

# WEST UNIVERSITY OF TIMIŞOARA FACULTY OF MATHEMATICS AND COMPUTER SCIENCE MASTER STUDY PROGRAM: ARTIFICIAL INTELLIGENCE AND DISTRIBUTED COMPUTING

## MASTER THESIS

SUPERVISOR: Conf. Dr. Kaslik Eva **GRADUATE:** Ricardo Belinha

# WEST UNIVERSITY OF TIMIŞOARA FACULTY OF MATHEMATICS AND COMPUTER SCIENCE MASTER STUDY PROGRAM: ARTIFICIAL INTELLIGENCE AND DISTRIBUTED COMPUTING

# Neural Networks Based Recognition of the Species and Subspecies of Vegetable Leaves

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#### Abstract

The objective of this master's thesis is to illustrate how to create a neural network using MATLAB as an integrated development environment. MATLAB will be used to develop the neural network because it was not used within the Artificial Intelligence and Distributed Computing Master's program and I would like to get familiar with it. For this project, a graphical user interface was developed for easier interaction between the software and the user. The user will be able to configure the model and use different types of transfer functions, training algorithms, and different numbers of hidden layers.

A neural network is a simulation of the workings of the human brain that enables computer systems to spot patterns and address common problems. My interest in leaves served as the source of inspiration for this endeavor. Nowadays, using technology to study is a more mature activity, and as a result, adults have more difficulty managing their time than children do. Learning rapidly is great since it will supply the people with some of the same learnt information and emotional fulfillment that science manuals do. I decided to expand my understanding of leaves and created this neural network to help aspiring apprentices in this field classify leaves more swiftly and effortlessly.

In the past, businesses and individuals have been successful in creating neural networks that discriminate items and/or persons using visual categorization. Since neural networks described a significant advancement in image recognition, similar applications were incredibly beneficial in comprehending the value and significance of a neural network. Everything, from social network photo tagging (Chapter 3.1.1) to self-driving automobiles (Chapter 3.1.6), relied on such fundamental concepts. As can be shown, neural networks are constantly working hard in the background of numerous applications, from examining one's vacation photos (Chapter 3.1.3) to providing healthcare (Chapter 3.1.2). The related applications demonstrate how a neural network with picture recognition can significantly improve a person's life.

The unique feature of the thesis is that I created the neural network fully on my own, making it possible to use it enthusiastically and without an internet connection to determine the specie and sub specie of a leaf. One can contend that by focusing on gathering the necessary data to classify the leaves, the neural network aids users in self-development.

The script has been written so that it can collect input and adapt. For a better weight adjustment, the neural network will train multiple times. The model will then be prepared to categorize and recognize unknown inputs. The development of the script helps in the comprehension of the various steps necessary to construct two completely functional neural networks that are capable of training using a variety of configurations and ultimately classifying the specie and sub specie of a leaf. As can be observed in section 2.2.1.2. The first neural network was trained using binary images, whereas the second used the attributes of the images. Both neural networks have undergone 1082 different types of training in total, with 24 instances of 100% overall success.

Due to the range of tools at the developer's disposal, using MATLAB to construct this project proved advantageous throughout. The Deep Learning Toolbox assisted with the training portion, enabling the developer to monitor the effectiveness of the preparation through charts and apps. In order to provide a user-friendly

interface and reduce the need for the user to learn a programming language or input commands, the MATLAB GUI assisted in the creation of the visual user interface. And last but certainly not least, the MATLAB Application Compiler, which builds an installer for the application and installs all the requirements required to run the project as well as the project itself, allowing it to be shared royalty-free with other users.

There are four chapters in this master's thesis.

The goal of the first chapter, "Problem Description," is to define a neural network, describe the thesis topic, and characterize the input data that the neural networks use.

The second chapter, "Related Work," is devoted to displaying some effective programs that employ image categorization to identify objects and/or persons.

The third chapter analyzes all of the output produced by this thesis project and presents the conclusions. The ideal neural network configurations will be identified.

The fourth chapter covers the functionality of the application, including details on the user guide and development guide.

As a conclusion, the project focuses on the creation of a neural network in MATLAB that can identify the specie and sub specie of a leaf using only an example of the iris neural network as a starting point. Users will have the chance to learn more about the various kinds of leaves that can be found worldwide. In addition, through this project, I want to motivate other programmers to create neural networks that take a straightforward photo as input and provide the user just enough feedback to keep learning more and more about a certain subject.

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# Chapter 1

## Introduction

This chapter attempts to briefly describe the choice of the subject and related applications of the submitted topic, the desired and pursued targets, and how the thesis is structured.

#### 1.1 Generalities

This master's thesis aspires to demonstrate the procedure of creating a neural network by utilizing MATLAB as the integrated development environment.

A neural network is a representation of the human brain's functions that enables computer systems to identify patterns and solve common issues. The inspiration for this project appeared as a result of my curiosity about leaves. The fact is that utilizing technology to study is a mature pastime today, and as a result, adults struggle with time management in comparison to their younger counterparts. Learning quickly is ideal since it will give the individuals some of the same emotional gratification and learned information that science manuals provide. I chose to further my knowledge of leaves and constructed this neural network to assist future apprentices in this domain in classifying leaves more easily and quickly.

Historically, companies and individuals have succeeded in developing neural networks that use visual categorization to distinguish objects and/or people. As examples, we may point to social networks, COVID masks verifier, Google photos' location, reverse image search from Google, Shutterstock: image composition artificial intelligence, and the autopilot from Tesla. All of these firms and individuals show the use of neural networks and how they may have a significant influence on one's life.

The novel aspect of the thesis is that I constructed the neural network entirely on my own, allowing it to be utilized without an online connection and with great excitement in order to identify the specie and sub specie of a leaf. As a result, one might argue that the neural network assists users in self-development by concentrating on acquiring the essential information to categorize the leaves.

The script will be designed to receive input and learn from it. The neural network will train various times in order to better adjust the weights. And afterwards, the model will be ready to identify and classify unknown inputs.

Within this thesis, I wish to develop a neural network in MATLAB, using only an example of the iris neural network as a starting point, that recognizes the specie and sub specie of a leaf. It will give users the opportunity to learn more about the

different types of leaves that exist in the world. Moreover, I intend to inspire other developers to develop neural networks that use a simple photo as input and provide the user with enough feedback in order to learn more and more about a specific topic.

## 1.2 Thesis structure

This master's thesis contains four chapters.

The first chapter, titled "Problem Description", is intended to explain what a neural network is, the thesis topic, and the input data utilized in the neural networks.

The second chapter, named "Related Work", focuses on showcasing some successful applications that use image classification to distinguish items and/or people.

The third chapter, summarizes the findings by analyzing all of the output generated by this thesis project. We will be able to determine which configurations are optimal for the neural network.

Last but not least, the fourth chapter discusses the application's functionality, containing information on the user guide and developer guide.

## Chapter 2

# **Problem Description**

This chapter gives details regarding what a neural network is, the thesis project itself, and the input data used in the neural networks.

#### 2.1 Neural network

A neural network is composed of neurons, where each of these neurons corresponds to a unit of information processing. The information that enters the network (attributes or characteristics of the problem) is called input; to the information resulting from the processing, the output name is given (what is intended to be achieved). In neural networks, information processing is distributed over a large number of interconnected units. Each neuron is stimulated by one or more connections from other neurons, called synapses, and this signal is propagated throughout the system, in turn stimulating other neurons. In artificial neural networks, neurons are called perceptrons (Figure 2.1).

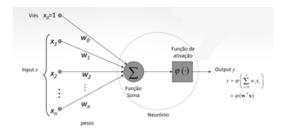


Figure 2.1: The Perceptron, or artificial neuron.

The output of the perceptron results from its training function or algorithm, the assigned weight, and the activation function. Training algorithms can be:

- 1. Perceptron Training Rule: random values are assigned to the coefficients w.
- 2. Gradient Descent: initializes the w coefficients randomly, applies them to all training examples in the unit, calculates the error generated for each w coefficient, and recalculates the error until it is low enough.
- 3. Stochastic Approximation to Gradient Descent: the correction value of each wi coefficient is calculated right after the presentation of a single example,

instead of adding up the errors of all the examples as in Gradient Descent.

The weight adjustment process is called an epoch; an epoch is when an entire dataset passes throughout the neural network back and forth once. The number of epochs rises according to the number of times w weights are adjusted and replaced.

As a result, the weights were adjusted more frequently when training with a neural network.

Briefly, in any of these training algorithms:

- Inputs that constitute training examples are applied to the perceptron or unit.
- Each one corresponds to a target value that is compared with a result: the output presented by the perceptron or linear unit.
- If this result generates a wrong classification, the synaptic coefficients or weights are readjusted.
- After training, in the presence of examples other than those used, the perceptron or unit must respond correctly.

The training functions can be:

• Hard-limit activation function (hardlim) - Figure 2.2.

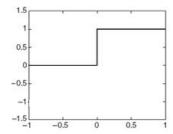


Figure 2.2: Plot: Hard-limit activation function (hardlim)

• Linear activation function (purelin) - Figure 2.3.

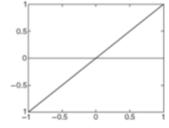


Figure 2.3: Plot: Linear activation function (purelin)

• Log-sigmoid activation function (logsig) - Figure 2.4.

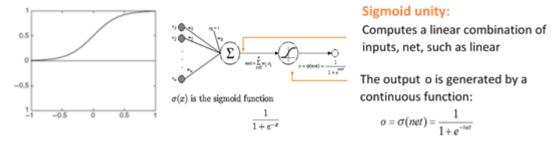


Figure 2.4: Plot: Log-sigmoid activation function (logsig)

• Hyperbolic tangent sigmoid activation function (tansig) - Figure 2.5.

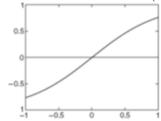


Figure 2.5: Plot: Hyperbolic tangent sigmoid activation function (tansig)

• Symmetric hard-limit activation function (hardlims) - Figure 2.6.

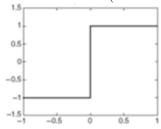


Figure 2.6: Plot: Symmetric hard-limit activation function (hardlims)

A set of perceptrons forms a neural network, the multilayer perceptron being a feed-forward network (Figure 2.7). The feed-forward network consists of an acyclic graph (usually completely connected), in which the inputs of each layer are the outputs of the previous layer.



Figure 2.7: Neural network

Perceptrons and linear units can only represent linear decision surfaces, giving results such as "positive" and "negative". Multilevel neural networks, trained by the BackPropagation Algorithm, adjust the weights of the networks from front to back, allowing you to train neural networks in multilayers so they can represent decision surfaces in very different ways.

The neural network is then composed of units organized into layers, usually 2 or 3, with the first units being the input units, which do not constitute a layer

(Figure 2.8). The inner units comprise the inner layer(s) or hidden layers, while the output units comprise the output layer.

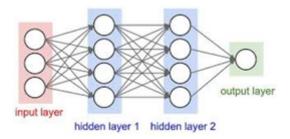


Figure 2.8: Neural network: input, hidden, and output layers.

The usefulness of neural networks is directly related to their ability to learn to classify, i.e., distinguish images, characters, sounds, etc., where each classification corresponds to an output or combination of different outputs. In order for this inherent utility to exist, three phases are needed, which are handled automatically by MATLAB[6] through the use of specific functions. By default, the program assigns them random values:

- Learning generally there is a value of 70% when defined by the user.
- Validation typically around 15%.
- Test remaining 15%.

It is necessary to know these percentage metrics to know how good the system is, thus having a comparison term. When training, validation, and testing values are predefined, a hold-out validation process is generally used to have more data and to be able to prove that the samples created have statistical significance to represent the population.

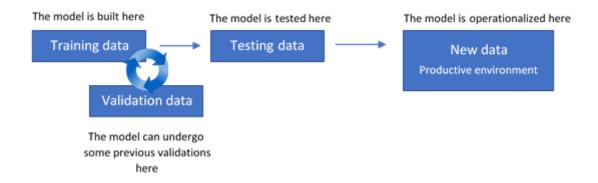


Figure 2.9: Training, validation, and testing.

If a model is tested with the same data that it was built with for training, its behavior cannot be generalized because it is unknown what its behavior is with previously unseen data and, for this, the data are used for testing (subchapter Leaves\_3: test data). The same author, while training the network, the training data can be divided into several data sets: the validation data, used to perform the

initial validations during network learning (subchapter Leaves\_2: validation data); Throughout the entire process of training, validation, and testing, the homogeneity of data, applicable to the specific problem you have, must be maintained: if you work with leaf images at the beginning, you must work throughout the process with leaves.

Learning may be supervised, unsupervised, or by reinforcement learning (i.e., approximately "by reward"). It is done by changing the synaptic coefficients (weights, [w\_n]) through an algorithm called backpropagation. Supervised training is done by applying previously classified examples (i.e., in which the intended inputs and outputs are already known) (Figure 2.10). Adjust the network parameters to find a function that performs the mapping between the provided input and output pairs.

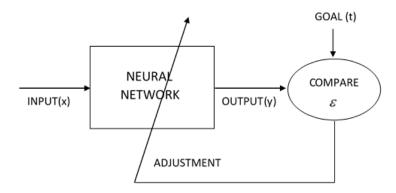


Figure 2.10: A scheme for the functioning of a neural network with supervised training.

There are two types of supervised training: offline and online. Once the network solution has been found, it must be maintained. If new data is added to the training set, a new training involving the previous data must be performed to avoid interference with the previous training. In unsupervised training (artificial neural networks), learning is done by discovering patterns in the input data. At the completion of a training session, the network is capable of resolving problems appropriately, whether successfully or not [3].

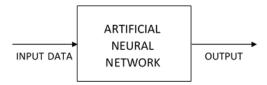


Figure 2.11: A neural network with unsupervised training (artificial neural network).

#### 2.2 Introduction to the project

In this project, in order to train the neural network, three folders with black and white images of leaves were used as data for the training.

1. The folder "Leaves\_1" contains 99 images;

- 2. The folder "Leaves\_2" contains 1564 images;
- 3. The folder "Leaves\_3" contains 20 images;

With the aim of creating a correspondence between the id of each image and its specie and sub specie, a table has been created. The input for the neural networks is the matrix containing such information.

Initially, the neural network was trained only with data from the folder Leaves\_1 and, later with the data from the folder Leaves\_2 was added to validate the training. At a later stage, the results are verified using the images contained in Leaves\_3 and other images which were not previously provided.

A record of the results of every training performed on the neural networks has been kept, so all the training results were supervised, and the results can be compared in order to understand how different configurations can influence the final results.

#### 2.2.1 Species

Figure 2.12 displays the species available in the folders "Leaves\_1", "Leaves\_2", and "Leaves\_3", each specie being assigned a different color. Also, it can be observed the quantity of images (leaves) belonging to each specie.

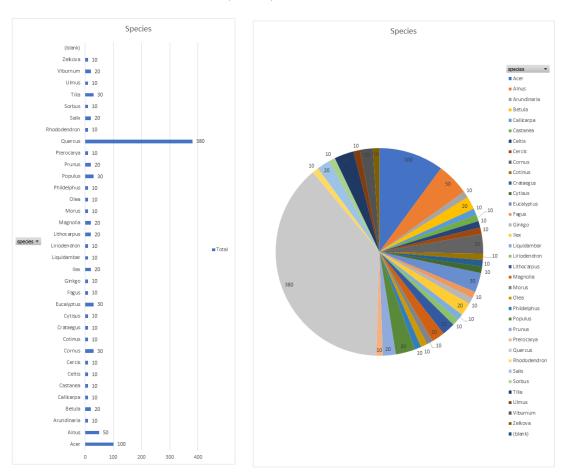


Figure 2.12: Species for the images in the folders: "Leaves\_1", "Leaves\_2", and "Leaves\_3".

