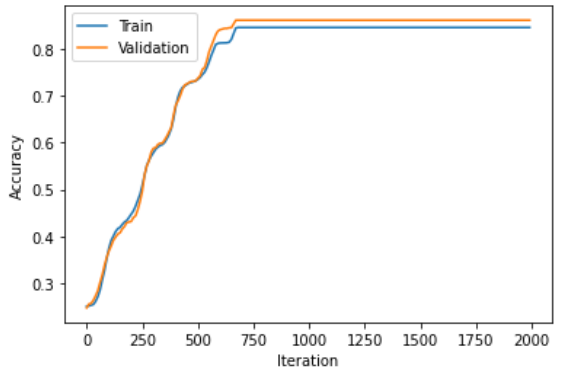
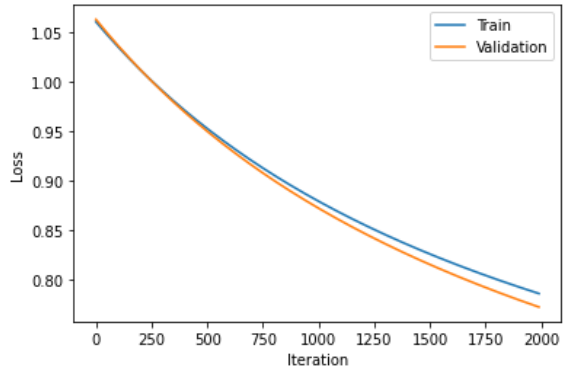
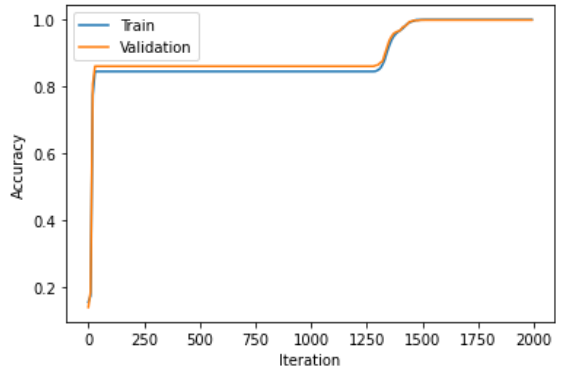


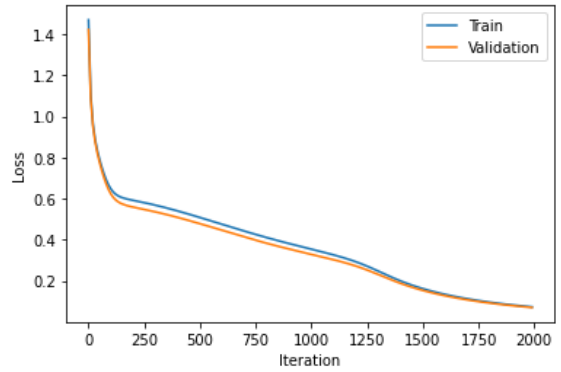


Hidden Layer Nodes : 2

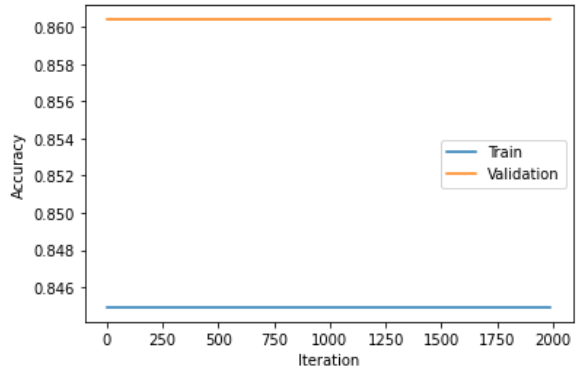
The Accuracy is almost 1 in 0.1 learning rate, so it looks like the best one.

