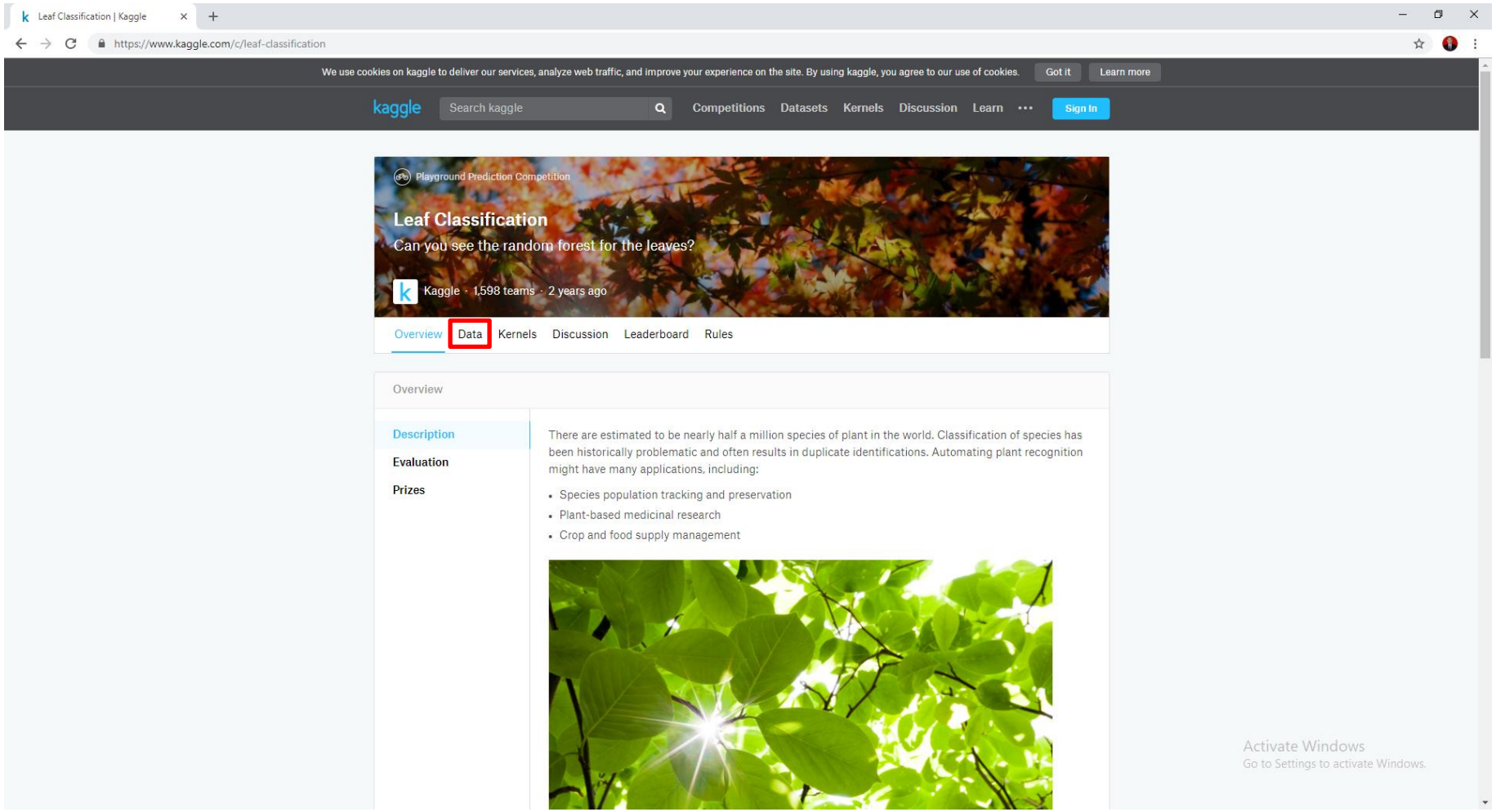
Leaf Classification

(use softmax_cross_entropy_with_logits)

