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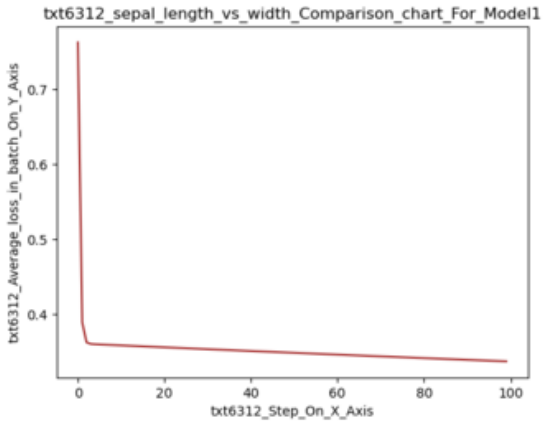
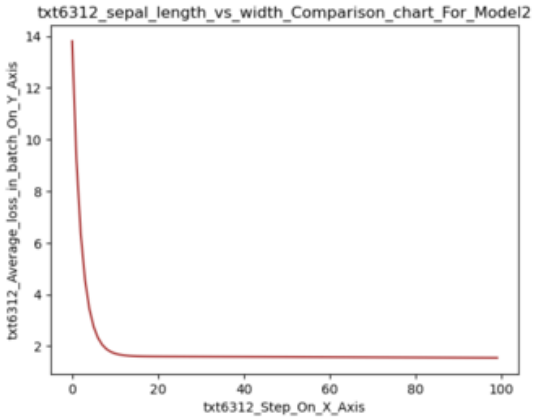
CSE 6363 --- Summer'23
Assignment 1

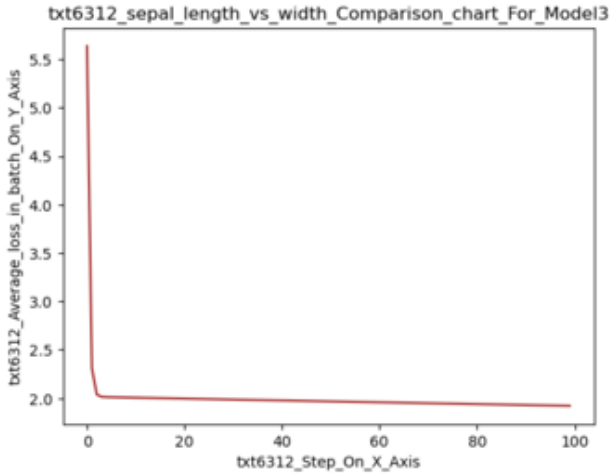
Linear Regression

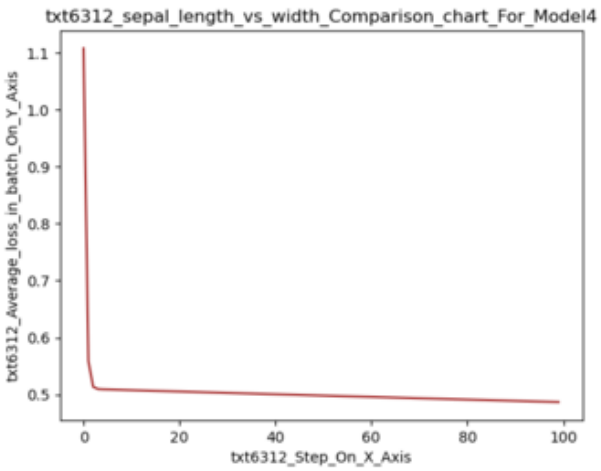
Ronald Fisher organized the Iris flower data collection in 1936 (see https://en.wikipedia.org/wiki/Iris_flower_data_set). It is a dataset that is frequently used to teach basic machine learning principles. This dataset will be used for both classification and regression tasks.