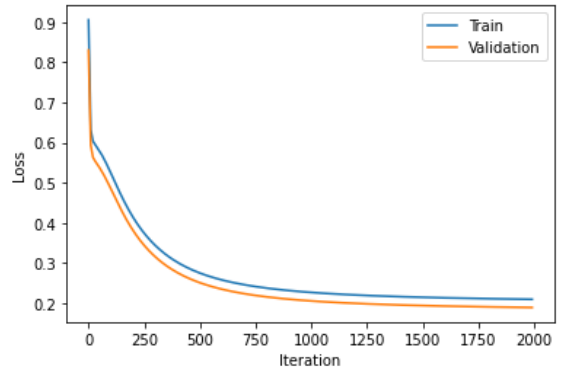
```
LR: 0.1 Layer: 2
Prediction Accuracy:  0.9986577181208054
Prediction F1: 0.9971948294493959
```






```
LR: 0.5 Layer: 2
Prediction Accuracy:  0.8604026845637583
Prediction F1: 0.4624819624819625
```

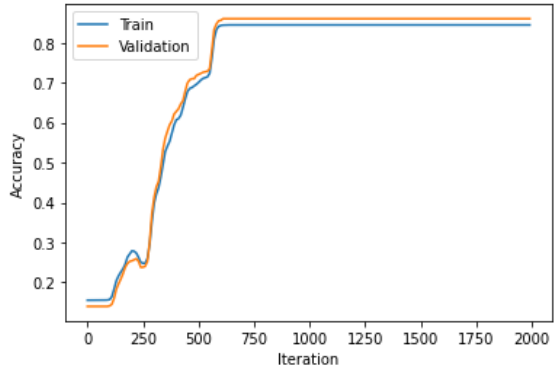


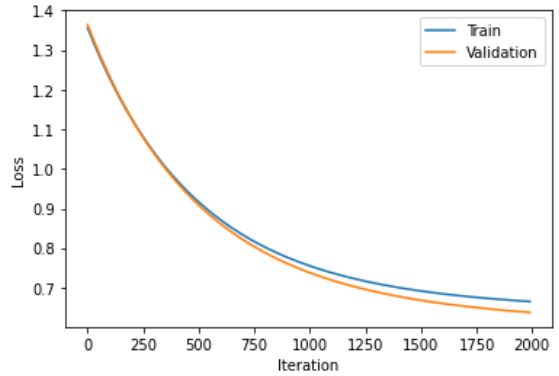


Hidden Layer Nodes : 8

The Accuracies are same with layer number 2, but time is a more than 2.

```
LR: 0.001 Layer: 8
Prediction Accuracy:  0.8604026845637583
Prediction F1: 0.4624819624819625
```



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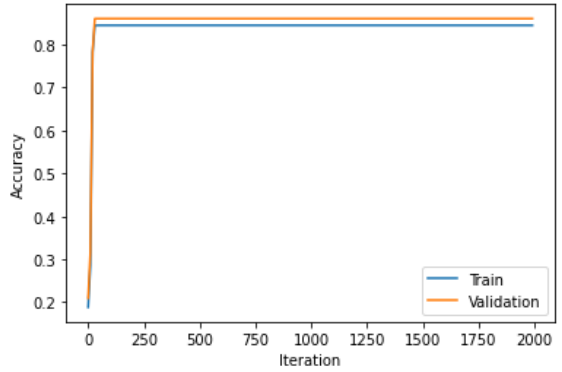
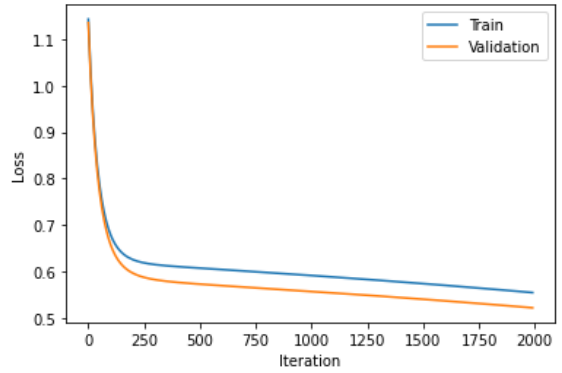
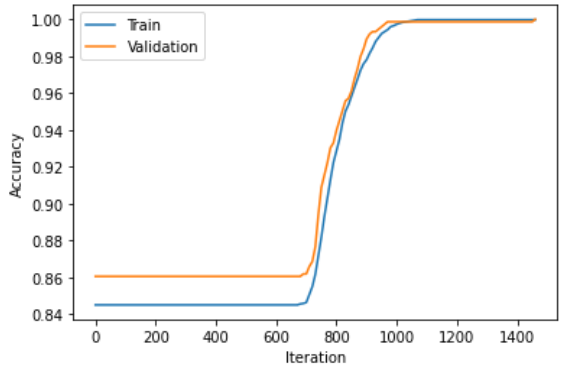