#### 2.2.1.1 Procedure's description

In order to identify the species, it is necessary to process the input data. In view of this, a specific id has been assigned to each specie (Appendix A.1). Then, the images, which are in .JPG format (for example Figure 2.13), were converted to binary matrices, where the value 0 corresponds to black pixels and white pixels to the value 1. If the images were colored, they would be automatically transformed into black and white.



Figure 2.13: A sample image of a leaf.

As the size of the images for the leaves might be large, they will be reduced to 32 by 32 binary matrices, and the neural network output will be the classified specie (Figure 2.14).

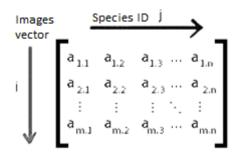


Figure 2.14: A matrix that contains image vectors in the rows and species IDs in the columns.

The matrix of vectorized images is then transposed, so that they can be entered as input data into the neural network (Figure 2.15).

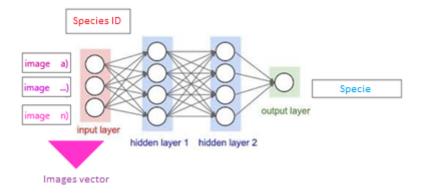


Figure 2.15: The neural network for species.

#### 2.2.1.2 Characteristics

Extracting the characteristics from the leaf allows the neural network to quickly find the species and sub specie to which it belongs. The data from the leaf characteristics has been extracted using the function regionprops. The chosen characteristics to help train the neural network to identify the specie and sub specie of a leaf are the ones displayed in Table 2.1.

Table 2.1: The characteristics that were used to assess image region properties.

Characteristics	Description
ConvexArea	The number of pixels in "ConvexImage" is returned as a scalar.
Eccentricity	The eccentricity of the ellipse sharing the region's second moments returns as a scalar. The eccentricity of an ellipse is defined as the proportion of the distance between its foci to the length of its main axis. The value ranges from 0 to 1 (where 0 and 1 are degraded situations). An ellipse with an eccentricity of 0 is a circle, but one with an eccentricity of 1 is a line segment [5].
Extent	The ratio of pixels inside the area to those within the overall bounding box is returned as a scalar. Computed as the area of the bounding box divided by the size of the bounding box [5].
EquivDiameter	Returns the radius of a circle with the same area as the region as a scalar. Calculated as $sqrt(4*area/pi)$ [5].
FilledArea	The number of pixels in the "FilledImage" is returned as a scalar [5].
MajorAxisLength	The main axis of the ellipse with the same standardized second central instants as the area is returned as a scalar with its length (in pixels) [5].
MinorAxisLength	The minor axis of the ellipse with the same standardized second central instants as the area is returned as a scalar with its length (in pixels) [5].
Orientation	The angle between the x-axis and the main axis of the ellipse is returned as a scalar with the same second instants as the area. The value is in degrees and ranges from $-90$ to $90$ [5].
Perimeter	The distance around the area's border is returned as a scalar. The perimeter of an area is determined by calculating the distance between each pair of pixels (not broken) along the region's boundary. If the picture includes areas that are not contiguous, regionprops produce surprising results. This graphic depicts the pixels that were used to calculate the perimeter of this item [5].
Solidity	A scalar representing the ratio of pixels in the convex framework that are also in the area is returned. It is calculated as "Area" or "ConvexArea" [5].

## 2.2.2 Subspecies

In order to obtain the sub species, the same procedure as for the species was used, creating a new neural network. This time, a vector with the images, in binary,

enters the network and targets the IDs of the images and the ID corresponding to their subspecies (Appendix A.2). The images are processed in the same way, thus obtaining the subspecies corresponding to the images. As we saw in Figure 2.12, the majority of leaves are from the Quercus species. Knowing this, it can be seen in Figure 2.16, the Quercus subspecies as an example.

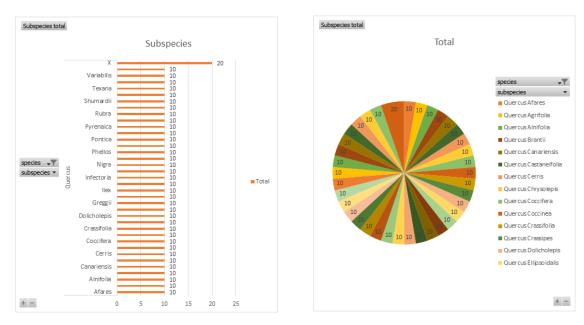


Figure 2.16: The subspecies for the specie "Quercus".

## 2.3 Goal of the project

The project is able to classify the specie and sub specie of an uploaded leaf based on all the training previously performed to prepare the neural networks. It will make use of the trained neural networks, the one trained by the images in binary or the one trained by the characteristics of the images, in order to classify the leaf. The results of the classification will be shown in the results section.

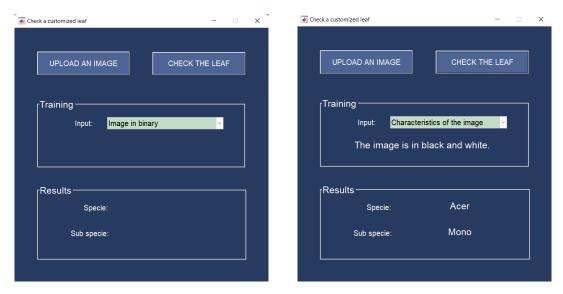


Figure 2.17: Neural Network - Check a customized leaf

## Chapter 3

## Related Work

This chapter intends to display some examples of other neural networks that have been developed and have become successful.

#### 3.1 Similar products

Multiple individuals and companies have managed to develop neural networks that use image classification in order to recognize objects and/or people. As examples, we can mention social networks, COVID masks verifier, Google photos' location, reverse image search from Google, Shutterstock, image composition artificial intelligence, autopilot from Tesla, and a general analysis and comparison.

#### 3.1.1 Social networks

In May 1997, the first true social media platform, named Six Degrees, was launched [8]. Since then, social media has grown enormously. Nowadays, social media has significantly influenced the world. The quick and broad use of these technologies is changing how individuals get news, communicate with each other, market their companies, and learn more about politics or any other subject.

Nowadays, the biggest social network platform in the world gathers 2.4 billion subscribers. Some different social networks have more than one billion subscribers as well. This implies that social networking platforms are used by one in every three people on the globe [10].

Even though these numbers are extremely high, if someone posts a picture where one appears and does not tag them, a notification will pop up immediately on one's device, alerting that someone posted a picture in which one might appear [1].

#### 3.1.2 Covid masks verifier

On December 31, 2019, the World Health Organization received notification of cases of pneumonia of unidentified etiology in Wuhan City, China. Coronaviruses are a vast set of viruses that can generate a wide variety of diseases, ranging from the ordinary flu to deadly conditions [9].

The coronaviruses spread around the world and some mandatory rules have been imposed by every country in the world. One of these rules is the use of a healthcare mask. Since the usage of the mask became mandatory inside public spaces, some of the owners of those spaces have started using devices that recognize if one is using a mask or not. An example of the mentioned type of recognition is presented in Figure 3.1.



Figure 3.1: Covid masks verifier

#### 3.1.3 Google: Photos' location

Google's neural network tells the user where photos were taken even when they do not have GPS turned on.

The system searches for visual indicators including architectural types, languages, and plant life and compares them to a database of 126 million geotagged photographs grouped into 26,000 grids. The lush foliage and Portuguese signage, for example, may indicate that you shot the photo in Brazil. It can even identify the locations of interior shots by starting with other, more identifiable images in the album [2].



Figure 3.2: Google Photos - Logo

#### 3.1.4 Google: Reverse Image Search

In order to utilize Google's reverse image search, one just submits a photo and subsequently receives results of similar photos, similar articles, links, and information about the photo. An example of this search tool can be noticed in the figure 3.3.

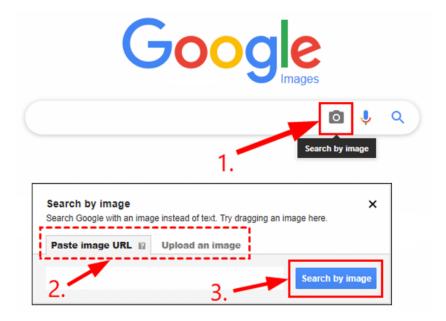


Figure 3.3: Google images - Search by image

#### 3.1.5 Shutterstock: Image Composition AI

Shutterstock's AI enables the user to search for photos using words in a creative way. Instead of inputting words that describe a picture that the user wishes to locate, the user may position those words in relation to each other in the same manner that the objects would appear in the photo. An example can be seen in Figure 3.4.

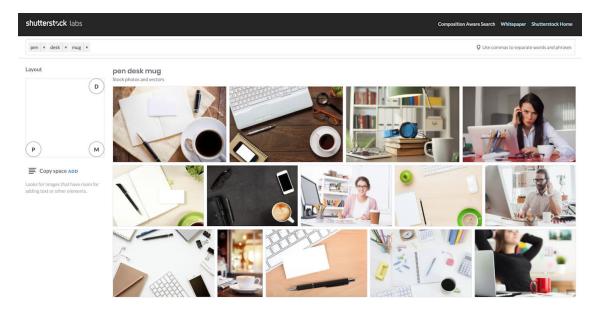


Figure 3.4: Shutterstock - Image search for photos using words

## 3.1.6 Tesla: Autopilot

Tesla refers to the usage of neural networks on their website. Their neural networks acquire knowledge from the most involved and diverse scenarios in the world, which are iteratively generated in real time by approximately 1 million cars.

Their full Autopilot neural network architecture consists of 48 neural networks that require 70,000 graphics processing units to train. Cooperatively, these neural networks output 1,000 different predictions at each timestep [7]. Figure 3.5 demonstrates a real scenario of the usage of the Autopilot by Tesla, where the way that the Autopilot sees and how the system works can be identified [7].



Figure 3.5: Tesla Autopilot - How it sees and how the system work

#### 3.2 Analysis and comparison

All the neural networks mentioned above use image classification. Image classification designates the action of taking a picture as input (a photograph of a leaf) and outputting a class (like specie and sub specie of the leaf) or a possibility that the input is a certain class (there is a 90% possibility that that leaf is from specie X and sub specie Y).

The neural networks describe a vast breakthrough within image recognition. These neural networks are at the heart of everything, from photo tagging on social networks (Chapter 3.1.1) to self-driving cars (Chapter 3.1.6). These neural networks are always operating intensely in the background in a variety of applications, ranging from healthcare (Chapter 3.1.2) to viewing one's trip photographs (Chapter 3.1.3).

# Chapter 4

## Results

This chapter shows the most important results obtained from the neural networks.

## 4.1 Training

The neural network using as input the images in binary and the neural network using as input the characteristics of the images have trained 1082 times, in total, with different types of configuration.

All the training has been recorded in the Excel file "results.xlsx" which can be opened from the graphic user interface. The results of the training for the images in binary are in Appendix B, and the results of the training for the characteristics of the images are in Appendix C.

Both neural networks only achieved 100% of success rate when classifying the species for the leaves from the folder "Leaves\_3".

The neural network using as input the images in binary has achieved 13 times 100% of success rate in total. 10 times of those 13, were using Perceptron Training Rule and Stochastic Approximation to Gradient Descent as training algorithms (5 times each of them). The transfer functions that most achieved 100% of success rate were the Linear and the Hyperbolic tangent sigmoid. Also, using 10 as hidden layer size achieved one more 100% success rate than using 2.

The neural network using as input the characteristics of the images has achieved 11 times 100% of success rate in total. 6 times of those 11, were using Stochastic Approximation to Gradient Descent as training algorithms. The transfer functions that most achieved 100% of success rate was the Hyperbolic tangent sigmoid which achieved 6 times. Also, using 10 as hidden layer size achieved 7 times 100% of success rate.

Since the input data was exactly the same to train both neural networks, it can be seen that Stochastic Approximation to Gradient Descent was the best training algorithm, Hyperbolic tangent sigmoid the best transfer function and 10 the best size for the hidden layers.

## Chapter 5

# **Application Functionalities**

This chapter is meant to describe the user guide and the developer guide.

## 5.1 User guide

The user will open the installer through its executable. There is no need to have MATLAB installed since the executable will install the prerequisites (if they are not already installed on one's computer) and the application itself.

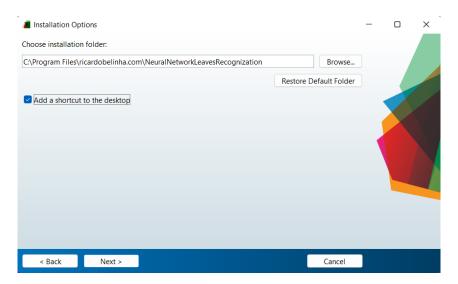


Figure 5.1: Installer

When the user opens the application, a main menu is shown, and it is possible to check the author's details, open the dissertation paper in ".PDF" format, or run the application, as it can be seen in figure 5.2.

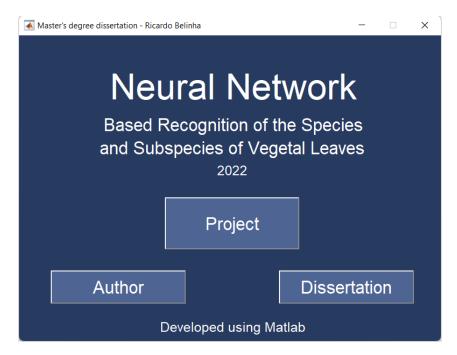


Figure 5.2: Main menu

If the user chooses to show the author's details, the information displayed in figure 5.3 is shown.

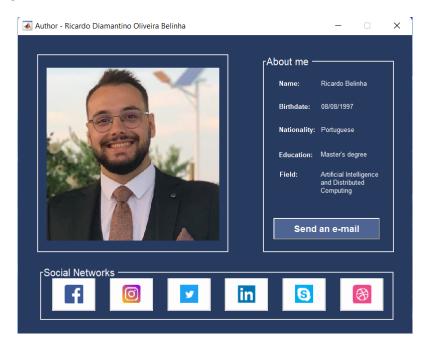


Figure 5.3: Author's details

When the user decides to run the application, one will be able to configure the entire neural network as one sees fit, as it can be seen in figure 5.4.



Figure 5.4: Neural Network

When clicking on the "Prepare the images" button, the graphic user interface will help the user to choose the folder that contains the images that will be uploaded to the software and used as training data for the neural neural network, as it can be seen in figure 5.5.

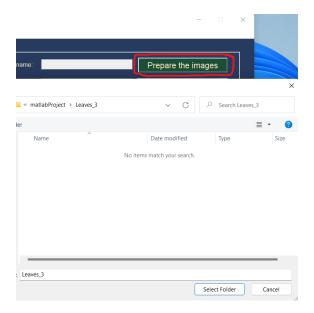


Figure 5.5: Neural Network - Preparing the images

When the user chooses the folder, the name of the folder will be dis-

played in the text box next to the filename, and the content of the folder will be taken as input. A notification will be displayed in order to inform the user that the images are ready to be entered as input data in the neural network, as it can be seen in figure 5.6.