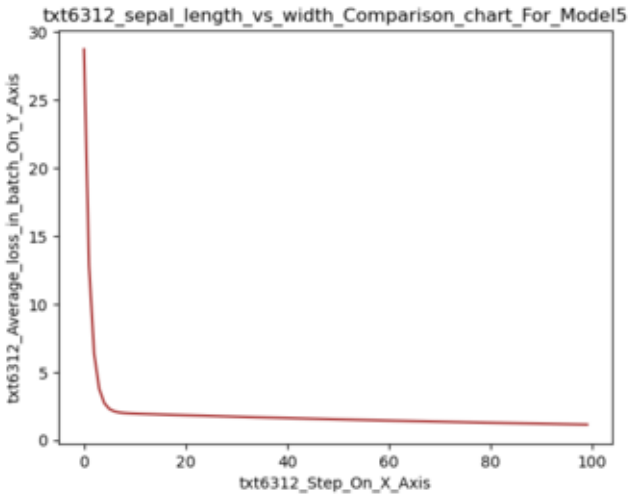
The following chart displays the loss vs the step-different models:







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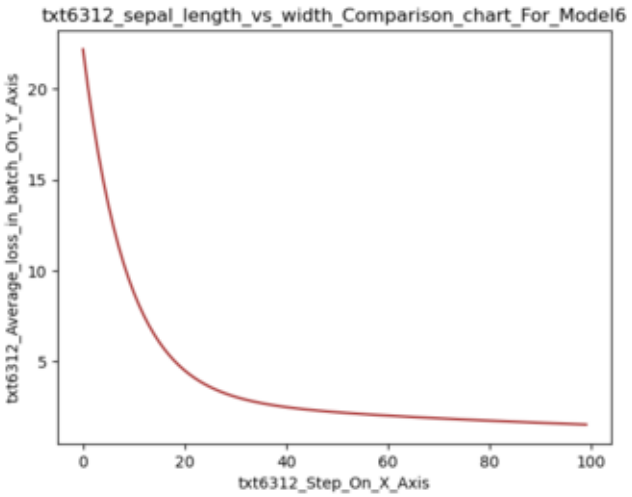
txt6312_Average_loss_in_batch_On_Y_Axis
txt6312_Step_On_X_Axis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txt6312_Average_loss_in_batch_On_Y_Axis
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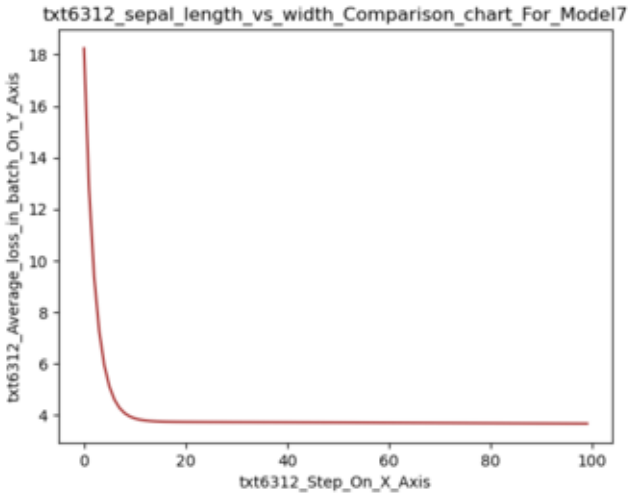
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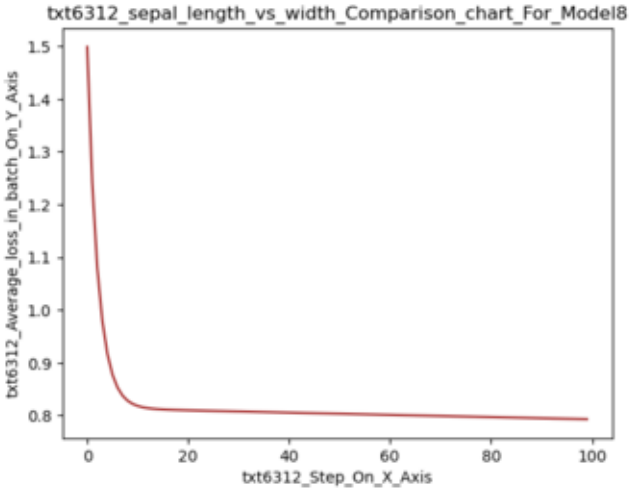