Training Data

1. Download Dataset from: https://www.kaggle.com/c/leaf-classification



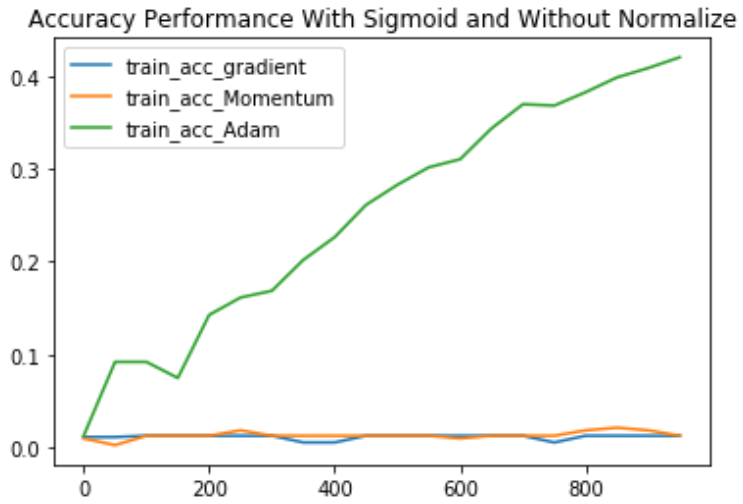
Description

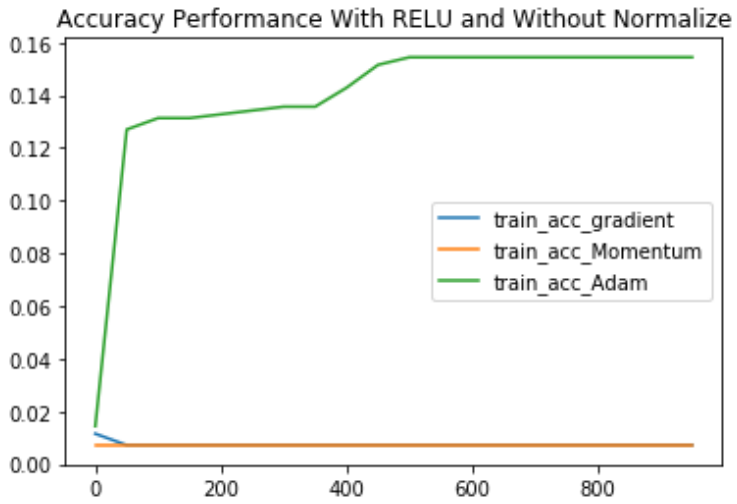
- This homework tried to made leaf classification with dataset from https://www.kaggle.com/c/leaf-classification using **MLP (Multilayer Perceptron)**. The dataset consists approximately 1,584 images and contains binary leaf images and extracted features, including shape, margin & texture, to accurately identify 99 species of plants.

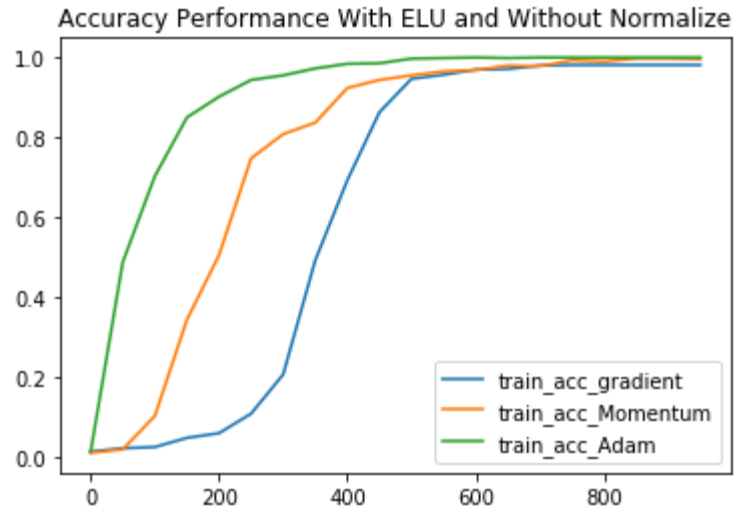
- This work used "softmax regression and cross entropy error" to made prediction of leaf classification with some parameters tuning:
  - ✓ Compare the performance of different optimizers (3 optimizers)
  - ✓ Compare the performance of sigmoid, ReLU, ELU
  - ✓ Compare the performance of normalizing the input data or not