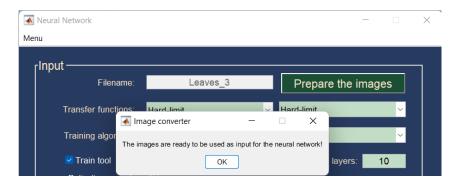


Figure 5.6: Neural Network - Feedback from preparing the images

The configuration of the neural network allows the user to try and test many different types of configurations in order to compare the results of such configurations. The neural network has as default, 2 layers defined with "net.numLayers = 2". The number of layers is not configurable. The figure 5.7 demonstrates which transfer functions are available for the first layer: hard-limit, linear, log-sigmoid, hyperbolic tangent sigmoid, and symmetric hard-limit.

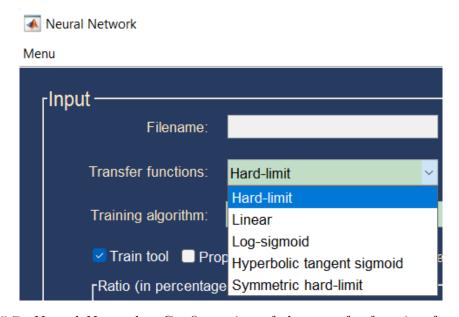


Figure 5.7: Neural Network - Configuration of the transfer function for the first layer

The figure 5.8 demonstrates which transfer functions are available for the second layer: hard-limit (hardlim), linear (purelin), log-sigmoid (logsig), hyperbolic tangent sigmoid (tansig), and symmetric hard-limit (hardlims). As it can be seen, it is possible to configure each layer with a different transfer function or the same.

While observing the results excel file, it can be seen that there was the "None" option for the transfer function for the second layer in this dropbox, but when selecting "None" as transfer function, it was using the default value

5.1. USER GUIDE 35

from MATLAB for the transfer function, which is the hyperbolic tangent sigmoid (tansig). Since this transfer function can be directly selected by the user, the "None" option has been removed.



Figure 5.8: Neural Network - Configuration of the transfer function for the second layer

The figure 5.9 demonstrates which training algorithms are available: perceptron training rule (trainlm), gradient descent (traingd), and stochastic approximation to gradient descent (trainbfg).

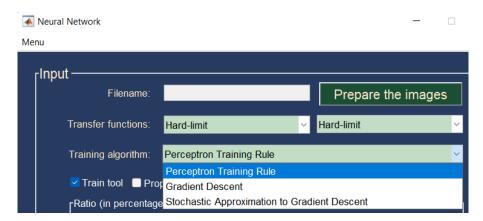


Figure 5.9: Neural Network - Configuration of the training algorithm

The size for the hidden layer in the neural network can also be configured as it can be seen in figure 5.10.

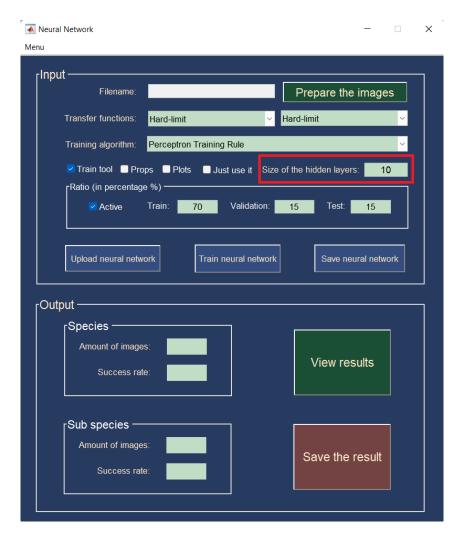


Figure 5.10: Neural Network - Configuration of the size for the hidden layer

All the steps above describe how the configuration of the neural network can be performed and how the training can be initiated. Figure 5.11 displays how to access the menu, where it is possible to close the application or upload an image to classify.

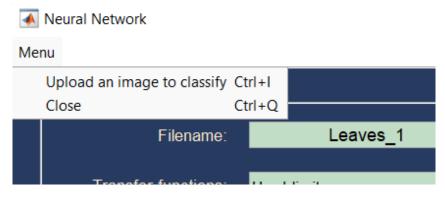


Figure 5.11: Neural Network - Menu

When the user chooses to upload an image to classify, a graphical user interface will open in order to select the image to use as input data. When the user decides to click on the "CHECK THE LEAF" button, the classification will be initiated and the output will be shown in the results group as soon as the

validation finishes.

One can decide which neural network should be used: the neural network that has learned while training with the characteristics of the images or the other one that has trained with the images in binary. The results might differ since they are being classified in different ways.

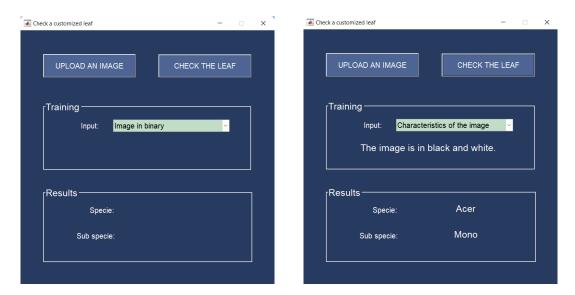


Figure 5.12: Neural Network - Check a customized leaf

### 5.2 Developer guide

This section will exhibit the technologies and tools that were used in this thesis, along with a brief description of their functionalities.

#### **5.2.1** MATLAB

The MATLAB programming environment has various advantages over other methods or languages. The fundamental construction of a matrix utilizes a simple data element. A basic number is represented by a matrix with one row and one column. The MATLAB environment has a variety of mathematical algorithms that operate on data matrices and arrays. Notable instances include cross-products, dot-products, determinants, and inverted matrices. Rather than requiring a for or while loop, vectorized operations such as adding two arrays just require a single instruction. With communication in mind, the graphical output has been created. Using interactive graphical tools, users can quickly plot their own data and then change it by changing its size, color, and other things [6].

These are collections of methods that perform more specific tasks. They enhance the programming language as optimal for machine learning [6].

#### 5.2.1.1 Deep Learn Toolbox

The Deep Learning Toolbox was crucial in deciding on MATLAB as the platform for coding my thesis project. This framework contains methods, training

models, and applications for creating and executing deep neural networks. Convolutional neural networks and long-term memory (LSTM) networks may be used for classification and regression on image, time series, and text data. Users may examine activations, change network designs, and check preparation progress via charts and apps [4].

Users may outsource data processing beyond multicore central processing units and graphics processing units on the computer to clusters and clouds for additional training on large datasets [4].

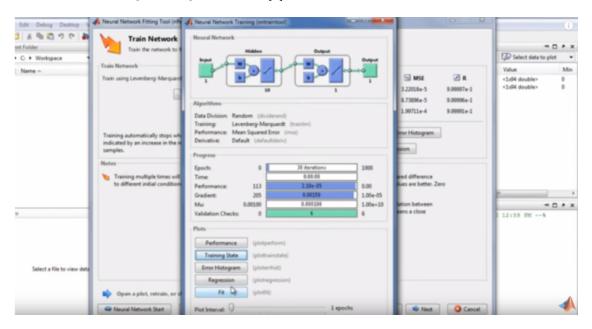


Figure 5.13: MATLAB - Deep Learn Toolbox

#### 5.2.1.2 MATLAB GUI

Graphic User Interfaces (GUIs) let the user operate software programs using a friendly interface, reducing the need for others to learn a programming language or input commands. Applications that use a GUI can be shared for usage inside MATLAB, as well as as a separate desktop or online application.

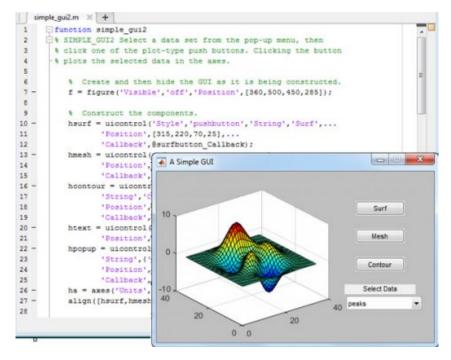


Figure 5.14: MATLAB - Example of a Graphic User Interface

#### 5.2.1.3 MATLAB Application Compiler

MATLAB contains an application named "Application Compiler" which helped to create the installer for the application, allowing it to be shared royalty-free with other users. The installer will download and install every needed prerequisite in order for the application to run without any problem. It is also easier for a non-developer user, since the graphic user interface will make everything easier. The user can choose to create a shortcut in their desktop and start using the application afterwards.

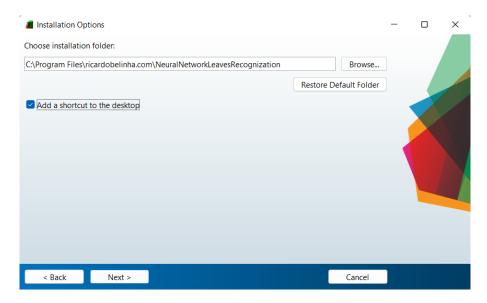


Figure 5.15: MATLAB - Application's installer

#### **5.2.2** Excel

Excel is also known as Microsoft's spreadsheet program, and it works by adjusting numbers and data using formulas and functions. Analysis performed by Excel is employed by organizations of all sizes around the globe to perform financial analysis. This tool is also very useful for entering and maintaining research study data. For this thesis project, Excel will be used to keep a record of the output data generated by the thesis script. Every time the script runs, the output data will be inserted into the same Excel file. It will be very helpful to compare the different results generated by different inputs.

## Chapter 6

## Conclusions and Future Work

This master's thesis used MATLAB to exhibit the process of developing a neural network that recognizes the specie and sub specie of a vegetable leaf.

The creation of the script aided in the understanding of the several processes required to produce two fully functional neural networks that are capable of training using numerous configurations and classifying the specie and sub specie of a leaf as a final result. The first neural network has been trained using the images in binary and the second one utilizes the characteristics of the images, as it can be seen in section 2.2.1.2. There have been performed, in total, 1082 different types of training for both neural networks, achieving an overall success rate of 100% 24 times.

The entire process of developing this project using MATLAB was beneficial due to the available applications that may support the developer. The Deep Learning Toolbox helped on the training part, which allows the developer to check the preparation progress via charts and apps. The MATLAB GUI helped to create the graphic user interface in order to provide a friendly interface, reducing the need for the user to learn a programming language or input commands to use the application. And, last but not least, the MATLAB Application Compiler, which creates an installer for the application, allowing it to be shared royalty-free with other users and installing all the prerequisites needed to run the project and the project itself.

The similar applications were truly helpful in terms of understanding the usefulness and importance of a neural network, since the neural networks described a vast breakthrough within image recognition. Those were the core of everything, from photo tagging on social networks (Chapter 3.1.1) to self-driving cars (Chapter 3.1.6). As it could be seen, neural networks are always running intensely in the background in many applications, ranging from healthcare (Chapter 3.1.2) to viewing one's trip photographs (Chapter 3.1.3). The similar applications show how positively a neural network with image recognition can impact one's life.

To summarize, everything was constructed from scratch, and the whole script is complete and ready for usage by anyone. The entire graphical user interface has been designed to make the script easier to use. As such, no prior knowledge of MATLAB coding is required.

In the future, I want to adapt this script to be able to run on all platforms and add augmented reality to it, which will attract more users and enable the script to be used to its full potential. Thus, users will be able to examine any leaf and determine its specie and sub specie. Moreover, for individuals who are passion-

ate about leaves but have acrophobia, this software will also be great because it will be available to be used by drones, making it possible for these individuals to study many leaves from any type of tree. Furthermore, it would be an improvement in phytomorphology, combining technology and biology, contributing to the continuous development of science.

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# Appendices

# Appendix A

# Mapping IDs with species and subspecies

## A.1 Species and their IDs

id_specie	species
1	Acer
2	Alnus
3	Arundinaria
4	Betula
5	Callicarpa
6	Castanea
7	Celtis
8	Cercis
9	Cornus
10	Cotinus
11	Crataegus
12	Cytisus
13	Eucalyptus
14	Fagus
15	Ginkgo
16	Ilex
17	Liquidambar
18	Liriodendron
19	Lithocarpus
20	Magnolia
21	Morus
22	Olea
23	Phildelphus
24	Populus
25	Prunus
26	Pterocarya
27	Quercus
28	Rhododendron
29	Salix
30	Sorbus
31	Tilia
32	Ulmus
33	Viburnum
34	Zelkova

## A.2 Subspecies and their IDs

id_subspecie	subspecies	id_subspecie	subspecies	id_subspecie	subspecies
1	Capillipes	34	Aquifolium	67	Ilex
2	Circinatum	35	Cornuta	68	Imbricaria
3	Mono	36	Styraciflua		
4	Opalus	37	Tulipifera	69	Infectoria
5	Palmatum	38	Cleistocarpus	70	Kewensis
6	Pictum	39	Edulis	71	Nigra
7	Platanoids	40	Heptapeta	72	Palustris
8	Rubrum	41	Salicifolia	73	Phellos
9	Rufinerve	42	Nigra	74	Phillyraeoides
10	Saccharinum	43	Europaea	75	Pontica
11	Cordata	44	Adenopoda	76	Pubescens
12	Maximowiczii	45	Grandidentata	77	Pyrenaica
13	Rubra	46	Nigra	78	Rhysophylla
14	Sieboldiana	47	Avium	79	Rubra
15	Viridis	48	Shmittii	80	Semecarpifolia
16	Simonii	49	Stenoptera	81	Shumardii
17	Austrosinensis	50	Afares	82	Suber
18	Pendula	51	Agrifolia	83	Texana
19	Bodinieri	52	Alnifolia	84	Trojana
20	Sativa	53	Brantii	85	Turneri
21	Koraiensis	54	Canariensis	86	Variabilis
22	Siliquastrum	55	Castaneifolia	87	Vulcanica
23	Chinensis	56	Cerris	88	Russellianum
24	Controversa	57	Chrysolepis	89	Fragilis
25	Macrophylla	58	Coccifera	90	Intergra
26	Coggygria	59	Coccinea	91	Aria
27	Monogyna	60	Crassifolia	92	Oliveri
28	Battandieri	61	Crassipes	93	Platyphyllos
29	Glaucescens	62	Dolicholepis	94	Tomentosa
30	Neglecta	63	Ellipsoidalis	95	Bergmanniana
31	Urnigera	64	Greggii	96	Rhytidophylloides
32	Sylvatica	65	Hartwissiana	97	Tinus
33	Biloba	66	Hispanica	98	Serrata
55	Diioba	30	1115panica	L	