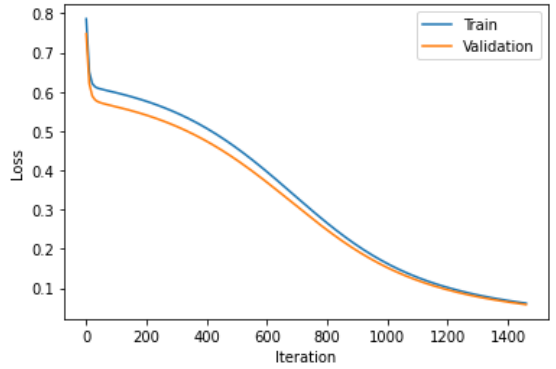


Hidden Layer Nodes : 8

The accuracy is best again in 0.1.

```
LR: 0.1 Layer: 8
Prediction Accuracy:  1.0
Prediction F1: 1.0
```



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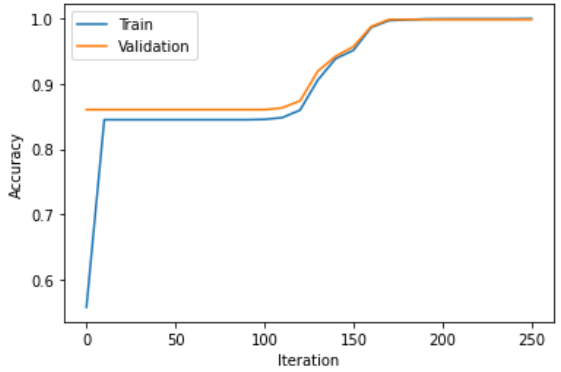
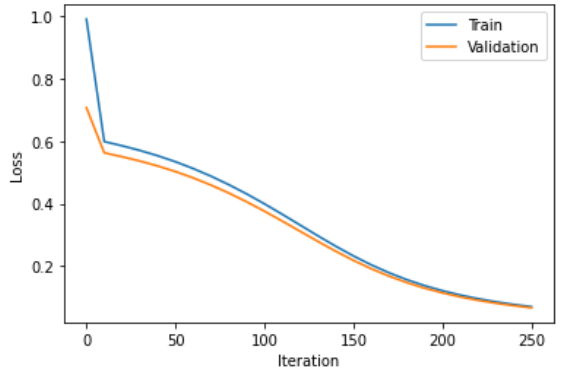
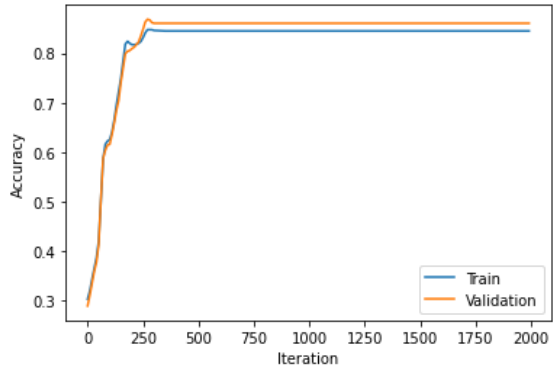


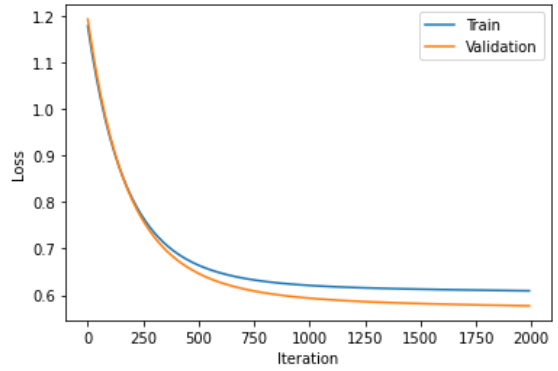


Hidden Layer Nodes : 20

In the low learning rates accuracies aren’t changing.

