**TOPIC : Classification of Iris Flower**

**Subject : Artificial Intelligence (INT-404)**

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**Classification of iris flowers from sepal and petal dimensions**

This is perhaps the best known example in the field of machine learning.

The aim is to classify iris flowers among three species (setosa, versicolor or virginica) from measurements of length and width of sepals and petals.

The iris data set contains 3 classes of 50 instances each, where each class refers to a type of iris plant.

The central goal here is to design a model which makes good classifications for new flowers or, in other words, one which exhibits good generalization.

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**1. Application type**

This is a [classification](https://www.neuraldesigner.com/learning/tutorials/neural-networks-applications#Classification) project, since the variable to be predicted is categorical (setosa, versicolor or virginica).

The goal here is to model the probabilities of class membership, conditioned on the flower features.

**2. Data set**

The first step is to prepare the [data set](https://www.neuraldesigner.com/learning/tutorials/data-set), which is the source of information for the classification problem. For that, we need to configure the next concepts:

* Data source.
* Variables.
* Instances.

The [data source](https://www.neuraldesigner.com/learning/tutorials/data-set#DataSource) is the file [iris\_flowers.csv](https://www.neuraldesigner.com/files/datasets/iris_flowers.csv). It contains the data for this example in comma separated values (CSV) format. The number of columns is 5 and the number of rows is 150.

The [variables](https://www.neuraldesigner.com/learning/tutorials/data-set#Variables) are:

* **sepal\_length**: Sepal length, in centimeters, used as input.
* **sepal\_width**: Sepal width, in centimeters, used as input.
* **petal\_length**: Petal length, in centimeters, used as input.
* **petal\_width**: Petal width, in centimeters, used as input.
* **class**: Iris Setosa, Versicolor or Virginica, used as target.

Note that neural networks work with numbers. In this regard, the categorical variable "class" is transformed into three numerical variables as follows:

* iris\_setosa: 1 0 0.
* iris\_versicolor: 0 1 0.
* iris\_virginica: 0 0 1.

The [instances](https://www.neuraldesigner.com/learning/tutorials/data-set#Instances) are divided into a training, a selection and a testing subsets. They represent 60% (90), 20% (30) and 20% (30) of the original instances, respectively, and are splitted at random.

**7. Model deployment**

The neural network is now ready to predict outputs for inputs that it has never seen. This process is called [model deployment](https://www.neuraldesigner.com/learning/tutorials/model-deployment).

To classify a given iris flower, from the lengths and widths of its sepals and petals, we calculate the [neural network outputs](https://www.neuraldesigner.com/learning/tutorials/model-deployment#NeuralNetworkOutputs). For instance:

* Sepal length: 5.84 cm.
* Sepal width: 3.05 cm.
* Petal length: 3.76 cm.
* Petal width: 1.20 cm.
* **Probability of Iris Setosa: 22 %.**
* **Probability of Iris Versicolor: 57 %.**
* **Probability of Iris Virginica: 21 %.**

For this particular case, the neural network would classify that flower as being of the virginica specie, since it has the highest probability.