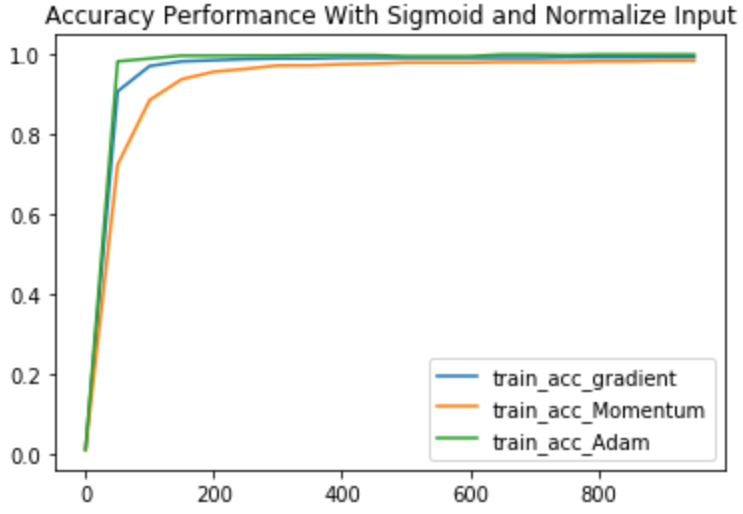
- You can use the following code to normalize the input features
  - ✓ from sklearn.preprocessing import StandardScaler
  - ✓ scaler = StandardScaler()
  - ✓ feature_matrix = scaler.fit_transform(feature_matrix)

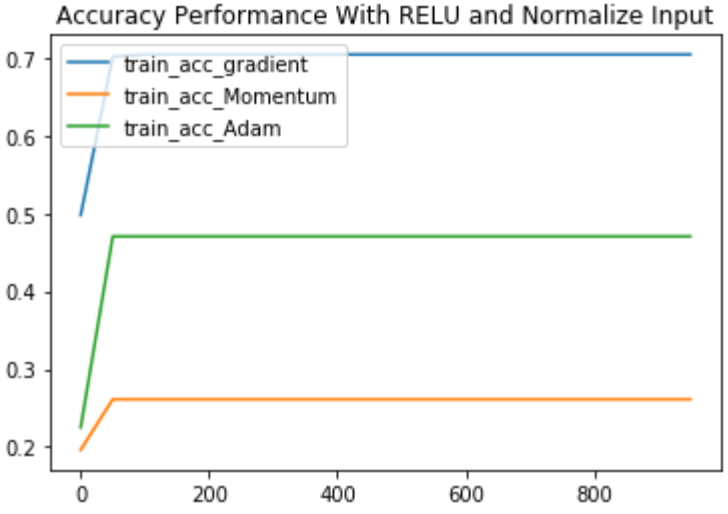
Simulation Result (Accuracy Performance)

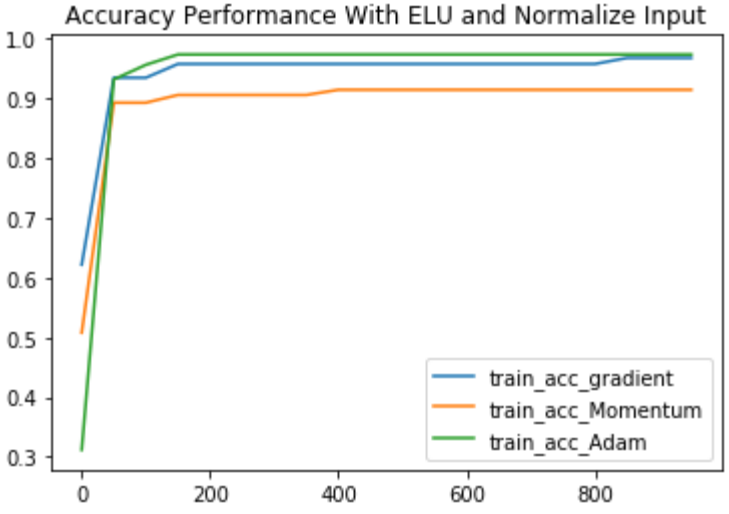












Simulation Result (Accuracy Performance)