LR: 0.001 Layer: 20
Prediction Accuracy: 0.8604026845637583
Prediction F1: 0.4624819624819625





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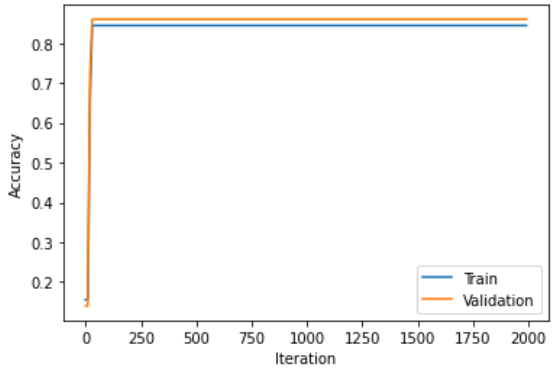

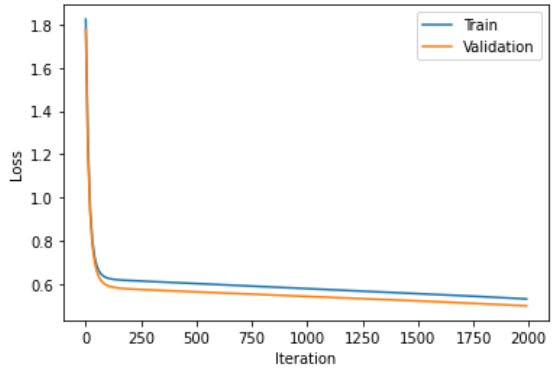

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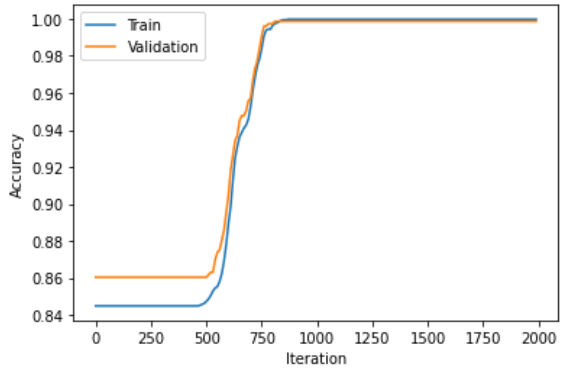

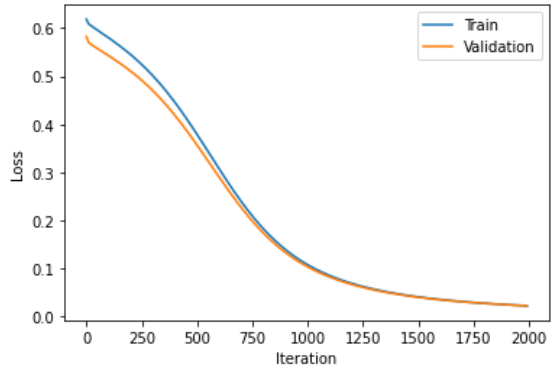


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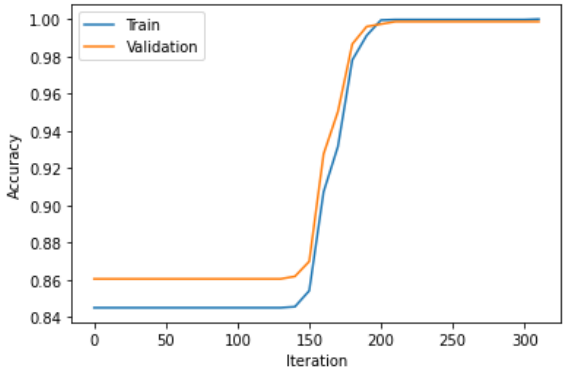

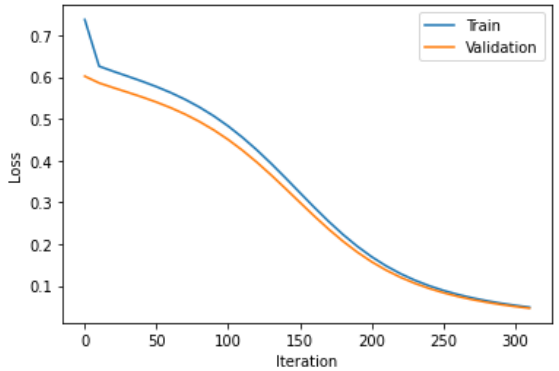

Hidden Layer Nodes : 50

In the low learning rates accuracies aren’t changing.