# Appendix B

Training results for the images in binary

Table B.1: Training - Image in binary with Leaves\_1 - Part 1  $\,$ 

	Transfer	Transfer functions	Ratio (in	(in percentage %	(% =			Species		Species	
Folder Hidden	n L. 1st	2nd	Training algorithm Train   Va	Validation	Test	Quant. images	Success %	Epoch   Duration	% Saccess %	Epoch	Duration
Leaves_1 2	Hard-limit	Hard-limit	Perceptron Training Rule 80 10			66	0.00%	0 0	0.00%	0	0
Leaves_1 2	Hard-limit	Linear	Perceptron Training Rule 80 10		10	66	10.00%	0 0	0.00%	0	0
Leaves_1 2	Hard-limit	Log-sigmoid	Perceptron Training Rule 80 10		10	66	10.00%	0 0	0.00%	0	0
Leaves_1 2	Hard-limit	Hyperbolic tangent sigmoid	Perceptron Training Rule 80 10		10	66	0.00%	0 0	0.00%	0	0
Leaves_1 2	Hard-limit	Symmetric hard-limit	Perceptron Training Rule   80   10		10	66	10.00%	0 0	0.00%	0	0
Leaves_1 2	Hard-limit	None	Perceptron Training Rule 80 10			66	20.00%	0 0	0.00%	0	0
Leaves_1 2	Linear	Hard-limit	Perceptron Training Rule 80 10		10	66	20.00%	0 0	0.00%	0	0
Leaves_1 2	Linear	Linear	Perceptron Training Rule 80 10			66	10.00%	0 0	0.00%	0	0
Leaves_1 2	Linear	Log-sigmoid	Perceptron Training Rule 80 10		10	66	20.00%	0 0	0.00%	0	0
Leaves_1 2	Linear	Hyperbolic tangent sigmoid	Perceptron Training Rule 80 10		10	66	10.00%	0 0	0.00%	0	0
Leaves_1 2	Linear	Symmetric hard-limit	Perceptron Training Rule 80 10			66	20.00%	0 0	0.00%	0	0
Leaves_1 2	Linear	None	Perceptron Training Rule 80 10		10	66	%00.0	0 0	0.00%	0	0
Leaves_1 2	Log-sigmoid	Hard-limit	Perceptron Training Rule 80 10		10	66	10.00%	0 0	0.00%	0	0
Leaves_1 2	Log-sigmoid	Linear	Perceptron Training Rule 80 10		10	66	%00.0	0 0	10.00%	0	0
Leaves_1 2	Log-sigmoid	Log-sigmoid	Perceptron Training Rule 80 10		10	66	0.00%		0.00%	0	0
Leaves_1 2	Log-sigmoid	Hyperbolic tangent sigmoid	Perceptron Training Rule 80 10		10	66	0.00%	0 0	0.00%	0	0
Leaves_1 2	Log-sigmoid	Symmetric hard-limit	Perceptron Training Rule 80 10		10	66	10.00%	0 0	0.00%	0	0
Leaves_1 2	Log-sigmoid	None	Perceptron Training Rule 80 10		10	66	0.00%	0 0	10.00%	0	0
Leaves_1 2	Hyperbolic tangent sigmoid	Hard-limit	Perceptron Training Rule 80 10		10	66	10.00%	0 0	0.00%	0	0
Leaves_1 2	Hyperbolic tangent sigmoid	Linear	Perceptron Training Rule 80 10		10	66	20.00%	0 0	0.00%	0	0
Leaves_1 2	Hyperbolic tangent sigmoid	Log-sigmoid	Perceptron Training Rule 80 10			66	10.00%	0 0	0.00%	0	0
Leaves_1 2	Hyperbolic tangent sigmoid	Hyperbolic tangent sigmoid	Perceptron Training Rule 80 10		10	66	10.00%	0 0	0.00%	0	0
Leaves_1 2	Hyperbolic tangent sigmoid		Perceptron Training Rule 80 10		10	66	0.00%	0 0	0.00%	0	0
Leaves_1 2	Hyperbolic tangent sigmoid		Perceptron Training Rule 80 10		10	66	0.00%	0 0	0.00%	0	0
Leaves_1 2	Symmetric hard-limit	Hard-limit	Perceptron Training Rule 80 10		10	66	0.00%	0 0	0.00%	0	0
Leaves_1 2	Symmetric hard-limit	Linear	Perceptron Training Rule   80   10	(		66	10.00%	0 0	0.00%	0	0
Leaves_1 2	Symmetric hard-limit	Log-sigmoid	Perceptron Training Rule 80 10		10	66	20.00%	0 0	0.00%	0	0
Leaves_1 2	Symmetric hard-limit	Hyperbolic tangent sigmoid	Perceptron Training Rule 80 10			66	0.00%	0 0	0.00%	0	0
Leaves_1 2	Symmetric hard-limit	Symmetric hard-limit	Training Rule   80	(		66	10.00%		0.00%	0	0
Leaves_1 2	Symmetric hard-limit	None	ng Rule 80			66	10.00%	0 0	0.00%	0	0
Leaves_1 2	Hard-limit	Hard-limit	08	(		66	0.00%		%00.0	0	0
Leaves_1 2	Hard-limit	Linear	Gradient Descent 80   10	(	10	99	10.00%	0 0	0.00%	0	0
Leaves_1 2	Hard-limit	Log-sigmoid	Gradient Descent 80   10	(		66	0.00%	0 0	0.00%	0	0
Leaves_1 2	Hard-limit	Hyperbolic tangent sigmoid	08	(		99	0.00%	0 0	0.00%	0	0
Leaves_1 2	Hard-limit	Symmetric hard-limit	Gradient Descent 80 10		10	99	10.00%	0 0	0.00%	0	0
Leaves_1 2	Hard-limit	None	Gradient Descent 80 10	(		66	20.00%	0 0	%00.0	0	0
Leaves_1 2	Linear	Hard-limit			10	66	10.00%	0 0	0.00%	0	0
Leaves_1 2	Linear	Linear	80			66	10.00%		0.00%	0	0
Leaves_1 2	Linear	Log-sigmoid	Gradient Descent 80 10		10	66	%00.0	0 0.04	0.00%	0	0
Leaves_1 2	Linear	Hyperbolic tangent sigmoid	08	(		66	20.00%		0.00%	0	0
Leaves_1 2	Linear	Symmetric hard-limit	Gradient Descent 80   10	(		99	20.00%	0 0	0.00%	0	0
Leaves_1 2	Linear	None	80	)		99	20.00%	0 0	0.00%	0	0
Leaves_1 2	Log-sigmoid	Hard-limit	80			66	10.00%		0.00%	0	0
Leaves_1 2	Log-sigmoid	Linear			10	99	10.00%	0 0	0.00%	0	0
Leaves_1 2	Log-sigmoid	Log-sigmoid	Gradient Descent 80 10		10	66	10.00%	0 0	0.00%	0	0

Table B.2: Training - Image in binary with Leaves\_1 - Part 2

	Transfer	Transfer functions		Ratio	(in percentage %)	şe %)			Species			Species	
Folder Hidde	Hidden L. 1st	2nd	Training algorithm	Train	Validation	Test	Quant. images	Success %	Epoch	Duration	Success %	Epoch	Duration
Leaves_1 2	Log-sigmoid	Hyperbolic tangent sigmoid	Gradient Descent	80	10	10	66	0.00%	0	0	0.00%	0	0
Leaves_1 2	Log-sigmoid	Symmetric hard-limit	Gradient Descent	98	10	10	66	20.00%	0	0	0.00%	0	0
Leaves_1 2	Log-sigmoid	None	Gradient Descent	08	10	10	66	30.00%	0	0	0.00%	0	0
Leaves_1 2	Hyperbolic tangent sigmoid	Hard-limit	Gradient Descent	80	10	10	66	10.00%	0	0	0.00%	0	0
Leaves_1 2	Hyperbolic tangent sigmoid	Linear	Gradient Descent	98	10	10	66	0.00%	0	0	0.00%	0	0
Leaves_1 2	Hyperbolic tangent sigmoid	Log-sigmoid	Gradient Descent	08	10	10	66	0.00%	0	0	10.00%	0	0
Leaves_1 2	Hyperbolic tangent sigmoid	Hyperbolic tangent sigmoid	Gradient Descent	08	10	10	66	10.00%	0	0	0.00%	0	0
Leaves_1 2	Hyperbolic tangent sigmoid	Symmetric hard-limit	Gradient Descent	08	10	10	66	10.00%	0	0	0.00%	0	0
Leaves_1 2	Hyperbolic tangent sigmoid	-	Gradient Descent	08	10	10	66	0.00%	0	0	0.00%	0	0
Leaves_1 2	Symmetric hard-limit	Hard-limit	Gradient Descent	08	10	10	66	0.00%	0	0	0.00%	0	0
Leaves_1 2	Symmetric hard-limit	Linear	Gradient Descent	08	10	10	66	30.00%	0	0	0.00%	0	0
Leaves_1 2	Symmetric hard-limit	Log-sigmoid	Gradient Descent	08	10	10	66	20.00%	0	0	0.00%	0	0
Leaves_1 2	Symmetric hard-limit	Hyperbolic tangent sigmoid	Gradient Descent	98	10	10	66	20.00%	0	0	0.00%	0	0
Leaves_1 2	Symmetric hard-limit	Symmetric hard-limit	Gradient Descent	80	10	10	66	%00.0	0	0	0.00%	0	0
Leaves_1 2	Symmetric hard-limit	None	Gradient Descent	98	10	10	66	10.00%	0	0	10.00%	0	0
Leaves_1 2	Hard-limit	Hard-limit	Stochastic Approximation to Gradient Descent	98	10	10	66	0.00%	0	0	0.00%	0	0
Leaves_1 2	Hard-limit	Linear	Stochastic Approximation to Gradient Descent	80	10	10	66	0.00%	0	0	10.00%	0	0
Leaves_1 2	Hard-limit	Log-sigmoid	Stochastic Approximation to Gradient Descent	98	10	10	66	10.00%	0	0	0.00%	0	0
Leaves_1 2	Hard-limit	Hyperbolic tangent sigmoid	Stochastic Approximation to Gradient Descent	80	10	10	66	0.00%	0	0	10.00%	0	0
Leaves_1 2	Hard-limit	Symmetric hard-limit	Stochastic Approximation to Gradient Descent	98	10	10	66	10.00%	0	0	0.00%	0	0
Leaves_1 2	Hard-limit	None	Stochastic Approximation to Gradient Descent	08	10	10	66	20.00%	0	0	0.00%	0	0
Leaves_1 2	Linear	Hard-limit	Stochastic Approximation to Gradient Descent	08	10	10	66	%00.0	0	0	%00.0	0	0
Leaves_1 2	Linear	Linear	Stochastic Approximation to Gradient Descent	Н	10	10	99	30.00%	0	0	0.00%	0	0
Leaves_1 2	Linear	Log-sigmoid	Stochastic Approximation to Gradient Descent	80	10	10	66	%00.0	0	0	%00.0	0	0
Leaves_1 2	Linear	Hyperbolic tangent sigmoid	Stochastic Approximation to Gradient Descent	80	10	10	66	%00.0	0	0	%00.0	0	0
Leaves_1 2	Linear	Symmetric hard-limit	Stochastic Approximation to Gradient Descent		10	10	66	30.00%	0	0	0.00%	0	0
Leaves_1 2	Linear	None	Stochastic Approximation to Gradient Descent	08	10	10	66	10.00%	0	0	%00.0	0	0
Leaves_1 2	Log-sigmoid	Hard-limit	Stochastic Approximation to Gradient Descent		10	10	66	10.00%	0	0	%00.0	0	0
Leaves_1 2	Log-sigmoid	Linear	Stochastic Approximation to Gradient Descent	80	10	10	66	%00:0	0	0	%00.0	0	0
Leaves_1 2	Log-sigmoid	Log-sigmoid	Stochastic Approximation to Gradient Descent		10	10	99	20.00%	0	0	0.00%	0	0
Leaves_1 2	Log-sigmoid	Hyperbolic tangent sigmoid	Stochastic Approximation to Gradient Descent		10	10	66	20.00%	0	0	%00.0	0	0
Leaves_1 2	Log-sigmoid	Symmetric hard-limit	Stochastic Approximation to Gradient Descent	80	10	10	99	%00.0	0	0	0.00%	0	0
Leaves_1 2	Log-sigmoid	None	Stochastic Approximation to Gradient Descent	80	10	10	99	0.00%	0	0	0.00%	0	0
Leaves_1 2	Hyperbolic tangent sigmoid	Hard-limit	Stochastic Approximation to Gradient Descent	08	10	10	66	%00.0	0	0	10.00%	0	0
Leaves_1 2	Hyperbolic tangent sigmoid	Linear	Stochastic Approximation to Gradient Descent	80	10	10	66	30.00%	0	0	%00.0	0	0
Leaves_1 2	Hyperbolic tangent sigmoid	Log-sigmoid	Stochastic Approximation to Gradient Descent	8	10	10	66	10.00%	0	0	0.00%	0	0
Leaves_1 2	Hyperbolic tangent sigmoid	Hyperbolic tangent sigmoid	Stochastic Approximation to Gradient Descent	08	10	10	66	20.00%	0	0	0.00%	0	0
Leaves_1 2	Hyperbolic tangent sigmoid	Symmetric hard-limit	Stochastic Approximation to Gradient Descent	80	10	10	66	%00.0	0	0	%00.0	0	0
Leaves_1 2	Hyperbolic tangent sigmoid	-	Stochastic Approximation to Gradient Descent	Н	10	10	66	20.00%	0	0	0.00%	0	0
Leaves_1   2	Symmetric hard-limit	Hard-limit	Stochastic Approximation to Gradient Descent		10	10	66	10.00%	0	0	%00.0	0	0
Leaves_1 2	Symmetric hard-limit	Linear	Stochastic Approximation to Gradient Descent	80	10	10	99	20.00%	0	0	0.00%	0	0