txt6312_Average_loss_in_batch_On_Y_Axis
txt6312_Step_On_X_Axis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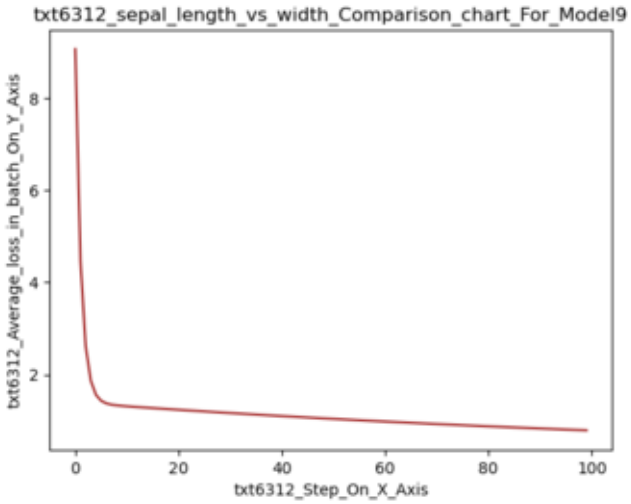
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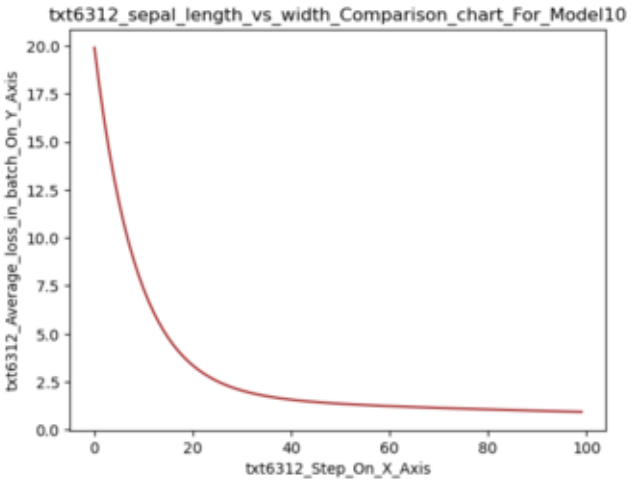
txt6312_Step_On_X_Axis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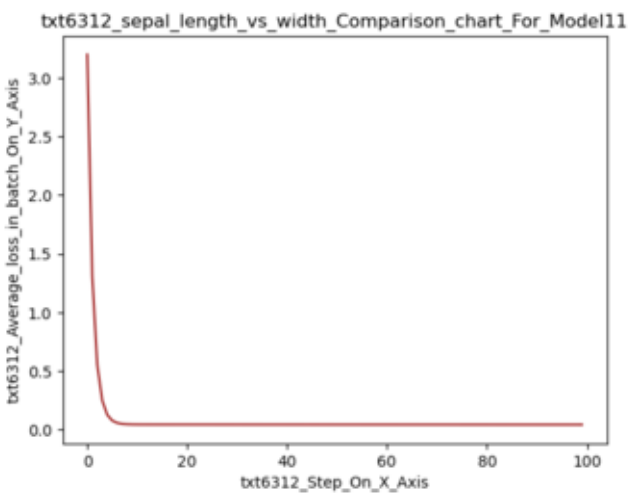
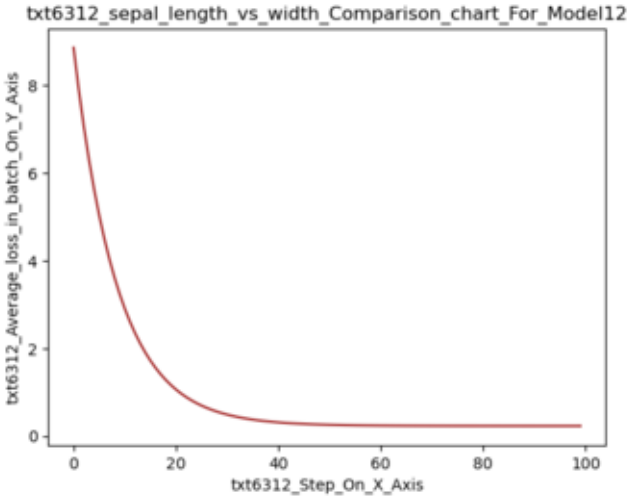




The weights of L2 Regularization and Mean Squared Error are contrasted in the following table. It is clear that l2 regularization reduces the mistake.