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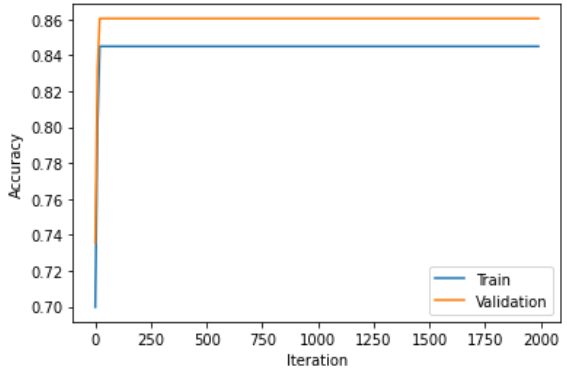
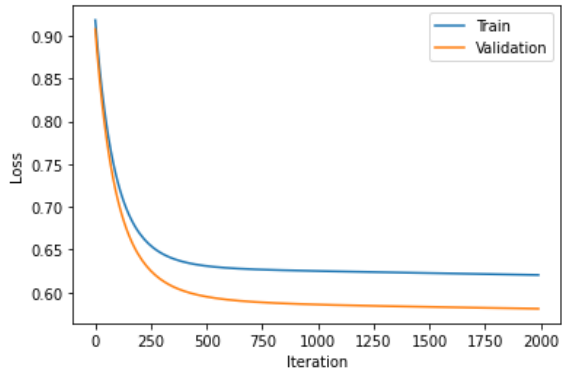
Prediction Accuracy: 0.8604026845637583
Prediction F1: 0.4624819624819625





LR: 0.01 Layer: 50
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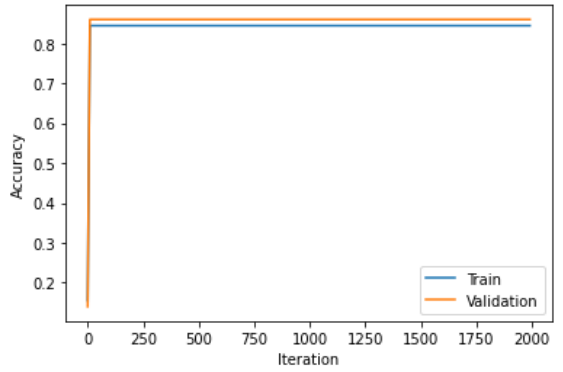

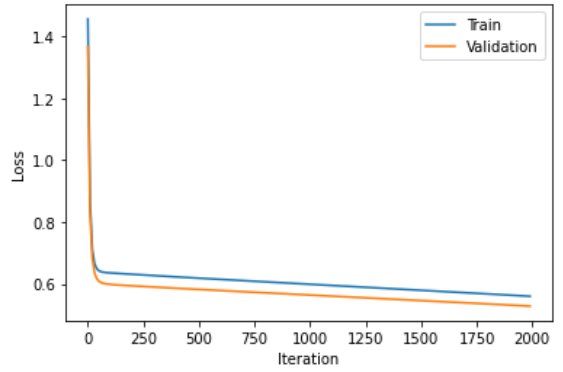

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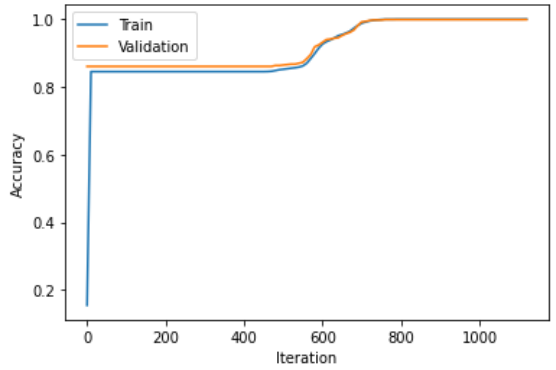