Table B.3: Training - Image in binary with Leaves\_1 - Part 3  $\,$ 

		E					(3-6)					Č		
Folder	Hidden I.	+	Transfer functions	Training algorithm	Ratio (	Katio (in percentage %) Train   Validation   Tes	_	Ought images	Success %	Species Fnoch Dura	Duration Suc	Success %	Species	Duration
Leaves_1	2	+	Log-sigmoid	Stochastic Approximation to Gradient Descent	+		+	66	2	+	+		+	
Leaves_1	2	Symmetric hard-limit	Hyperbolic tangent sigmoid	Stochastic Approximation to Gradient Descent	+	10	10	66	0.00%		10.	0 %00.01		0
Leaves_1	2	Symmetric hard-limit	Symmetric hard-limit	Stochastic Approximation to Gradient Descent	08	10	10	66	10.00%		0.00%	0 %0		0
Leaves_1	2	Symmetric hard-limit	None	Stochastic Approximation to Gradient Descent	08	10	10	66	30.00%	0 0	0.00%	0 %0		
Leaves_1	10	Hard-limit	Hard-limit	Perceptron Training Rule	20	15	15	66	10.00%	0 0	0.00%	0 %0		0
Leaves_1	10	Hard-limit	Linear	Perceptron Training Rule	20	15	15	66	10.00%	0 0	10.	10.00% 0		0
Leaves_1	10	Hard-limit	Log-sigmoid	Perceptron Training Rule	20	15	15	66	10.00%		0.00%	0 %0		0
Leaves_1	10	Hard-limit	Hyperbolic tangent sigmoid	Perceptron Training Rule	20	15	15	66	20.00%	0 0	0.00%	0 %0		0
Leaves_1	10	Hard-limit	Symmetric hard-limit	Perceptron Training Rule	20	15	15	66	30.00%	0 0	0.00%	0 %0		0
Leaves_1	10	Hard-limit	None	Perceptron Training Rule	20	15		66	10.00%	0 0	0.00%	0 %0		0
Leaves_1	10	Linear	Hard-limit	Perceptron Training Rule	20	15		66	10.00%	0 0	0.00%	0 %0		0
Leaves_1	10	Linear	Linear	Perceptron Training Rule	20	15	15	66	20.00%	0 0	0.00%	0 %0		0
Leaves-1	10	Linear	Log-sigmoid	Perceptron Training Rule	20	15	15	66	20.00%	0 0	0.00%	0 %0		0
Leaves_1	10	Linear	Hyperbolic tangent sigmoid	Perceptron Training Rule	20	15	15	66	10.00%	0 0	0.00%	0 %0		0
Leaves 1	10	Linear	Symmetric hard-limit	Perceptron Training Rule	20	15	15	66	30.00%	0 0	0.00%	0 %0		0
Leaves_1	10	Linear	None	Perceptron Training Rule	20	15	15	66	20.00%	0 0	0.00%			0
Leaves_1	10	Log-sigmoid	Hard-limit	Perceptron Training Rule	20	15	15	66	10.00%	0 0	0.00%	0 %0		0
Leaves_1	10	Log-sigmoid	Linear	Perceptron Training Rule	20	15	15	66	20.00%	0 0	0.00%	0 %0		0
Leaves_1	10	Log-sigmoid	Log-sigmoid	Perceptron Training Rule	20	15	15	66	20.00%	0 0	00.0	0 %0		0
Leaves_1	10	Log-sigmoid	Hyperbolic tangent sigmoid	Perceptron Training Rule	20	15	15	66	0.00%	0 0	0.00%	0 %0		0
Leaves_1	10	Log-sigmoid	Symmetric hard-limit	Perceptron Training Rule	20	15		66	10.00%	0 0	00:0			0
Leaves_1	10	Log-sigmoid	None	Perceptron Training Rule	02	15		66	00:001	0 0	0.00%	0 %0		0
Leaves_1	10	Hyperbolic tangent sigmoid	Hard-limit	Perceptron Training Rule	20	15		66	10.00%   (	0 0	0.00%			0
Leaves_1	10	Hyperbolic tangent sigmoid	Linear	Perceptron Training Rule	02	15		66	10.00%   (	0 0	00:00			0
Leaves_1	10	Hyperbolic tangent sigmoid	Log-sigmoid	Perceptron Training Rule	20	15		99	0.00%	0 0	0.00%	0 80		0
Leaves_1	10	Hyperbolic tangent sigmoid	Hyperbolic tangent sigmoid	Perceptron Training Rule	20	15		99	10.00%		10.	10.00% 0		0
Leaves_1	10	Hyperbolic tangent sigmoid	Symmetric hard-limit	Perceptron Training Rule	20	15	Н	66		0 0	0.00%	0 %0		0
Leaves_1	10	Hyperbolic tangent sigmoid	None	Perceptron Training Rule	20	15		66	10.00%   (	0 0	0.00%			0
Leaves-1	10	Symmetric hard-limit	Hard-limit	Perceptron Training Rule	20	15		66			0.00%	.0		0
Leaves-1	10	Symmetric hard-limit	Linear	Perceptron Training Rule	20	15		99	_		0.00%			0
Leaves_1	10	Symmetric hard-limit	Log-sigmoid	Perceptron Training Rule	20	15		99			0.00%			0
Leaves_1	10	Symmetric hard-limit	Hyperbolic tangent sigmoid	Perceptron Training Rule	20	15		99	٠.		0.00%			0
Leaves-1	10	Symmetric hard-limit	Symmetric hard-limit	Perceptron Training Rule	20	15		99	0.00%	0 0	0.00%			0
Leaves-1	10	Symmetric hard-limit	None	Perceptron Training Rule	20	15	15	99	10.00%	0 0	0.00%			0
Leaves_1	10	Hard-limit	Hard-limit	Gradient Descent	20	15	15	99	10.00%	0 0	0.00%	0 %0		0
Leaves_1	10	Hard-limit	Linear	Gradient Descent	20	15	15	66	)   %00:08	0 0	%00·0	0 %0		0
Leaves_1	10	Hard-limit	Hyperbolic tangent sigmoid	Gradient Descent	02	15	15	66	20.00%   (	0 0	%00·0			0
Leaves_1	10	Hard-limit	Log-sigmoid	Gradient Descent	02	15	15	66	10.00%	0 0	0.00%	0 %0		0
Leaves_1	10	Hard-limit	Symmetric hard-limit	Gradient Descent	20	15	15	66	20.00%   (	0 0	%00·0	0 80		0
Leaves_1	10	Hard-limit	None	Gradient Descent	02	15	15	66	00:001	0 0	00:00	0 %0		0
Leaves_1	10	Linear	Hard-limit	Gradient Descent	20	15	15	66	10.00%	0 0	00:00	0 %0		0
Leaves_1	10	Linear	Linear	Gradient Descent	02	15		66			%00·0			0
Leaves_1	10	Linear	Log-sigmoid	Gradient Descent	20	15		66		0 0	0.00%	0 %0		0
Leaves_1	10	Linear	Hyperbolic tangent sigmoid	Gradient Descent	20	15	15	66	20.00%	0 0	00:00	%		

Table B.4: Training - Image in binary with Leaves\_1 - Part 4  $\,$ 

		TOTOTOTO	transfer functions		I rano (m bercemage 70)	, ,	0)		obecies			obecies	
Folder	Hidden L.	1st	2nd	Training algorithm	ain	on Test	st Quant. images	% ssaccess %	Epoch	Duration	% ssecons	Epoch	Duration
Leaves_1	10	Linear	Symmetric hard-limit	Gradient Descent	70 15	15	66	20.00%	0	0	0.00%	0	0
Leaves_1	10	Linear	None	Gradient Descent	70 15	15	66	10.00%	0	0	%00:0	0	0
Leaves_1	10	Log-sigmoid	Hard-limit	Gradient Descent		15		%00.0	0	0	0.00%	0	0
Leaves_1	10	Log-sigmoid	Linear	Gradient Descent	70 15	15	66	10.00%	0	0	0.00%	0	0
Leaves_1	10	Log-sigmoid	Log-sigmoid	Gradient Descent		15		20.00%	0	0	%00:0	0	0
Leaves_1	10	Log-sigmoid	Hyperbolic tangent sigmoid	Gradient Descent	70 15	15		10.00%	0	0	%00.0	0	0
Leaves_1	10	Log-sigmoid	Symmetric hard-limit	Gradient Descent		15		0.00%	0	0	0.00%	0	0
Leaves_1	10	Log-sigmoid	None	Gradient Descent	70 15	15	66	%00.0	0	0	%00.0	0	0
Leaves_1	10	Hyperbolic tangent sigmoid	Hard-limit	Gradient Descent	70 15	15	66	%00.0	0	0	%00.0	0	0
Leaves_1	10	Hyperbolic tangent sigmoid	Linear	Gradient Descent	70 15	15	66	10.00%	0	0	0.00%	0	0
Leaves_1	10	Hyperbolic tangent sigmoid	Log-sigmoid	Gradient Descent		15	66	10.00%	0	0	%00.0	0	0
Leaves_1	10	Hyperbolic tangent sigmoid	_	Gradient Descent		15		%00.0	0	0	%00.0	0	0
Leaves_1	10	Hyperbolic tangent sigmoid	+	Gradient Descent	70 15	15	66	0.00%	0	0	0.00%	0	0
Leaves_1	10	Hyperbolic tangent sigmoid	None	Gradient Descent	70 15	15	66	10.00%	0	0	%00.0	0	0
Leaves_1	10	Symmetric hard-limit	Hard-limit	Gradient Descent		15		10.00%	0	0	%00.0	0	0
Leaves_1	10	Symmetric hard-limit	Linear	Gradient Descent		15		30.00%	0	0	0.00%	0	0
Leaves_1	10	Symmetric hard-limit	Log-sigmoid	Gradient Descent		15		20.00%	0	0	%00.0	0	0
Leaves_1	10	Symmetric hard-limit	Hyperbolic tangent sigmoid	Gradient Descent		15		10.00%	0	0	0.00%	0	0
Leaves_1	10	Symmetric hard-limit	Symmetric hard-limit	Gradient Descent		15		10.00%	0	0	%00.0	0	0
Leaves_1	10	Symmetric hard-limit	None	Gradient Descent	20	15		%00.0	0	0	%00.0	0	0
Leaves_1	10	Hard-limit	Hard-limit	Stochastic Approximation to Gradient Descent	20	15		%00.0	0	0	%00:0	0	0
Leaves_1	10	Hard-limit	Linear	Stochastic Approximation to Gradient Descent	20	15		20.00%	0	0	0.00%	0	0
Leaves_1	10	Hard-limit	Log-sigmoid	Stochastic Approximation to Gradient Descent	20	15	$\neg$	20.00%	0	0	0.00%	0	0
Leaves_1	10	Hard-limit	Hyperbolic tangent sigmoid	Stochastic Approximation to Gradient Descent	20	15	$\exists$	10.00%	0	0	0.00%	0	0
Leaves_1	10	Hard-limit	Symmetric hard-limit	Stochastic Approximation to Gradient Descent	20	15		0.00%	0	0	10.00%	0	0
Leaves_1	10	Hard-limit	None	Stochastic Approximation to Gradient Descent	20	15	$\exists$	10.00%	0	0	10.00%	0	0
Leaves_1	10	Linear	Hard-limit	Stochastic Approximation to Gradient Descent	20	15		10.00%	0	0	0.00%	0	0
Leaves_1	10	Linear	Linear	Stochastic Approximation to Gradient Descent	20	15	$\neg$	30.00%	0	0	10.00%	0	0
Leaves_1	10	Linear	Log-sigmoid	Stochastic Approximation to Gradient Descent	70 15	15		10.00%	0	0	0.00%	0	0
Leaves_1	10	Linear	gmoi	Stochastic Approximation to Gradient Descent	0	15		10.00%	0	0	0.00%	0	0
Leaves_1	10	Linear	netric hard-limit	Stochastic Approximation to Gradient Descent		15	$\dashv$	20.00%	0	0	0.00%	0	0
Leaves_1	10	Linear		Stochastic Approximation to Gradient Descent	0 9	15	1	0.00%	0	0	0.00%	0	0
Leaves_1	10	Log-sigmoid	mnt	Stochastic Approximation to Gradient Descent	0 9	15	1	10.00%	0	0	0.00%	0	0
Leaves_1	10	Log-sigmoid		Stochastic Approximation to Gradient Descent		C	$\top$	0.00%	0	0	0.00%		0
Leaves_1	10	Log-sigmoid	Log-sigmoid Hamorholio teneent eiemoid	Stochastic Approximation to Gradient Descent	70 13	5 7	66	10.00%	0 0	0	0.00%		
Leaves_1	10	Log-sigmoid	Symmetric hard-limit	Stochastic Approximation to Gradient Descent 7		2 2	T	10.00%	0	0	0.00%	0	0
Leaves_1	10	Log-sigmoid		Stochastic Approximation to Gradient Descent		15	T	10.00%	0	0	10.00%	0	0
Leaves_1	10	Hyperbolic tangent sigmoid	Hard-limit	Stochastic Approximation to Gradient Descent	0	15		10.00%	0	0	10.00%	0	0
Leaves_1	10	Hyperbolic tangent sigmoid	Linear	Stochastic Approximation to Gradient Descent	0	15	66	30.00%	0	0	10.00%	0	0
Leaves_1	10	Hyperbolic tangent sigmoid	Log-sigmoid	Stochastic Approximation to Gradient Descent	0	15		%00.0	0	0	%00.0	0	0
Leaves_1	10	Hyperbolic tangent sigmoid	Hyperbolic tangent sigmoi	Stochastic Approximation to Gradient Descent	70 15	15	66	10.00%	0	0	0.00%	0	0
Leaves_1	10	Hyperbolic tangent sigmoid	Symmetric hard-limit	Stochastic Approximation to Gradient Descent	20	15		%00.0	0	0	10.00%	0	0
Leaves_1	10	Hyperbolic tangent sigmoid	None	Stochastic Approximation to Gradient Descent	20	15		%00.0	0	0	0.00%	0	0
Leaves_1	10	Symmetric hard-limit	Hard-limit	Stochastic Approximation to Gradient Descent	20	15	Н	10.00%	0	0	0.00%	0	0
Leaves_1	10	Symmetric hard-limit	Linear	Stochastic Approximation to Gradient Descent	20	15		%00.0	0	0	%00:0	0	0
Leaves_1	10	Symmetric hard-limit	Log-sigmoid	Stochastic Approximation to Gradient Descent	20	15		0.00%	0	0	0.00%	0	0
Leaves_1	10	Symmetric hard-limit	Hyperbolic tangent sigmoid	Stochastic Approximation to Gradient Descent	20	15		0.00%	0	0	0.00%	0	0
Leaves_1	10	Symmetric hard-limit	Symmetric hard-limit	Stochastic Approximation to Gradient Descent	2 1	12	$\top$	10.00%	0	0	0.00%	0	0
Leaves_1	10	Symmetric hard-limit	None	Stochastic Approximation to Gradient Descent	2	-	5.	2					=

