

Final Year B. Tech (EE)

Trimester: I Subject: Artificial Intelligence and Machine Learning

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Roll No: 52 Batch: A3

Experiment No: 04

Name of the Experiment: Classify species of Iris flower using MLP

	Marks	Teacher's Signature with date
Performed on:14/09/2023		
Submitted on:14/09/2023		

Aim: To create a multilayer neural network and classify species of iris flower using Python.

Prerequisite: Knowledge of MLP, iris flower data and its classes.

Objective:

To create a multi-layer neural network and classify iris flower data using Python Programming.

Components and Equipment required:

SkLearn Python module, Python software, NumPy and Panda Libraries



Theory

A hobby botanist is interested in distinguishing the species of some iris flowers that she has found. She has collected some measurements associated with each iris, which are:

- the length and width of the petals
- the length and width of the sepals, all measured in centimetres.

She also has the measurements of some irises that have been previously identified by an expert botanist as belonging to the species setosa, versicolor, or virginica. For these measurements, she can be certain of which species each iris belongs to. We will consider that these are the only species our botanist will encounter.

The goal is to create a machine learning model that can learn from the measurements of these irises whose species are already known, so that we can predict the species for the new irises that she has found.

Building our model

As we have measurements for which we know the correct species of iris, this is a supervised learning problem. We want to predict one of several options (the species of iris), making it an example of a classification problem. The possible outputs (different species of irises) are called classes. Every iris in the dataset belongs to one of three classes considered in the model, so this problem is a three-class classification problem. The desired output for a single data point (an iris) is the species of the flower considering it's features. For a particular data point, the class / species it belongs to is called its label.

Procedure:

• SkLearn is a pack of Python modules built for data science applications

- load_iris: The classic dataset for the iris classification problem. (NumPy array)
- train_test_split: method for splitting our dataset.
- KNeighborsClassifier: method for classifying using the K-Nearest Neighbor approach.
- NumPy is a Python library that makes it easier to work with N-dimensional arrays and has a
 large collection of mathematical functions at its disposal. It's' base data type is the
 "numpy.ndarray".

Output

The target array contains the species of each of the flowers that were measured. This array is composed of numbers from 0 to 2.

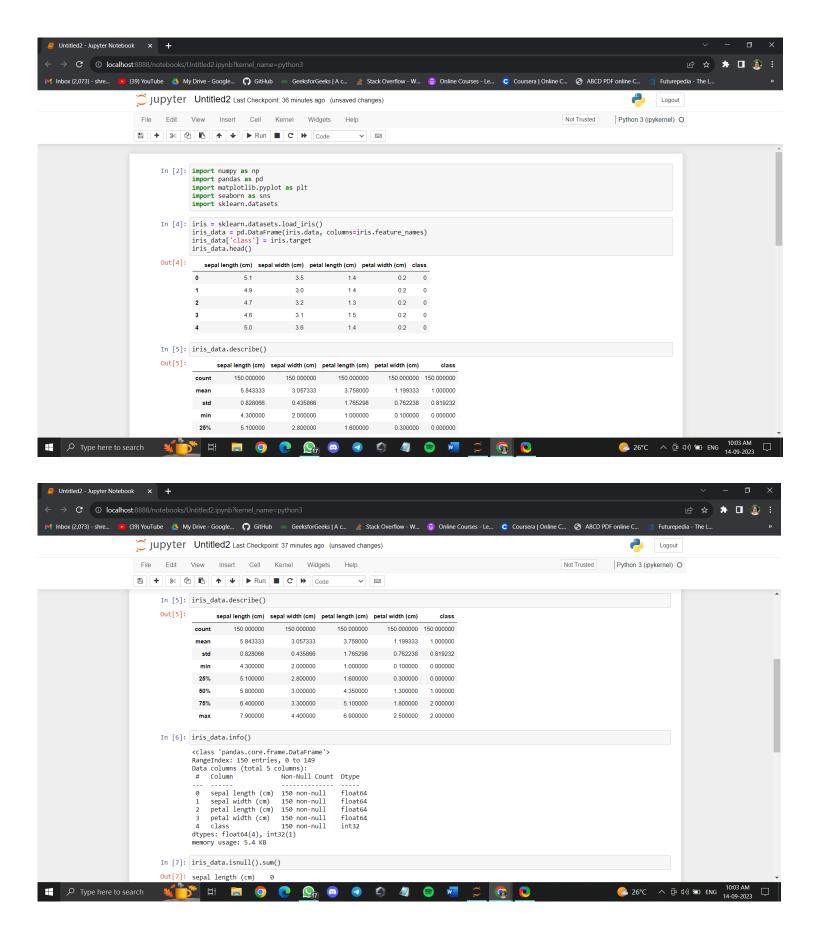
The meaning of those numbers are directly related to our target names (classes):