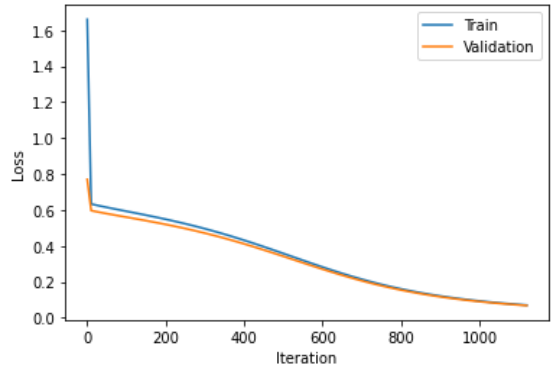


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Prediction Accuracy:  1.0
Prediction F1: 1.0
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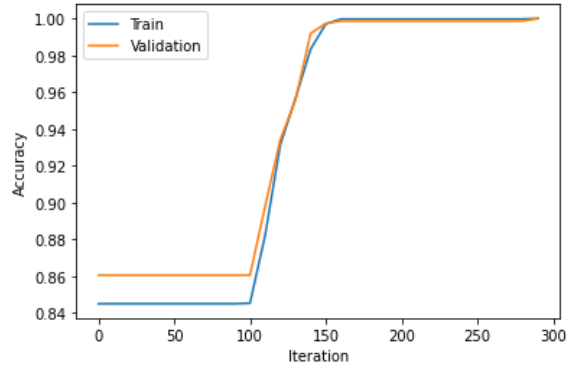
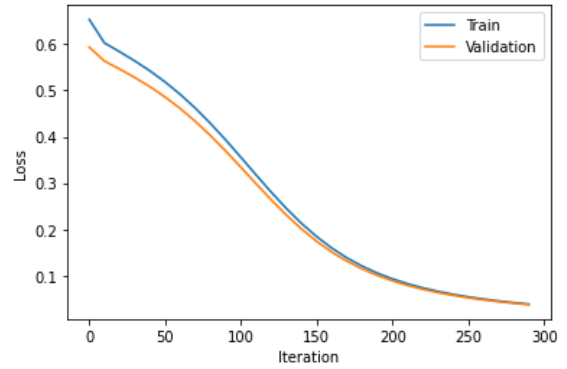