Table B.5: Training - Image in binary with Leaves\_2 - Part  $1\,$ 

		Transfer	Transfer functions	Ratio	(in percentage %	(%			Species		Species	
Folder	Hidden L.	1st	2nd	Training algorithm Train	Validation   T	+-	Quant. images	Success %	Epoch Duration	% ssacons	Epoch	Duration
Leaves_2	2	Hard-limit	Hard-limit	Perceptron Training Rule 80	10 10		1564	5.15%	0 0	2.08%	0	0
Leaves_2	2	Hard-limit	Linear	Perceptron Training Rule 80	10 10		1564	12.37%	0 0	3.13%	0	0
Leaves_2	2	Hard-limit	Log-sigmoid	Perceptron Training Rule   80	10   10		1564	12.37%	0 0	2.08%	0	0
Leaves_2	2	Hard-limit	Hyperbolic tangent sigmoid	Perceptron Training Rule 80	10 10		1564	11.34%	0 0	2.08%	0	0
Leaves_2	2	Hard-limit	Symmetric hard-limit	Perceptron Training Rule   80	10   10		1564	11.34%	0 0	1.04%	0	0
Leaves_2	2	Hard-limit	None	Perceptron Training Rule 80	10 10		1564	8.25%	0 0	2.08%	0	0
Leaves_2	2	Linear	Hard-limit	Perceptron Training Rule 80	10 10		1564	9.28%	0 0	2.08%	0	0
Leaves_2	2	Linear	Linear	Perceptron Training Rule 80	10 10		1564	6.19%	0 0	0.00%	0	0
Leaves_2	2	Linear	Log-sigmoid	Perceptron Training Rule 80	10 10		1564	6.19%	0 0	0.00%	0	0
Leaves_2	2	Linear	Hyperbolic tangent sigmoid	Training Rule	10 10		1564	11.34%	0 0	4.17%	0	0
Leaves_2	2	Linear	Symmetric hard-limit	Perceptron Training Rule 80	10 10		1564	13.40%	0 0	1.04%	0	0
Leaves_2	2	Linear	None	Perceptron Training Rule 80	10 10		1564	9.28%	0 0	2.08%	0	0
Leaves_2	2	Log-sigmoid	Hard-limit	Perceptron Training Rule 80	10 10		1564	11.34%	0 0	0.00%	0	0
Leaves_2	2	Log-sigmoid	Linear	Perceptron Training Rule 80	10 10		1564	10.31%	0 0	1.04%	0	0
Leaves_2	2	Log-sigmoid	Log-sigmoid	Perceptron Training Rule 80	10 10		1564	9.28%	0 0	2.08%	0	0
Leaves_2	2	Log-sigmoid	Hyperbolic tangent sigmoid	Perceptron Training Rule 80	10 10		1564	9.28%	0 0	1.04%	0	0
Leaves_2	2	Log-sigmoid	Symmetric hard-limit	Perceptron Training Rule 80	10 10		1564	10.31%	0 0	2.08%	0	0
Leaves_2	2	Log-sigmoid	None	Perceptron Training Rule 80	10 10	H	1564	8.25%	0 0	1.04%	0	0
Leaves_2	2	Hyperbolic tangent sigmoid	Hard-limit	Perceptron Training Rule 80	10 10		1564	5.15%	0 0	5.21%	0	0
Leaves_2	2	Hyperbolic tangent sigmoid	Linear	Perceptron Training Rule 80	10 10		1564	8.25%	0 0	0.00%	0	0
Leaves_2	2	Hyperbolic tangent sigmoid	Log-sigmoid	Perceptron Training Rule 80	10 10		1564	4.12%	0 0	0.00%	0	0
Leaves_2	2	Hyperbolic tangent sigmoid	Hyperbolic tangent sigmoid	Perceptron Training Rule 80	10 10		1564	11.34%	0 0	0.00%	0	0
Leaves_2	2	Hyperbolic tangent sigmoid	Symmetric hard-limit	Perceptron Training Rule 80	10 10		1564	5.15%	0 0	2.08%	0	0
Leaves_2	2	Hyperbolic tangent sigmoid	None		10 10		1564	8.25%	0 0	2.08%	0	0
Leaves_2	2	Symmetric hard-limit	Hard-limit	Perceptron Training Rule 80	10 10		1564	6.19%	0 0	1.04%	0	0
Leaves_2	2	Symmetric hard-limit	Linear	Perceptron Training Rule 80	10 10		1564	10.31%	0 0	0.00%	0	0
Leaves_2	2	Symmetric hard-limit	Log-sigmoid	Perceptron Training Rule 80	10 10		1564	9.28%	0 0	1.04%	0	0
Leaves_2	2	Symmetric hard-limit	Hyperbolic tangent sigmoid	Perceptron Training Rule 80	10 10		1564	5.15%	0 0	2.08%	0	0
Leaves_2	2	Symmetric hard-limit	Symmetric hard-limit	Training Rule			1564	10.31%	0 0	2.08%	0	0
Leaves_2	2	Symmetric hard-limit	None	ng Rule			1564	11.34%	0 0	1.04%	0	0
Leaves_2	2	Hard-limit	Hard-limit				1564	5.15%	0 0	0.00%	0	0
Leaves_2	2	Hard-limit	Linear	Gradient Descent 80	10 10		1564	7.22%	0 0	1.04%	0	0
Leaves_2	2	Hard-limit	Log-sigmoid	Gradient Descent 80	10 10		1564	9.28%	0 0	0.00%	0	0
Leaves_2	2	Hard-limit	Hyperbolic tangent sigmoid	Gradient Descent 80	10   10		1564	3.09%	0 0	3.13%	0	0
Leaves_2	2	Hard-limit	Symmetric hard-limit	Gradient Descent 80	10 10		1564	6.19%	0 0	1.04%	0	0
Leaves_2	2	Hard-limit	None	Gradient Descent 80	10 10		1564	7.22%	0 0	1.04%	0	0
Leaves_2	2	Linear	Hard-limit	Gradient Descent 80	10 10		1564	11.34%	0 0	1.04%	0	0
Leaves_2	2	Linear	Linear	Gradient Descent 80	10 10		1564	11.34%	0 0	1.04%	0	0
Leaves_2	2	Linear	Log-sigmoid	Gradient Descent 80	10 10		1564	15.46%	0 0	1.04%	0	0
Leaves_2	2	Linear	Hyperbolic tangent sigmoid	Gradient Descent 80	10 10		1564	8.25%	0 0	2.08%	0	0
Leaves_2	2	Linear	Symmetric hard-limit		10   10		1564	13.40%	0 0	2.08%	0	0
Leaves_2	2	Linear	None	Gradient Descent 80	10 10		1564	9.28%	0 0	1.04%	0	0
Leaves_2	2	Log-sigmoid	Hard-limit	Gradient Descent 80	10 10		1564	11.34%		3.13%	0	0
Leaves_2	2	Log-sigmoid	Linear		10 10		1564	10.31%	0 0	1.04%	0	0
Leaves_2	2	Log-sigmoid	Log-sigmoid	Gradient Descent 80	10   10		1564	12.37%	0 0	2.08%	0	0

Table B.6: Training - Image in binary with Leaves\_2 - Part 2  $\,$ 

	Transfer	Transfer functions		Ratio	(in percentage %)	tage %)			Species			Species	
Folder Hidden L.	1st	2nd	Training algorithm	Train	Validation	n   Test	Quant. images	% ssecons	Epoch	Duration	% ssecons	Epoch	Duration
Leaves_2 2	Log-sigmoid	Hyperbolic tangent sigmoid	Gradient Descent	80	10	10	1564	14.43%	0	0	%00.0	0	0
Leaves_2 2	Log-sigmoid	Symmetric hard-limit	Gradient Descent	08	10	10	1564	7.22%	0	0	1.04%	0	0
Leaves_2 2	Log-sigmoid	None	Gradient Descent	80	10	10	1564	17.53%	0	0	1.04%	0	0
Leaves_2 2	Hyperbolic tangent sigmoid	Hard-limit	Gradient Descent	80	10	10	1564	10.31%	0	0	2.08%	0	0
Leaves_2 2	Hyperbolic tangent sigmoid	Linear	Gradient Descent	80	10	10	1564	9.28%	0	0	1.04%	0	0
Leaves_2 2	Hyperbolic tangent sigmoid	Log-sigmoid	Gradient Descent	80	10	10	1564	10.31%	0	0	1.04%	0	0
Leaves_2 2	Hyperbolic tangent sigmoid	Hyperbolic tangent sigmoid	Gradient Descent	98	10	10	1564	9.28%	0	0	1.04%	0	0
Leaves_2 2	Hyperbolic tangent sigmoid		Gradient Descent	80	10	10	1564	7.22%	0	0	%00.0	0	0
Leaves_2 2	Hyperbolic tangent sigmoid		Gradient Descent	80	10	10	1564	10.31%	0	0	1.04%	0	0
Leaves_2 2	Symmetric hard-limit	Hard-limit	Gradient Descent	80	10	10	1564	13.40%	0	0	%00.0	0	0
Leaves_2 2	Symmetric hard-limit	Linear	Gradient Descent	80	10	10	1564	6.19%	0	0	1.04%	0	0
Leaves_2 2	Symmetric hard-limit	Log-sigmoid	Gradient Descent	98	10	10	1564	10.31%	0	0	1.04%	0	0
Leaves 2 2	Symmetric hard-limit	Hyperbolic tangent sigmoid	Gradient Descent	80	10	10	1564	9.28%	0	0	%00.0	0	0
Leaves_2 2	Symmetric hard-limit	Symmetric hard-limit	Gradient Descent	80	10	10	1564	15.46%	0	0	1.04%	0	0
Leaves_2 2	Symmetric hard-limit	None	Gradient Descent	8	10	10	1564	11.34%	0	0	1.04%	0	0
Leaves_2 2	Hard-limit	Hard-limit	Stochastic Approximation to Gradient Descent		10	10	1564	7.22%	0	0	1.04%	0	0
Leaves_2 2	Hard-limit	Linear	Stochastic Approximation to Gradient Descent	1 80	10	10	1564	14.43%	0	0	3.13%	0	0
Leaves_2 2	Hard-limit	Log-sigmoid	Stochastic Approximation to Gradient Descent	1t 80	10	10	1564	11.34%	0	0	1.04%		0
Leaves_2 2	Hard-limit	Hyperbolic tangent sigmoid	Stochastic Approximation to Gradient Descent	ıt 80	10	10	1564	11.34%	0	0	1.04%	0	0
Leaves_2 2	Hard-limit	Symmetric hard-limit	Stochastic Approximation to Gradient Descent	1t 80	10	10	1564	10.31%	0	0	%00.0	0	0
Leaves_2 2	Hard-limit	None	Stochastic Approximation to Gradient Descent	1t 80	10	10	1564	12.37%	0	0	2.08%	0	0
Leaves_2 2	Linear	Hard-limit	Stochastic Approximation to Gradient Descent	t 80	10	10	1564	8.25%	0	0	1.04%	0	0
Leaves_2 2	Linear	Linear	Stochastic Approximation to Gradient Descent	1 80	10	10	1564	7.22%	0	0	1.04%	0	0
Leaves_2 2	Linear	Log-sigmoid	Stochastic Approximation to Gradient Descent	t 80	10	10	1564	8.25%	0	0	1.04%		0
Leaves_2 2	Linear	Hyperbolic tangent sigmoid	Stochastic Approximation to Gradient Descent	Н	10	10	1564	11.34%	0	0	1.04%	0	0
Leaves_2 2	Linear	Symmetric hard-limit	Stochastic Approximation to Gradient Descent	t 80	10	10	1564	10.31%	0	0	2.08%	0	0
Leaves_2 2	Linear	None	Stochastic Approximation to Gradient Descent	t 80	10	10	1564	4.12%	0	0	%00.0	0	0
Leaves_2 2	Log-sigmoid	Hard-limit	Stochastic Approximation to Gradient Descent	ıt 80	10	10	1564	14.43%	0	0	%00.0		0
Leaves_2 2	Log-sigmoid	Linear	Stochastic Approximation to Gradient Descent	1t 80	10	10	1564	12.37%	0	0	%00.0	0	0
Leaves_2 2	Log-sigmoid	Log-sigmoid	Stochastic Approximation to Gradient Descent	t 80	10	10	1564	5.15%	0	0	1.04%	0	0
Leaves_2 2	Log-sigmoid	Hyperbolic tangent sigmoid	Stochastic Approximation to Gradient Descent	1t 80	10	10	1564	4.12%	0	0	2.08%	0	0
Leaves_2   2	Log-sigmoid	Symmetric hard-limit	Stochastic Approximation to Gradient Descent	ıt 80	10	10	1564	7.22%	0	0	2.08%	0	0
Leaves_2 2	Log-sigmoid	None	Stochastic Approximation to Gradient Descent	ıt 80	10	10	1564	12.37%	0	0	2.08%	0	0
	Hyperbolic tangent sigmoid	Hard-limit	Stochastic Approximation to Gradient Descent		10	10	1564	16.49%	0	0	1.04%	0	0
Leaves_2 2	Hyperbolic tangent sigmoid	Linear	Stochastic Approximation to Gradient Descent		10	10	1564	15.46%	0	0	0.00%	0	0
Leaves_2 2	Hyperbolic tangent sigmoid	Log-sigmoid	Stochastic Approximation to Gradient Descent		10	10	1564	10.31%	0	0	1.04%	0	0
Leaves_2 2	Hyperbolic tangent sigmoid	Hyperbolic tangent sigmoid	Stochastic Approximation to Gradient Descent	ıt 80	10	10	1564	87.6	0	0	3.13%	0	0
Leaves_2 2	Hyperbolic tangent sigmoid	Symmetric hard-limit	Stochastic Approximation to Gradient Descent	1 80	10	10	1564	13.40%	0	0	3.13%	0	0
Leaves_2 2	Hyperbolic tangent sigmoid	None	Stochastic Approximation to Gradient Descent	1 80	10	10	1564	16.49%	0	0	%00.0	0	0
Leaves_2 2	Symmetric hard-limit	Hard-limit	Stochastic Approximation to Gradient Descent	t 80	10	10	1564	10.31%	0	0	1.04%	0	0
Leaves_2 2	Symmetric hard-limit	Linear	Stochastic Approximation to Gradient Descent	1 80	10	10	1564	14.43%	0	0	1.04%	0	0
Leaves_2 2	Symmetric hard-limit	Log-sigmoid	Stochastic Approximation to Gradient Descent	t 80	10	10	1564	6.19%	0	0	1.04%	0	0
Leaves_2 2	Symmetric hard-limit	Hyperbolic tangent sigmoid	Stochastic Approximation to Gradient Descent		10	10	1564	11.34%	0	0	0.00%	0	0
	Symmetric hard-limit	Symmetric hard-limit	Stochastic Approximation to Gradient Descent	H	10	10	1564	6.19%	0	0	1.04%	0	0
Leaves_2 2	Symmetric hard-limit	None	Stochastic Approximation to Gradient Descent	1t 80	10	10	1564	10.31%	0	0	1.04%	0	