- **Un - Normalize Input**

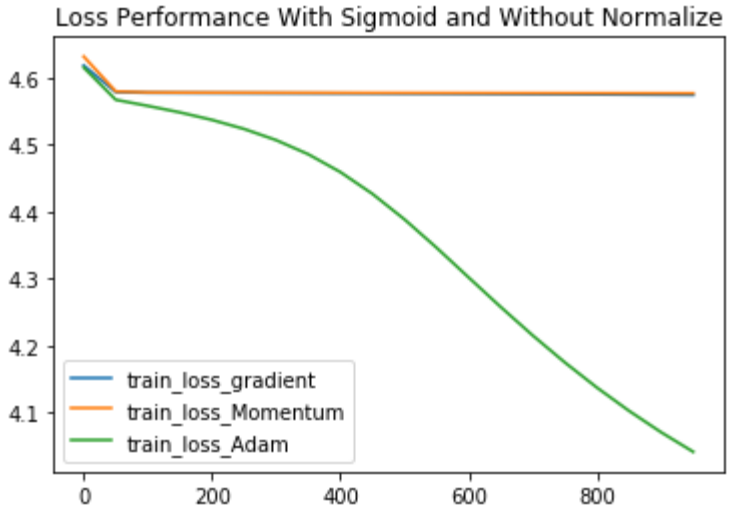
Optimizers	Function	Number of Epochs	Highest Accuracy
Gradient Descent	Sigmoid	950	0.012987013
Momentum	Sigmoid	950	0.012987013
Adam	Sigmoid	950	0.4199134
Gradient Descent	RELU	950	0.007215007
Momentum	RELU	950	0.007215007
Adam	RELU	950	0.15440115
Gradient Descent	ELU	950	0.981241
Momentum	ELU	950	0.995671
Adam	ELU	600	1.0

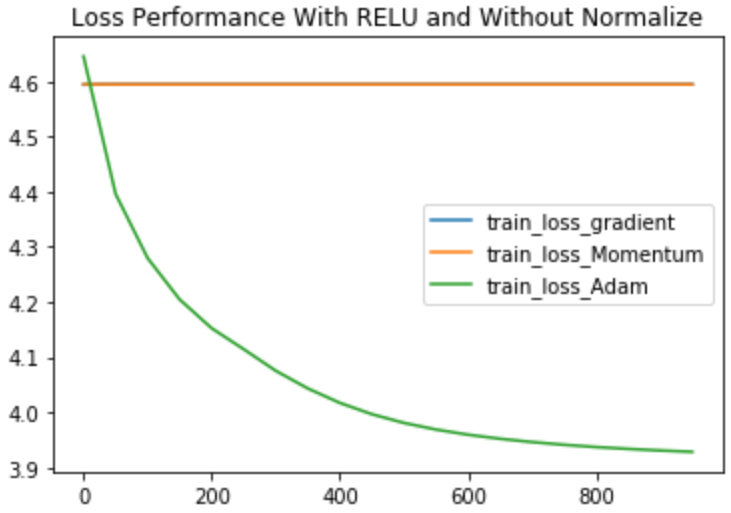
Simulation Result (Accuracy Performance)

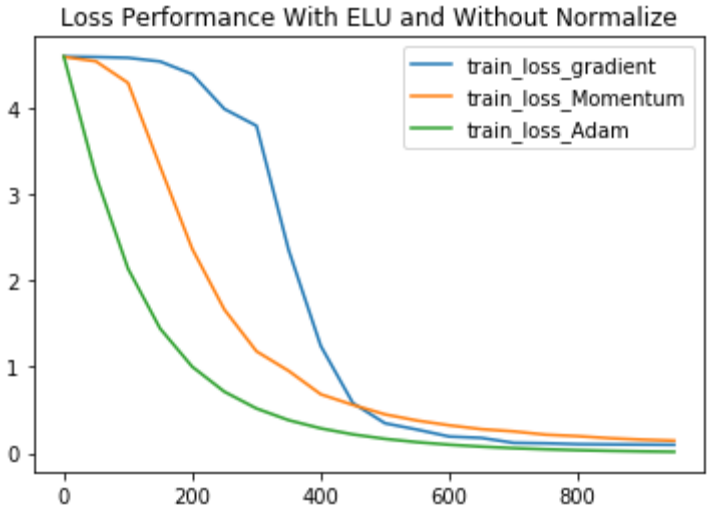
- **Normalize Input**

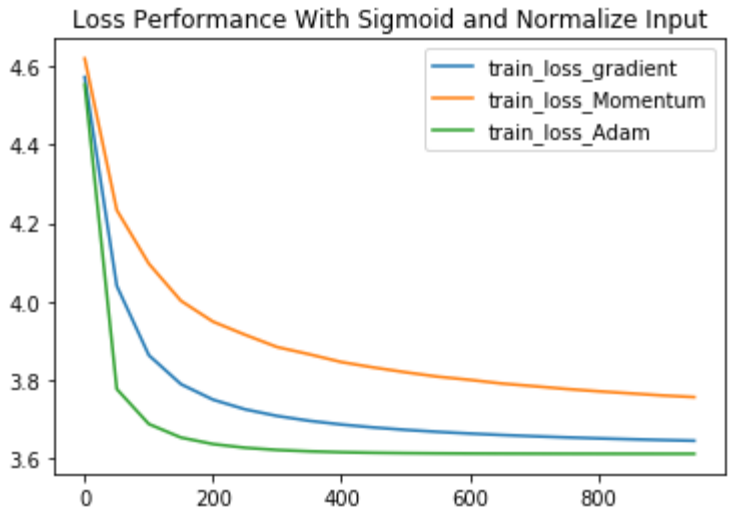
Optimizers	Function	Number of Epochs	Highest Accuracy
Gradient Descent	Sigmoid	950	0.992785
Momentum	Sigmoid	950	0.984127
Adam	Sigmoid	650	1.0
Gradient Descent	RELU	950	0.7041847
Momentum	RELU	950	0.26118326
Adam	RELU	950	0.47041848
Gradient Descent	ELU	950	0.96825397
Momentum	ELU	950	0.91486293
Adam	ELU	950	0.97402596