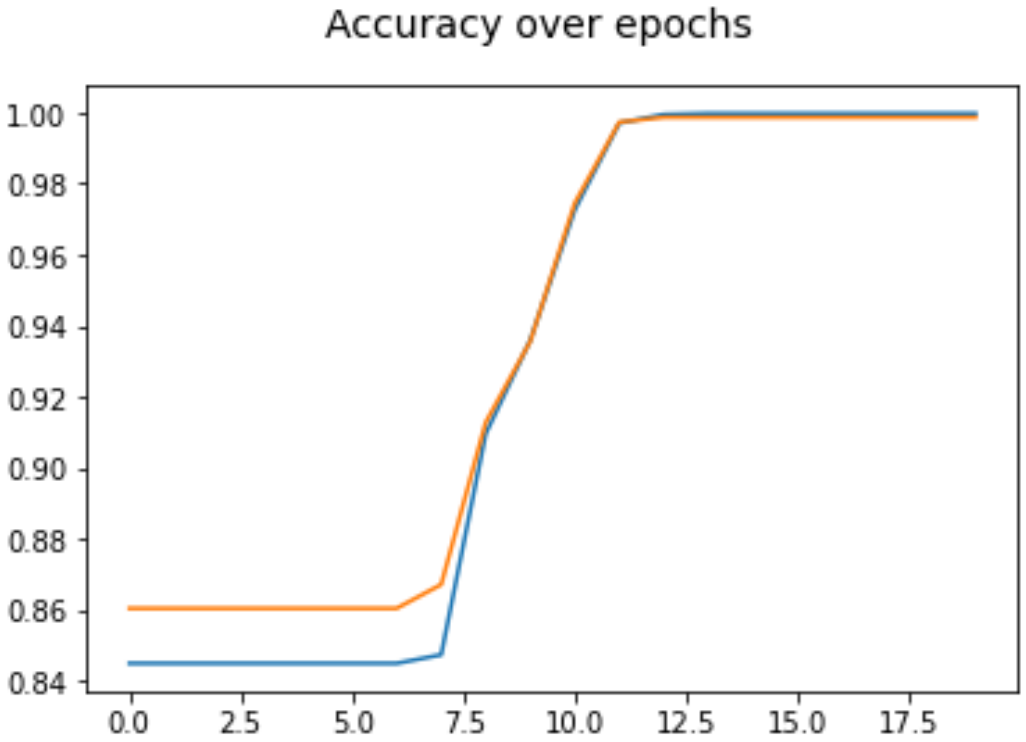


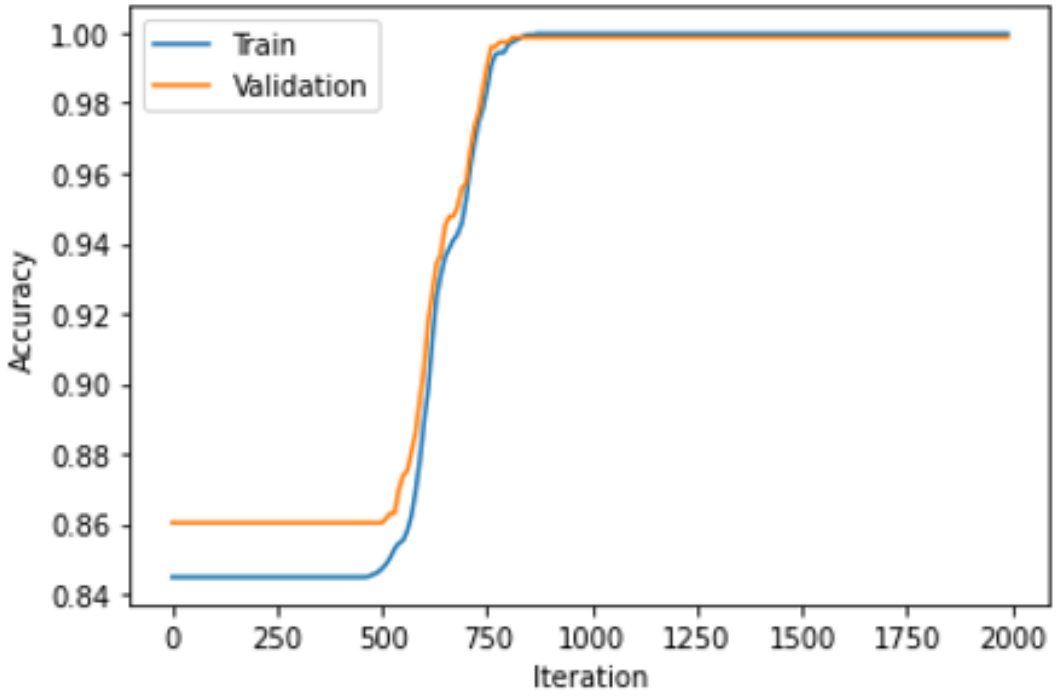
Parameters

AS A RESULT, WE CAN SAY THAT BEST ACCURACY VALUES HAPPENED İN LEARNİNG RATE = 0.1.

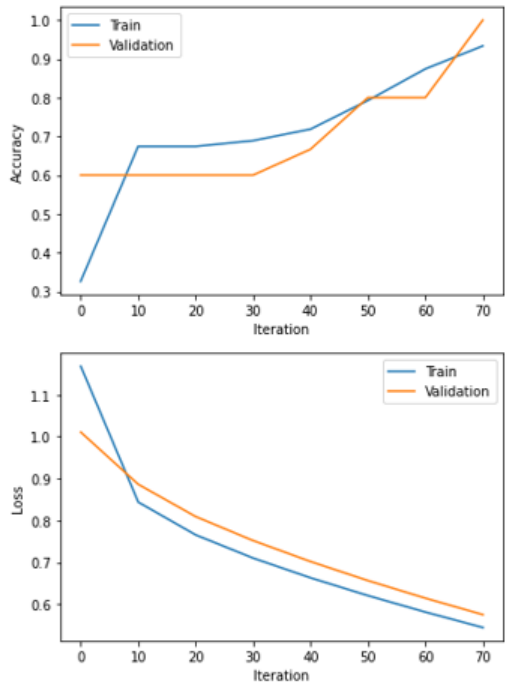
SİNCE TİME IS INCREASING WITH THE NUMBER OF HIDDEN LAYER NODES, BEST VALUE FOR NODE NUMBERS IS 20.

SKLearn vs My Algorithm





Accuracy in IRIS Dataset



	Iteration	Accuracy	Loss
0	0	0.325926	1.167665
	Iteration	Accuracy	Loss
0	10	0.674074	0.843605
	Iteration	Accuracy	Loss
0	20	0.674074	0.765423
	Iteration	Accuracy	Loss
0	30	0.688889	0.710086
	Iteration	Accuracy	Loss
0	40	0.718519	0.662999
	Iteration	Accuracy	Loss
0	50	0.792593	0.620517
	Iteration	Accuracy	Loss
0	60	0.874074	0.581255
	Iteration	Accuracy	Loss
0	70	0.933333	0.544429

Prediction Accuracy: 1.0
Prediction F1: 1.0

Thank you for listening, do you have any questions?