Table B.7: Training - Image in binary with Leaves\_2 - Part 3

	Transfer	Transfer functions	Ratio	Ratio (in percentage %	(% e)			Species			Species	
Folder Hidden	L. 1st	2nd	Training algorithm Train	Validation	Test	Quant. images	% ssecons	Epoch	Duration	% ssecons	Epoch	Duration
Leaves_2 10	Hard-limit	Hard-limit	Perceptron Training Rule 70	15	15	1564	12.37%	0	+	0.00%	0	0
Leaves_2 10	Hard-limit	Linear	Perceptron Training Rule 70	15	15	1564	12.37%	0	0	2.08%	0	0
Leaves_2 10	Hard-limit	Log-sigmoid	Perceptron Training Rule 70	15	15	1564	5.15%	0	0	2.08%	0	0
Leaves_2 10	Hard-limit	Hyperbolic tangent sigmoid	Perceptron Training Rule 70	15	15	1564	11.34%	0	0	2.08%	0	0
Leaves_2 10	Hard-limit	Symmetric hard-limit	Perceptron Training Rule 70	15	15	1564	12.37%	0	0	2.08%	0	0
Leaves_2 10	Hard-limit	None	Perceptron Training Rule 70	15	15	1564	15.46%	0	0	2.08%	0	0
Leaves_2 10	Linear	Hard-limit	Perceptron Training Rule 70	15	15	1564	13.40%	0	0	2.08%	0	0
Leaves_2 10	Linear	Linear	Perceptron Training Rule 70	15	15	1564	12.37%	0	0.01	0.00%	0	0
Leaves_2 10	Linear	Log-sigmoid	Perceptron Training Rule 70	15	15	1564	12.37%	0	0	2.08%	0	0
Leaves_2 10	Linear	Hyperbolic tangent sigmoid	Perceptron Training Rule 70	15	15	1564	5.15%	0	0	2.08%	0	0
Leaves_2 10	Linear	Symmetric hard-limit	Perceptron Training Rule 70	15	15	1564	11.34%	0	0	2.08%	0	0
Leaves_2 10	Linear	None	Perceptron Training Rule 70	15	15	1564	12.37%	0	0	2.08%	0	0
Leaves_2 10	Log-sigmoid	Hard-limit		15	15	1564	15.46%	0	0	2.08%	0	0
Leaves_2 10	Log-sigmoid	Linear		15	15	1564	13.40%	0	0	2.08%	0	0
Leaves_2 10	Log-sigmoid	Log-sigmoid	Training	15	15	1564	12.37%	0	0	4.17%	0	0
Leaves_2 10	Log-sigmoid	Hyperbolic tangent sigmoid	Perceptron Training Rule 70	15	15	1564	8.25%	0	0	1.04%	0	0
Leaves_2 10	Log-sigmoid	Symmetric hard-limit		15	15	1564	10.31%	0	0	0.00%	0	0
Leaves_2 10	Log-sigmoid	None	Perceptron Training Rule 70	15	15	1564	10.31%	0	0	2.08%	0	0
Leaves_2 10	Hyperbolic tangent sigmoid	Hard-limit	Perceptron Training Rule 70	15	15	1564	4.12%	0	0	0.00%	0	0
Leaves_2 10	Hyperbolic tangent sigmoid	Linear		15	15	1564	10.31%	0	0	1.04%	0	0
Leaves_2 10	Hyperbolic tangent sigmoid	Log-sigmoid	Perceptron Training Rule 70	15	15	1564	13.40%	0	0	2.08%	0	0
Leaves_2 10	Hyperbolic tangent sigmoid	Hyperbolic tangent sigmoid		15	15	1564	11.34%	0	0	1.04%	0	0
Leaves_2 10	Hyperbolic tangent sigmoid	Symmetric hard-limit	Perceptron Training Rule 70	15	15	1564	8.25%	0	0	2.08%	0	0
Leaves_2 10	Hyperbolic tangent sigmoid	None		15	15	1564	6.19%	0	0	0.00%	0	0
Leaves_2 10	Symmetric hard-limit	Hard-limit	Perceptron Training Rule 70	15	15	1564	8.25%	0	0	0.00%	0	0
Leaves_2 10	Symmetric hard-limit	Linear	Perceptron Training Rule 70	15	15	1564	7.22%	0	0	2.08%	0	0
Leaves_2 10	Symmetric hard-limit	Log-sigmoid	Perceptron Training Rule 70	15	15	1564	12.37%	0	0	3.13%	0	0
Leaves_2 10	Symmetric hard-limit	Hyperbolic tangent sigmoid	Perceptron Training Rule 70	15	15	1564	8.25%	0	0	1.04%	0	0
Leaves_2 10	Symmetric hard-limit	Symmetric hard-limit	Training Rule	15	15	1564	6.19%	0	0	0.00%	0	0
Leaves_2 10	Symmetric hard-limit	None	Perceptron Training Rule   70	15	12	1564	16.49%	0	0	1.04%	0	0
Leaves_2 10	Hard-limit	Hard-limit	Gradient Descent 70	15	15	1564	8.25%	0	0	0.00%	0	0
Leaves_2 10	Hard-limit	Linear	Gradient Descent 70	15	15	1564	13.40%	0	0	2.08%	0	0
Leaves_2   10	Hard-limit	Log-sigmoid	Gradient Descent 70	15	15	1564	6.19%	0	0	3.13%	0	0
Leaves_2   10	Hard-limit	Hyperbolic tangent sigmoid		15	15	1564	7.22%	0	0	2.08%	0	0
Leaves_2 10	Hard-limit	Symmetric hard-limit	Gradient Descent 70	15	15	1564	4.12%	0	0	1.04%	0	0
Leaves_2 10	Hard-limit	None	Gradient Descent 70	15	15	1564	10.31%	0	0	3.13%	0	0
Leaves_2 10	Linear	Hard-limit	Gradient Descent 70	15	15	1564	8.25%	0	0	0.00%	0	0
Leaves_2 10	Linear	Linear	Gradient Descent 70	15	15	1564	10.31%	0	0	2.08%	0	0
Leaves_2 10	Linear	Log-sigmoid	Gradient Descent 70	15	15	1564	9.28%	0	0	0.00%	0	0
Leaves_2 10	Linear	Hyperbolic tangent sigmoid	Gradient Descent 70	15	15	1564	7.22%	0	0	2.08%	0	0
Leaves_2 10	Linear	Symmetric hard-limit		15	15	1564	6.19%	0	0	1.04%	0	0
Leaves_2 10	Linear	None		15	15	1564	8.25%	0	0	2.08%	0	0
$\vdash$	Log-sigmoid	Hard-limit		15	15	1564	4.12%	0	0	1.04%	0	0
-	Log-sigmoid	Linear		15	15	1564	12.37%	0	0	1.04%	0	0
Leaves_2 10	Log-sigmoid	Log-sigmoid	Gradient Descent 70	15	15	1564	9.28%	0	0	1.04%	0	0

Table B.8: Training - Image in binary with Leaves\_2 - Part 4

Folder														
,	Hidden L.	Ist	2nd	Training algorithm	Train	in   Validation	tion Test	st Quant. images	Success %	Epoch	Duration	Success %	Epoch	Duration
Feaves-2	10	Log-sigmoid	Hyperbolic tangent sigmoid	Gradient Descent	20	15	15	1564	12.37%	0	0		0	0
Leaves_2	10	Log-sigmoid	Symmetric hard-limit	Gradient Descent	20	15	15	1564	12.37%	0	0	2.08%	0	0
Leaves_2	10	Log-sigmoid	None	Gradient Descent	20	15	15	1564	9.28%	0	0	2.08%	0	0
Leaves_2	10	Hyperbolic tangent sigmoid	Hard-limit	Gradient Descent	20	15	15		7.22%	0	0	%00:0	0	0
Leaves 2	10	Hyperbolic tangent sigmoid	Linear	Gradient Descent	20	15	15	1564	8.25%	0	0	%00.0	0	0
Leaves_2	10	Hyperbolic tangent sigmoid	Log-sigmoid	Gradient Descent	20	15	15		7.22%	0	0	2.08%		0
Leaves_2	10	Hyperbolic tangent sigmoid	Hyperbolic tangent sigmoid	Gradient Descent	20	15	15	1564	11.34%	0	0	1.04%		0
Leaves 2	10	Hyperbolic tangent sigmoid	Symmetric hard-limit	Gradient Descent	20	15	15	1564	7.22%	0	0	%00.0	0	0
Leaves_2	10	Hyperbolic tangent sigmoid	None	Gradient Descent	20	15	15	1564	10.31%	0	0	1.04%	0	0
Leaves 2	10	Symmetric hard-limit	Hard-limit	Gradient Descent	20	15	15	1564	10.31%	0	0	%00.0	0	0
Leaves_2	10	Symmetric hard-limit	Linear	Gradient Descent	20	15	15	1564	4.12%	0	0	1.04%	0	0
Leaves_2	10	Symmetric hard-limit	Log-sigmoid	Gradient Descent	20	15	15	1564	12.37%	0	0	1.04%	0	0
Leaves 2	10	Symmetric hard-limit	Hyperbolic tangent sigmoid	Gradient Descent	20	15	15		9.28%	0	0	2.08%	0	0
Leaves_2	10	Symmetric hard-limit	Symmetric hard-limit	Gradient Descent	20	15	15	1564	13.40%	0	0	1.04%	0	0
Leaves_2	10	Symmetric hard-limit	None	Gradient Descent		15	15		12.37%	0	0	%00:0	0	0
Leaves_2	10	Hard-limit	Hard-limit	Stochastic Approximation to Gradient Descen		15	15		9.28%	0	0	%00.0		0
Leaves_2	10	Hard-limit	Linear	Stochastic Approximation to Gradient Descent	nt 70	15	15	1564	15.46%	0	0	%00.0	0	0
Leaves 2	10	Hard-limit	Log-sigmoid	Stochastic Approximation to Gradient Descen		15	15		7.22%	0	0	2.08%	0	0
Leaves_2	10	Hard-limit	Hyperbolic tangent sigmoid	Stochastic Approximation to Gradient Descent	nt 70	15	15	1564	9.28%	0	0	1.04%	0	0
Leaves_2	10	Hard-limit	Symmetric hard-limit	Stochastic Approximation to Gradient Descent	nt 70	15	15	1564	9.28%	0	0	3.13%	0	0
Leaves 2	10	Hard-limit	None	Stochastic Approximation to Gradient Descent	nt 70	15	15	1564	6.19%	0	0	3.13%	0	0
Leaves_2	10	Linear	Hard-limit	Stochastic Approximation to Gradient Descent	nt 70	15	15	1564	8.25%	0	0	%00.0	0	0
Leaves_2	10	Linear	Linear	Stochastic Approximation to Gradient Descent	nt 70	15	15	1564	4.12%	0	0	1.04%	0	0
Leaves_2	10	Linear	Log-sigmoid	Stochastic Approximation to Gradient Descent		15	15		9.28%	0	0	1.04%	0	0
Leaves_2	10	Linear	Hyperbolic tangent sigmoid	Stochastic Approximation to Gradient Descent	Н	15	15		5.15%	0	0	%00:0		0
Leaves 2	10	Linear	Symmetric hard-limit	Stochastic Approximation to Gradient Descen	nt 70	15	15		9.28%	0	0	%00.0		0
Leaves_2	10	Linear	None	Stochastic Approximation to Gradient Descen		15	15	1564	9.28%	0	0	3.13%		0
Leaves_2	10	Log-sigmoid	Hard-limit	Stochastic Approximation to Gradient Descen	nt 70	15	15	1564	10.31%	0	0	%00:0	0	0
Leaves_2	10	Log-sigmoid	Linear	Stochastic Approximation to Gradient Descen	nt 70	15	15	1564	13.40%	0	0	1.04%	0	0
Leaves_2	10	Log-sigmoid	Log-sigmoid	Stochastic Approximation to Gradient Descent	nt 70	15	15	1564	11.34%	0	0	3.13%	0	0
Leaves_2	10	Log-sigmoid	Hyperbolic tangent sigmoid	Stochastic Approximation to Gradient Descent	nt 70	15	15		15.46%	0	0	2.08%	0	0
Leaves_2	10	Log-sigmoid	Symmetric hard-limit	Stochastic Approximation to Gradient Descent		15	15		9.28%	0	0	3.13%		0
Leaves_2	10	Log-sigmoid	None	Stochastic Approximation to Gradient Descent	-	15	15		7.22%	0	0	1.04%	0	0
Leaves 2	10	Hyperbolic tangent sigmoid	Hard-limit	Stochastic Approximation to Gradient Descent	$\dashv$	15	15		9.28%	0	0	1.04%		0
Leaves_2	10	Hyperbolic tangent sigmoid	Linear	Stochastic Approximation to Gradient Descen	-	15	15		13.40%	0	0	0.00%		0
Leaves_2	10	Hyperbolic tangent sigmoid	Log-sigmoid	Stochastic Approximation to Gradient Descent		15	15		8.25%	0	0			0
Leaves_2	10	Hyperbolic tangent sigmoid	Hyperbolic tangent sigmoid	Stochastic Approximation to Gradient Descent	nt   70	15	15	1564	9.28%	0	0	%00:0	0	0
Leaves_2	10	Hyperbolic tangent sigmoid	Symmetric hard-limit	Stochastic Approximation to Gradient Descent	nt 70	15	15	1564	7.22%	0	0	2.08%	0	0
Leaves_2	10	Hyperbolic tangent sigmoid	None	Stochastic Approximation to Gradient Descent	nt 70	15	15	1564	8.25%	0	0	1.04%	0	0
Leaves_2	10	Symmetric hard-limit	Hard-limit	Stochastic Approximation to Gradient Descent	nt 70	15	15	1564	12.37%	0	0	1.04%	0	0
Leaves_2	10	Symmetric hard-limit	Linear	Stochastic Approximation to Gradient Descent	nt 70	15	15	1564	10.31%	0	0	0.00%	0	0
Leaves 2	10	Symmetric hard-limit	Log-sigmoid	Stochastic Approximation to Gradient Descent	nt 70	15	15		7.22%	0	0	1.04%	0	0
Leaves_2	10	Symmetric hard-limit	Hyperbolic tangent sigmoid	Stochastic Approximation to Gradient Descent		15	15		14.43%	0	0	1.04%	0	0
Leaves_2	10	Symmetric hard-limit	Symmetric hard-limit	Stochastic Approximation to Gradient Descent		15	15		11.34%	0	0	1.04%		0
Leaves_2	10	Symmetric hard-limit	None	Stochastic Approximation to Gradient Descent	nt 10	12	15	1564	7.22%	0	0	1.04%	0	0

Table B.9: Training - Image in binary with Leaves\_3 - Part 1  $\,$ 

		Transfer	Transfer functions	Ratio	(in percentage %	(9)		Species		Species	
Folder	Hidden L.	1st	2nd	orithm Train	Validation   Te	+	s Success %	Epoch Duration	% ssəcons	Epoch	Duration
Leaves_3	2	Hard-limit	Hard-limit	Perceptron Training Rule 80	10 10		100.00%		%00.0	0	0
Leaves_3	2	Hard-limit	Linear	Perceptron Training Rule 80	10 10		%00.0	0 0	0.00%	0	0
Leaves_3	2	Hard-limit	Log-sigmoid	Perceptron Training Rule   80	10   10		20.00%	0 0	%00'0	0	0
Leaves_3	2	Hard-limit	Hyperbolic tangent sigmoid	Perceptron Training Rule 80	10 10	20	%00.0	0 0	0.00%	0	0
Leaves_3	2	Hard-limit	Symmetric hard-limit	Perceptron Training Rule   80	10   10		%00.0	0 0	%00.0	0	0
Leaves_3	2	Hard-limit	None	Perceptron Training Rule 80	10 10		%00.0	0 0	%00.0	0	0
Leaves_3	2	Linear	Hard-limit	Perceptron Training Rule 80	10 10	20	%00.0	0 0	0.00%	0	0
Leaves_3	2	Linear	Linear	Perceptron Training Rule 80	10 10		%00.0	0 0	%00.0	0	0
Leaves_3	2	Linear	Log-sigmoid	Perceptron Training Rule 80	10 10		%00.0	0 0	0.00%	0	0
Leaves_3	2	Linear	Hyperbolic tangent sigmoid	Training Rule	10 10		20.00%	0 0	%00.0	0	0
Leaves_3	2	Linear	Symmetric hard-limit	Perceptron Training Rule 80	10 10		100.00%	0 0	0.00%	0	0
Leaves_3	2	Linear	None	Perceptron Training Rule 80	10 10		20.00%	0 0	0.00%	0	0
Leaves_3	2	Log-sigmoid	Hard-limit	Perceptron Training Rule 80	10 10		%00.0	0 0	0.00%	0	0
Leaves_3	2	Log-sigmoid	Linear	Perceptron Training Rule 80	10 10	20	%00.0	0 0	0.00%	0	0
Leaves_3	2	Log-sigmoid	Log-sigmoid	Perceptron Training Rule 80	10 10		%00.0		0.00%	0	0
Leaves_3	2	Log-sigmoid	Hyperbolic tangent sigmoid	Perceptron Training Rule 80	10 10	20	20.00%	0 0	0.00%	0	0
Leaves_3	2	Log-sigmoid	Symmetric hard-limit	Perceptron Training Rule 80	10 10		%00.0	0 0	0.00%	0	0
Leaves_3	2	Log-sigmoid	None	Perceptron Training Rule 80	10 10	20	0.00%	0 0	0.00%	0	0
Leaves_3	2	Hyperbolic tangent sigmoid	Hard-limit	Perceptron Training Rule 80	10 10	20	%00.0	0 0	0.00%	0	0
Leaves_3	2	Hyperbolic tangent sigmoid	Linear	Perceptron Training Rule 80	10 10		20.00%	0 0	0.00%	0	0
Leaves_3	2	Hyperbolic tangent sigmoid	Log-sigmoid	Perceptron Training Rule 80	10 10		100.00%	0 0	0.00%	0	0
Leaves_3	2	Hyperbolic tangent sigmoid	Hyperbolic tangent sigmoid		10 10	20	%00.0	0 0	0.00%	0	0
Leaves_3	2	Hyperbolic tangent sigmoid	Symmetric hard-limit	Perceptron Training Rule 80	10 10	20	%00.0	0 0	0.00%	0	0
Leaves_3	2	Hyperbolic tangent sigmoid	None		10 10		20.00%	0 0	0.00%	0	0
Leaves_3	2	Symmetric hard-limit	Hard-limit	Perceptron Training Rule 80	10 10		%00.0	0 0	0.00%	0	0
Leaves_3	2	Symmetric hard-limit	Linear		10   10		20.00%	0 0	%00.0	0	0
Leaves_3	2	Symmetric hard-limit	Log-sigmoid	Perceptron Training Rule 80	10 10		20.00%	0 0	%00.0	0	0
Leaves_3	2	Symmetric hard-limit	Hyperbolic tangent sigmoid	Perceptron Training Rule   80	10 10		20.00%	0 0	%00.0	0	0
Leaves_3	2	Symmetric hard-limit	Symmetric hard-limit	Training Rule			20.00%		%00.0	0	0
Leaves_3	2	Symmetric hard-limit	None	ng Rule			%00.0	0 0	0.00%	0	0
Leaves_3	2	Hard-limit	Hard-limit				%00:0	0 0	%00.0	0	0
Leaves_3	2	Hard-limit	Linear	Gradient Descent 80	10   10		0.00%	0 0	0.00%	0	0
Leaves_3	2	Hard-limit	Log-sigmoid	Gradient Descent 80	10   10		%00:0	0 0	%00.0	0	0
Leaves_3	2	Hard-limit	Hyperbolic tangent sigmoid	Gradient Descent 80	10   10		20.00%	0 0	%00.0	0	0
Leaves_3	2	Hard-limit	Symmetric hard-limit	Gradient Descent 80	10 10		100.00%	0 0	%00'0	0	0
Leaves_3	2	Hard-limit	None	Gradient Descent 80	10 10		20.00%	0 0	%00.0	0	0
Leaves_3	2	Linear	Hard-limit	Gradient Descent 80	10 10	20	%00.0	0 0	0.00%	0	0
Leaves_3	2	Linear	Linear	Gradient Descent 80	10 10		%00.0	0 0	0.00%	0	0
Leaves_3	2	Linear	Log-sigmoid	Gradient Descent 80	10 10		20.00%	0 0	0.00%	0	0
Leaves_3	2	Linear	Hyperbolic tangent sigmoid	Gradient Descent 80	10 10		20.00%	0 0	%00.0	0	0
Leaves_3	2	Linear	Symmetric hard-limit		10   10		%00:0		%00.0	0	0
Leaves_3	2	Linear	None	Gradient Descent 80	10   10		50.00%	0 0	0.00%	0	0
Leaves_3	2	Log-sigmoid	Hard-limit	Gradient Descent 80	10   10		%00:0	0 0	%00.0	0	0
Leaves_3	2	Log-sigmoid	Linear	Gradient Descent 80	10 10		0.00%	0 0	0.00%	0	0
Leaves_3	2	Log-sigmoid	Log-sigmoid	Gradient Descent 80	10 10	20	20.00%	0 0	0.00%	0	0

