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Course: Advanced Natural Language Processing

Assignment: 02 – Intent Classification with Feedforward
Neural Network

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Intent Classification with Feedforward Neural Network

Tools Used:

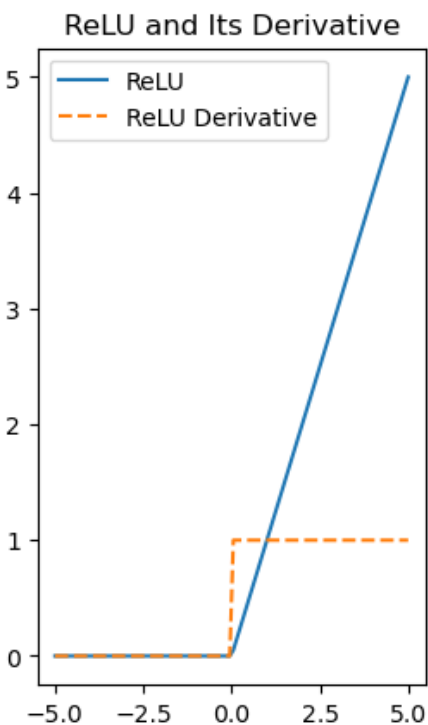
1. IDE: PyCharm
2. Jupyter Notebook
3. Python: Numpy, NLTK, matplotlib

Source of the Dataset:

Source of the dataset: Coucke A. et al., "Snips Voice Platform: an embedded Spoken Language Understanding system for private-by-design voice interfaces." 2018, accepted for a spotlight presentation at the Privacy in Machine Learning and Artificial Intelligence workshop colocated with ICML 2018.

Advantages and Disadvantages of different Activation functions:

1. ReLU (Rectified Linear Unit):

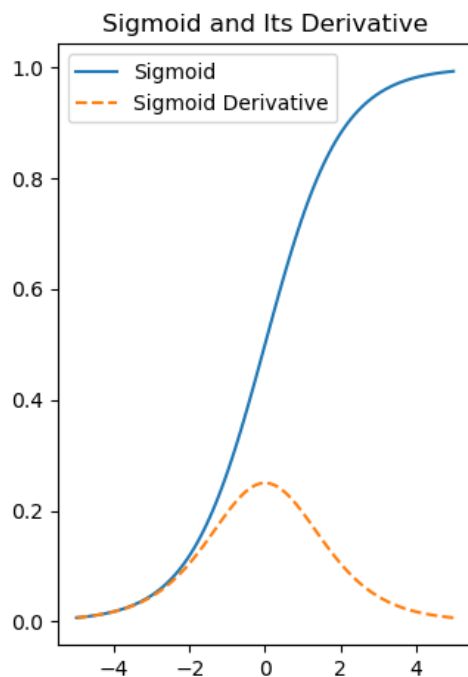


Advantages:

Computationally efficient due to its simplicity. Addresses the vanishing gradient problem, which can occur with other activation functions like sigmoid or tanh. Provides sparsity (activation is either 0 or positive).

Disadvantages:

Can suffer from the "dying ReLU" problem, where neurons can become inactive during training and stop learning entirely.

2. Sigmoid:**Advantages:**

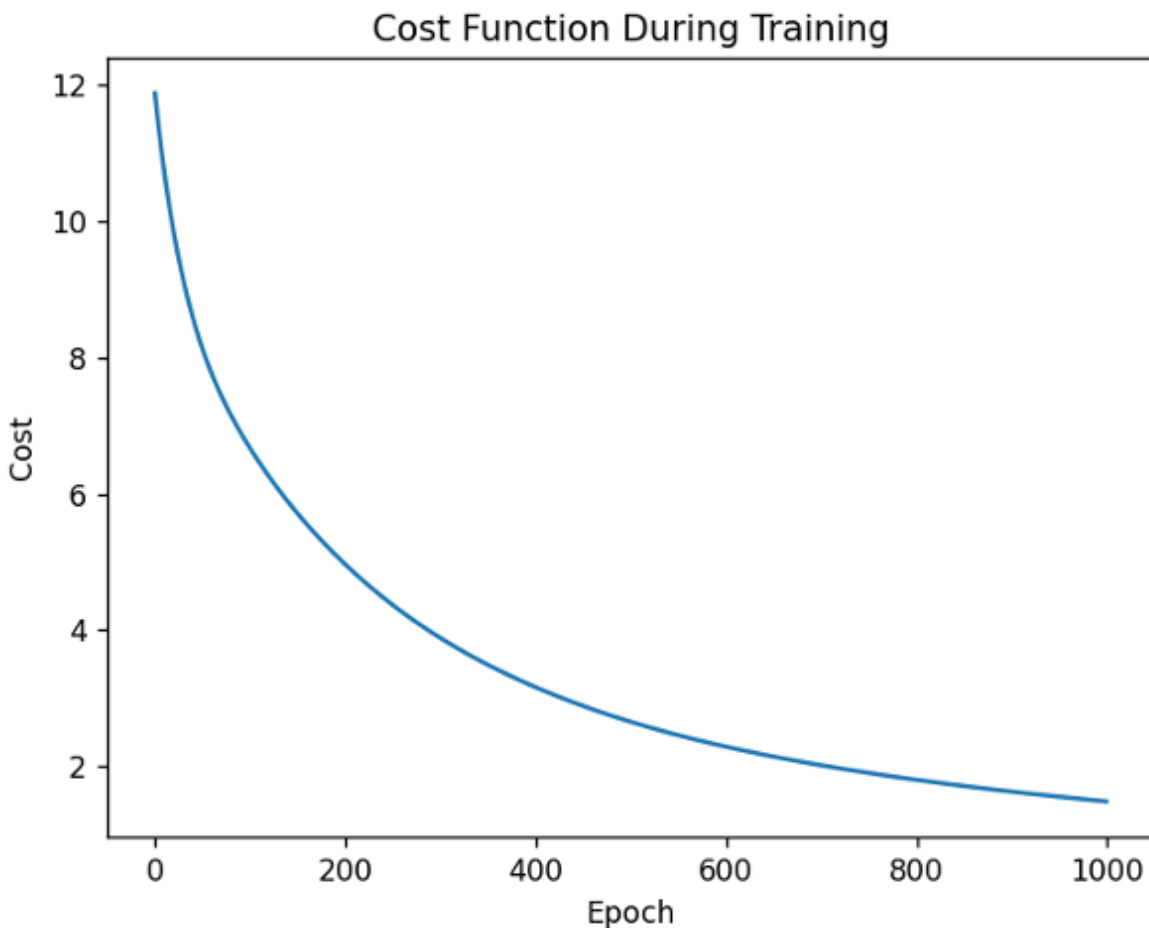
Outputs are in the range (0, 1), which is useful for binary classification problems. Smooth and differentiable, making it suitable for gradient-based optimization.

Disadvantages:

Prone to vanishing gradient problem, especially in deep networks. Outputs are not zero-centered, which can slow down learning in certain scenarios.

Accuracy after Backpropagation Training:

Before training the Neural Network, the accuracy of the network was 19.67%. After the training with 1000 epochs and learning rate of 0.005 the accuracy increased to 85.67%. The cost function is plotted for each epoch interval (the first one is after 800 epochs and the second one is after 200) as can be shown below.



Accuracy after Backpropagation using Mini-Batch Training:

After training the Neural Network using Mini-Batch Training, the accuracy of the model is increased from 85.77% to 98.34%. The plot of Cost function vs Epoch is shown below.

Cost Function During Mini-batch Training