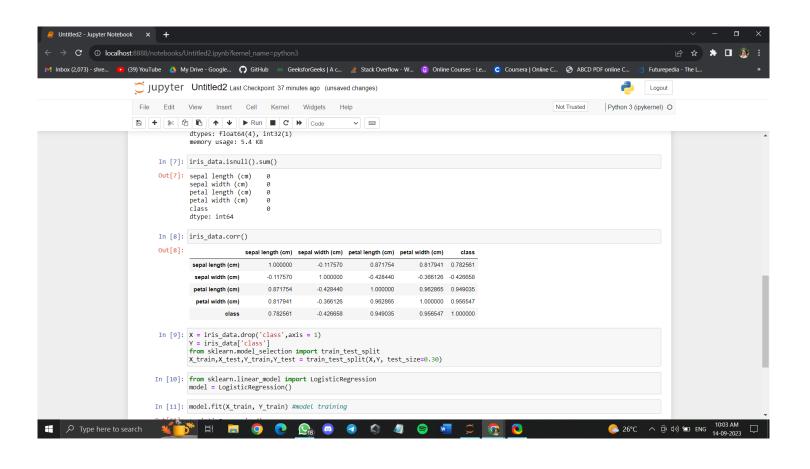
- setosa (0)
- versicolor (1)
- virginica(2)

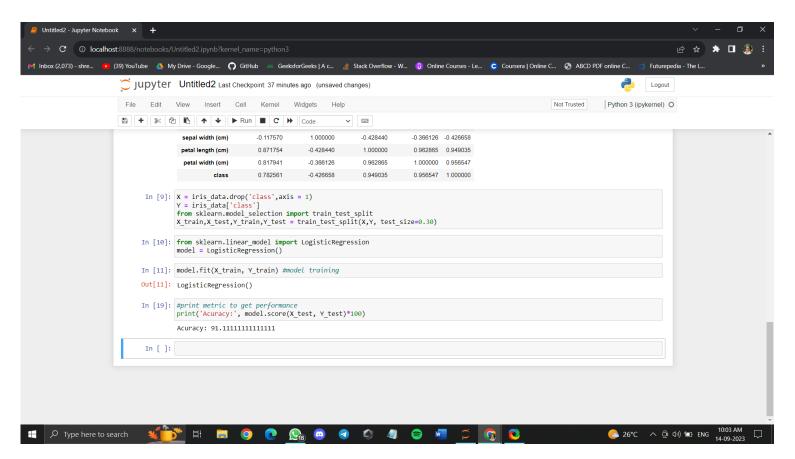


Post Lab Questions:

- 1. What are the limitations of a perceptron?
- 2. Explain Generalization.
- 3. How many training data patterns should be used to train a back propagation network.
- 4. How to determine the number of Hidden Layer Nodes.







Exp4 of Fris flower using MLP * Post lab quastionson what are the limitations of perceptron? 7 Limitations of parception -2 lack of Hidden layers 3 Binary outputs

G sensitivity to Input Scale

G Inability to Learn Complex Functions

D Lack of Representation Learning 1) unsuitable for Image & speech Recognition. 8) Training challonges (32) Explain Generalization -> Generalization, in the context of machine learning, refers to a model's ability to parform well on now, unseen data that it has not boon specifically hained on. It means that the model has learned underlying patterns and relation ships in the training data without simply momorizing it. A good generalization implies that the model can make accurate predictions or classifications for a wide range of inputs beyond the training set, indicating its ability to capture.

		PAGE Web.
20		DATE
OS OS	3>	How many training data patterns should be used to train a back propagation network
		The number of training data patterns needed for a back propagation neural network varies based on factors like problem complexity and network design Generally, thousands to tens of thousands of diverse data points are often required, but it depends on the specific problem. Over fitting should be excited problem, over fitting should be excited for good generalization. Experementation & cross-validation her deformine the night data sot gize
	,h)	How to determine the number of Hidden Layer Nodes
	0	The no-of hidden layor Nodes are- start simple (avadually invoce Avaid over fitting
\		use of Rule of Thumb
\	(5)	consider Architectural Variations
	6	Regularization Techniques
\	(8)	Cross - validation Pomain Knowledge
1-		The state of the s