As a result, adding regularization improves algorithm accuracy.

	Mean Squared Error	L2 Regularization
w0	0.8252323554370375	0.2801690241611868
w1	0.3321188295662777	0.33420230729629957
error	0.38838722	0.341388254104276

The following table describes the Model and its accuracy with different inputs and outputs.

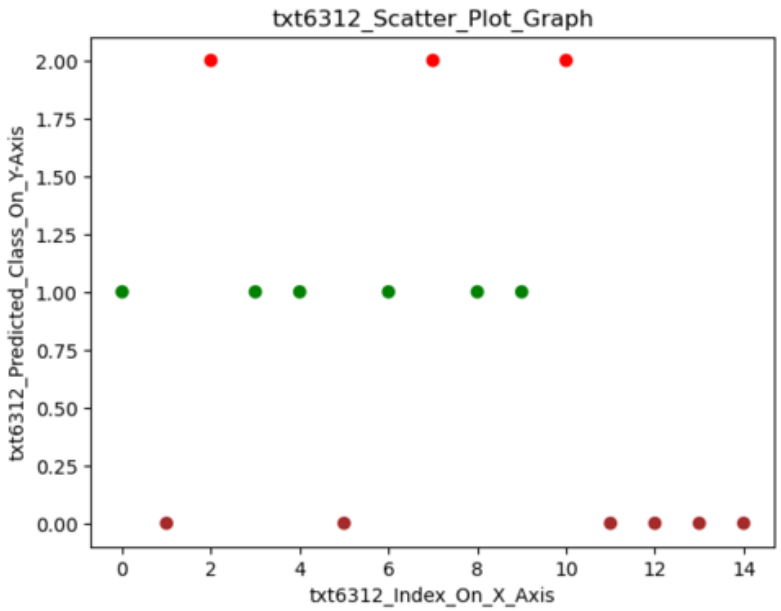
Model	Error
Sepal Length vs Sepal Width Model1	0.2696838600556661
Sepal Width vs Sepal Length Model 2	0.9840541908312987
Sepal Length vs Petal Length Model 3	3.595215462112951
Sepal Length vs Petal Width Model 4	0.7186816919723215
Petal Length vs Sepal Length Model 5	5.408831642643838
Petal Width vs Sepal Length Model 6	4.513068171863081
Sepal Width vs Petal Length Model 7	3.409447839714003
Sepal Width vs Petal Width Model 8	0.6090836644164614
Petal Length vs Sepal Width Model 9	0.8967584554809656
Petal Width vs Sepal Width Model 10	0.5151540964524072
Petal Length vs Petal Width Model 11	1.2960279023014005
Petal Width vs Petal Length Model 12	4.9156630050442764

The table shows that Sepal Length vs Sepal Width, Sepal Length vs Petal Width, Petal Length vs Petal Width, and Petal Width vs Petal Length are all excellent predictors of one another.

Classification:

Linear Discriminant Analysis:

The following plot represents the linear discriminant analysis.



Due to the data's extreme stability and tiny size, we achieve 100% accuracy for the naive bayes classifier.

For model 1 of the logistic regression, which compares classes 0 to 1 and 2, we get 100% accuracy. We get 80% accuracy for model 2, which compares class 1 to classes 0 and 2.

We get 80% accuracy for model 3, which compares class 2 to classes 0 and 1.

Read Me Section :

As I have directly written out "**.pynb"** files, there's no need for evaluation scripts, just running those files are enough to generate different outputs.