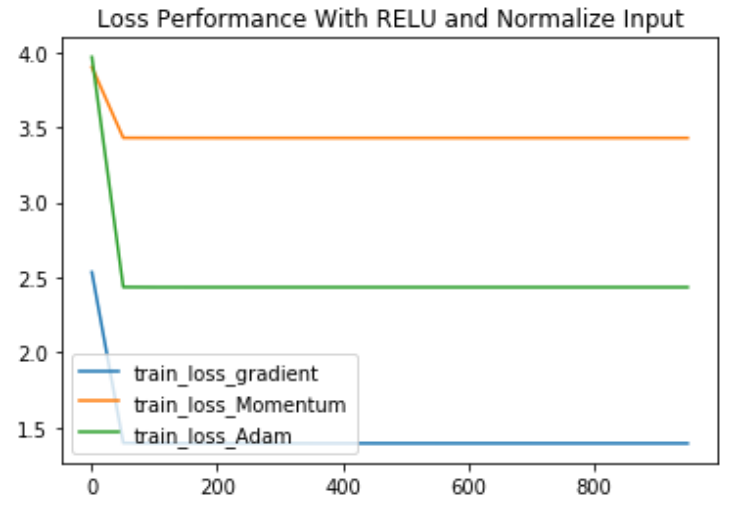
Simulation Result (Loss Performance)

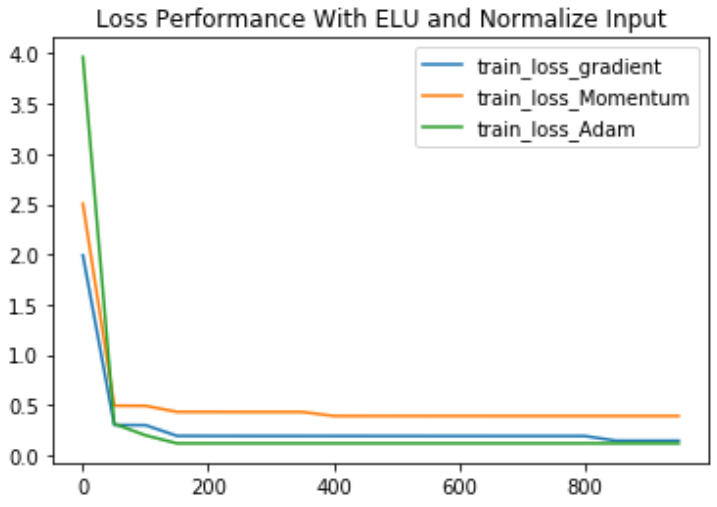












Simulation Result (Loss Performance)

- **Un - Normalize Input**

Optimizers	Function	Number of Epochs	Lowest Loss
Gradient Descent	Sigmoid	950	4.574041
Momentum	Sigmoid	950	4.5766363
Adam	Sigmoid	950	4.0416007
Gradient Descent	RELU	950	4.59512
Momentum	RELU	950	4.59512
Adam	RELU	950	3.928196
Gradient Descent	ELU	950	0.09765818
Momentum	ELU	950	0.14541991
Adam	ELU	950	0.016129047

Simulation Result (Loss Performance)

- **Normalize Input**

Optimizers	Function	Number of Epochs	Lowest Loss
Gradient Descent	Sigmoid	950	3.645684
Momentum	Sigmoid	950	3.7568676
Adam	Sigmoid	950	3.6123497
Gradient Descent	RELU	950	1.3925711
Momentum	RELU	950	3.4282568
Adam	RELU	950	2.433491
Gradient Descent	ELU	950	0.14606574
Momentum	ELU	950	0.39170784
Adam	ELU	950	0.119353764