Abstract

Abstract—The choice of Activation Functions (AF) has proven to be an important factor that affects the performance of an Artificial Neural Network (ANN). Use a 1-hidden layer neural network model that adapts to the most suitable activation function according to the data-set. The ANN model can learn for itself the best AF to use by exploiting a flexible functional form, $k0 + k1 * x$ with parameters k0, k1 being learned from multiple runs.

Introduction

Classification is one of the major data mining processes which maps data into predefined groups. It comes under supervised learning method as the classes are determined before examining the data. All approaches to performing classification assume some knowledge of the data. Usually, a training set is used to develop the specific parameters required. Pattern classification aims to build a function that maps the input feature space to an output space of two or more than two classes. Neural Networks (NN) are an effective tool in the field of pattern classification. Neural networks are simplified models of the biological nervous systems. An NN can be said to be a data processing system, consisting of a large number of simple, highly interconnected processing elements (artificial neurons), in an architecture inspired by the structure of the cerebral cortex of the brain. The interconnected neural computing elements have the quality to learn and thereby acquire knowledge and make it available for use. NN is an effective tool in the field of pattern classification. This project is related to the use of multi-layer feed-forward neural networks (MLFF) and backpropagation algorithm towards the identification of IRIS flowers based on the following measurements: sepal length, sepal width, petal length, and petal width. A variety of constructive neural-network learning algorithms have been proposed for solving the general function approximation problem. The traditional BP algorithm typically follows a greedy strategy

wherein each new neuron added to the network is trained to minimize the residual error as much as possible. This report also contains an analysis of the performance results of backpropagation neural networks with various numbers of hidden layer neurons and the different number of epochs.

objectives

Use a 1-hidden layer neural network model that adapts to the most suitable activation function according to the data-set. The ANN model can learn for itself the best AF to use by exploiting a flexible functional form, $k0 + k1 * x$ with parameters k0, k1 being learned from multiple runs.

Problem statement and methodology

This chapter will explain the proposed method in detail and how the project is concerned to classify each type in the right way.

Problem Statement

Use a 1-hidden layer neural network model that adapts to the most suitable activation function according to the data-set. The ANN model can learn for itself the best AF to use by exploiting a flexible functional form, $k0 + k1 * x$ with parameters k0, k1 being learned from multiple runs.

The Material

1- **sepal length**
2- **sepal width**
3- **petal length**
4- **petal width**

2.4.1 Preprocessing

Initially the dataset pre-processing was done by isolating the attribute part that have the features from the label part and cleaning the data by removing null or missing values.

The dataset is shuffled to ensure that all cases will be trained on the neural network and tested successfully.

In addition, the dataset has been configured to be an input to the neural network, by normalize it and make its values between zero and one to reduce the model over-fitting.

Testing and training the accuracy

This will show you the training and the accuracy for the Iris dataset and with the set of correct code we can find the accuracy with every run.

Summary

These steps show the summary of IRIS flower and neural network

1- Load the dataset and clean it to extract the feature vector.
2- Normalize the extracted features.
3- Split the dataset into training set and test set to evaluate the neural network.
4- Create neural network and train it on the training set.
5- For each new IRIS flower image to be identified, calculate its feature vector.
6- Use these feature vectors as network inputs and simulate network with these inputs.

Results

We notice the top result yield when choose 4 hidden neurons and learning rate was 0.3 and the training time was 0.691 milliseconds. For all training test the time was performance and speed as well as between 0.6 millisecond to 4.3 milliseconds that show how the network is speed and accurate.

So with the help of the training the ann with batch size of 32 we are getting the values of

```
Epoch 1000/1000 4/4 [==============================] - 0s 24ms/step - loss: -
400.0548 - accuracy: 0.5333 - val_loss: -371.9798 - val_accuracy: 0.7000
```