Table B.10: Training - Image in binary with Leaves\_3 - Part 2

idden L.	1st         2nd           Log-sigmoid         Hyperbol           Log-sigmoid         Symmet           Log-sigmoid         None           Hyperbolic tangent sigmoid         Hard-lin           Hyperbolic tangent sigmoid         Linear           Hyperbolic tangent sigmoid         Log-sign           Hyperbolic tangent sigmoid         Hyperbol           Hyperbolic tangent sigmoid         Symmetric hard-limit           Hyperbolic tangent sigmoid         Hyperbol           Symmetric hard-limit         Linear           Symmetric hard-limit         Linear           Symmetric hard-limit         Log-sign           Hyperbolic hard-limit         Hyperbol	olic tangent sigmoid ric hard-limit nit	Training algorithm	Train 80	+	n Test	t Quant. images	Success %	Epoch 0	Duration 0	% ss	Epoch	Duration
		-	,	8	10	10	06	10.00%	0	0	7,000	_	
			Gradient Descent				24	, , ,		_	0.00%	0	0
			Gradient Descent	8	10	10	20	20.00%	0	0	%00.0	0	0
			Gradient Descent	98	10	10	20	%00.0	0	0	%00.0	0	0
			Gradient Descent	80	10	10	20	20.00%	0	0	%00.0	0	0
		Linear	Gradient Descent	98	10	10	20	%00.0	0	0	%00.0	0	0
		Log-sigmoid	Gradient Descent	80	10	10	20	%00.0	0		%00.0	0	0
		Hyperbolic tangent sigmoid	Gradient Descent	08	10	10	20	%00.0	0		%00.0	0	0
		$\vdash$	Gradient Descent	80	10	10	20	%00.0	0	0	%00.0	0	0
		None	Gradient Descent	8	10	10	20	20.00%	0	0	%00.0	0	0
		Hard-limit	Gradient Descent	8	10	10	20	%00.0	0	0	%00.0	0	0
		Linear	Gradient Descent	80	10	10	20	%00.0	0	0	%00.0	0	0
		Log-sigmoid	Gradient Descent	98	10	10	20	%00.0	0	0	%00.0	0	0
		Hyperbolic tangent sigmoid	Gradient Descent	08	10	10	20	20.00%	0	0	%00.0	0	0
	Symmetric hard-limit	Symmetric hard-limit	Gradient Descent	8	10	10	20	20.00%	0	0	%00.0	0	0
	Symmetric hard-limit	None	Gradient Descent	98	10	10	20	%00.0	0	0	%00.0	0	0
	Hard-limit	Hard-limit	Stochastic Approximation to Gradient Descent	08	10	10	20	%00.0	0	0	%00.0	0	0
	Hard-limit	Linear	Stochastic Approximation to Gradient Descent	280	10	10	20	%00.0	0	0	%00.0	0	0
	Hard-limit	Log-sigmoid	Stochastic Approximation to Gradient Descent		10	10	20	%00.0	0		%00.0	0	0
	Hard-limit	Hyperbolic tangent sigmoid	Stochastic Approximation to Gradient Descent	2	10	10	20	%00.0	0	0	%00.0	0	0
	Hard-limit	Symmetric hard-limit	Stochastic Approximation to Gradient Descent	98	10	10	20	%00.0	0		%00.0	0	0
	Hard-limit	None	Stochastic Approximation to Gradient Descent	08	10	10	20	%00.0	0	0	%00.0	0	0
	Linear	Hard-limit	Stochastic Approximation to Gradient Descent	98	10	10	20	100.00%	0	0	%00.0	0	0
	Linear	Linear	Stochastic Approximation to Gradient Descent	08	10	10	20	20.00%	0	0	%00.0	0	0
			Stochastic Approximation to Gradient Descent		10	10	20	100.00%	0		%00.0	0	0
	Linear	Hyperbolic tangent sigmoid	Stochastic Approximation to Gradient Descent		10	10	20	%00.0	0		%00.0	0	0
2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2	Linear	Symmetric hard-limit	Stochastic Approximation to Gradient Descent	: 80	10	10	20	50.00%	0	0	0.00%	0	0
2 2 2 2 2 2 2 2 2 2	Linear		Stochastic Approximation to Gradient Descent	2 80	10	10	20	%00.0	0	0	%00.0	0	0
0 0 0 0 0 0 0 0	Log-sigmoid	Hard-limit	Stochastic Approximation to Gradient Descent	2 80	10	10	20	0.00%	0		%00.0	0	0
00000000	Log-sigmoid	Linear	Stochastic Approximation to Gradient Descent	08	10	10	20	%00.0	0	0	%00.0	0	0
0 0 0 0 0 0	Log-sigmoid	-	Stochastic Approximation to Gradient Descent	2	10	10	20	0.00%	0	0	%00.0	0	0
2 2 2 2 2	Log-sigmoid	Hyperbolic tangent sigmoid	Stochastic Approximation to Gradient Descent	: 80	10	10	20	0.00%	0	0	0.00%	0	0
2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2	Log-sigmoid	etric hard-limit	Stochastic Approximation to Gradient Descent		10	10	20	0.00%	0		%00.0	0	0
2 2 2			Stochastic Approximation to Gradient Descent		10	10	20	20.00%	0	0	%00.0	0	0
2 2	Hyperbolic tangent sigmoid	Hard-limit	Stochastic Approximation to Gradient Descent		10	10	20	%00.0	0		%00.0	0	0
2		Linear	Stochastic Approximation to Gradient Descent		10	10	20	50.00%	0		%00.0	0	0
	Hyperbolic tangent sigmoid	Log-sigmoid	Stochastic Approximation to Gradient Descent	08	10	10	20	%00.0	0		%00.0	0	0
Leaves_3   2   H	Hyperbolic tangent sigmoid	Hyperbolic tangent sigmoid	Stochastic Approximation to Gradient Descent	08	10	10	20	%00.0	0	0	%00.0	0	0
Leaves_3 2 H	Hyperbolic tangent sigmoid	Symmetric hard-limit	Stochastic Approximation to Gradient Descent	98 13	10	10	20	20.00%	0		%00.0	0	0
Leaves_3 2 H	$\vdash$	None	Stochastic Approximation to Gradient Descent	08	10	10	20	20.00%	0	0	%00.0	0	0
Leaves_3 2 Sy		Hard-limit	Stochastic Approximation to Gradient Descent	98	10	10	20	%00.0	0	0	%00.0	0	0
Leaves_3 2 Sy	Symmetric hard-limit	Linear	Stochastic Approximation to Gradient Descent	28	10	10	20	%00.0	0	0	%00.0	0	0
Leaves_3 2 Sy			Stochastic Approximation to Gradient Descent	08	10	10	20	%00.0	0	0	%00.0	0	0
2		Hyperbolic tangent sigmoid	Stochastic Approximation to Gradient Descent	08	10	10	20	20.00%	0	0	%00.0	0	0
2		netric hard-limit	Stochastic Approximation to Gradient Descent		10	10	20	0.00%	0	0	0.00%	0	0
Leaves_3 2 Sy	Symmetric hard-limit	None	Stochastic Approximation to Gradient Descent	08	10	10	20	20.00%	0	0	%00.0	0	0

Table B.11: Training - Image in binary with Leaves\_3 - Part 3

Success %         Epoch         Duration         Success %         Epoch           0.00%         0         0.00%         0           0.00%         0         0.00%         0           0.00%         0         0.00%         0           0.00%         0         0.00%         0           0.00%         0         0.00%         0           0.00%         0         0.00%         0           0.00%         0         0.00%         0           0.00%         0         0.00%         0           0.00%         0         0.00%         0           0.00%         0         0.00%         0           0.00%         0         0.00%         0           0.00%         0         0.00%         0           0.00%         0         0.00%         0           0.00%         0         0.00%         0           0.00%         0         0.00%         0           0.00%         0         0.00%         0           0.00%         0         0.00%         0           0.00%         0         0.00%         0           0.00%         0		Transfer	Transfer functions		Ratio	in percentage	age %)			Species			Species	
(1)         Hand-lating         Hand-lating         Program Thating Rule         70         15         20         6000%         0         0         0         0         0         10         0           (1)         Hand-lating         Local-lating         Local-lating         Local-lating         Local-lating         Procession Thating Rule         71         5         20         0.00%         0			2nd	Training algorithm	Train		_		Success	$\vdash$	Duration		Epoch	Duration
Hard-bunith   Liborator   Liborator   Proception Planting Rule   70   15   15   30   10,00%   0   0   0   0.0%   0   0   0   0   0   0   0   0   0		Hard-limit	Hard-limit	Perceptron Training Rule		15	15	20	%00.0	0	0	%00.0	0	0
10         Hard-lanth         Log-signod         Processor         Processor         11         10         600%         0         0         100%         0           10         Hard-lanth         Hyperbolic tangen signod         Proception Thating Rule         7         15         50         600%         0         0         0.00%         0           10         Hard-lanth         Symmetric hard-lanth         Proception Thating Rule         7         15         50         600%         0         0         0.00%         0         0         0.00%         0         0         0.00%         0         0         0.00%         0         0         0.00%         0         0         0.00%         0         0         0.00%         0         0         0.00%         0         0         0.00%         0         0         0.00%         0         0         0.00%         0         0         0.00%         0         0         0.00%         0         0         0.00%         0         0         0.00%         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0	$\vdash$	Hard-limit	Linear	Perceptron Training Rule	-	15	15	20	50.00%	0	0	%00.0	0	0
10         Hard-linit         Pyte-belic tangent eigenoff Perception Thailing Rule 70         16         15         20         6000%         0         0         10         0           10         Hard-linit         Symmetric band-linit         Perception Thailing Rule 70         15         20         6000%         0         0         10         000%           10         Ideac         Inched-linit         Perception Thailing Rule 70         15         20         6000%         0         0         10         000%         0           10         Likear         Likear         Hope Paper and Paper Annual Paper An		Hard-limit	Log-sigmoid	Training		15	15	20	%00.0	0	0	%00.0	0	0
10.         Hard-Burtt         Numerate band-Jamit         Preception Thanks Rule         70         15         20         0.00%         0         0         0.00%         0           10.         Hard-Burtt         Numerate band-Jamit         Preception Thanks Rule         70         15         20         0.00%         0         0         0.00%         0           10.         Innear         Linear         Linear         Preception Thanks Rule         70         15         20         0.00%         0		Hard-limit	Hyperbolic tangent sigmoid	Perceptron Training Rule		15	15	20	0.00%	0	0	0.00%	0	0
Hard-limit   Numeri		Hard-limit	Symmetric hard-limit	Perceptron Training Rule		15	15	20	20.00%	0	0	0.00%	0	0
10         Linear         Have thank         Proceptor Thinking Rule         70         15         23         0.00%         0         0.00%         0           10         Linear         Linear         Linear         Linear         Linear         Proceptor Thinking Rule         70         15         22         0.00%         0         0.00%         0           10         Linear         Standard         Proceptor Thinking Rule         70         15         22         610.00%         0         0         0.00%         0           10         Linear         Standard         Manuer's bard-limit         Proceptor Thinking Rule         70         15         22         610.00%         0         0         0.00%         0           10         Linear         None         Proceptor Thinking Rule         70         15         22         610.00%         0         0         0.00%         0		Hard-limit	None	Perceptron Training Rule		15	15	20	%00.0	0	0	0.00%	0	0
10         Linear         Linear         Linear         Perceptor Training Bule 70         15         23         10.00%         0         0.00%         0           10         Linear         Hope and the control of the control of Perceptor Training Bule 70         15         15         20         10.00%         0         0.00%         0           10         Linear         Symmetric hand-limit         Perceptor Training Bule 70         15         20         60.00%         0         0.00%         0           10         Linear         No.         15         20         60.00%         0         0         0.00%         0           10         Linear         No.         15         20         60.00%         0         0         0.00%         0           10         Lee-signoid         Barch Imag         Perceptor Training Bule 70         15         15         20         60.00%         0         0         0.00%           10         Lee-signoid         Expendent signoid         Perceptor Training Rule 70         15         15         20         0.00%         0         0.00%           10         Perceptor Training Rule 70         15         15         20         0.00%         0         0.0	$\vdash$	Linear	Hard-limit	Perceptron Training Rule	$\vdash$	15	15	20	0.00%	0	0	0.00%	0	0
10         Linear         Logs-gamed signed signed benefator Thining Rule (2002)         15         2.0         100.00%         0         0.00%         0           10         Linear         Experience band-limit         Perceptor Thining Rule (2002)         15         2.0         30.00%         0         0.00%         0           10         Linear         Name of the Chinat         Perceptor Thining Rule (2002)         15         2.0         0.00%         0         0.00%         0           10         Linear         Name of the Chinat         Perceptor Thining Rule (2002)         15         2.0         0.00%         0         0         0.00%         0           10         Log-signoid         Broad (2002)         Perceptor Thining Rule (2002)         15         2.0         0.00%         0	1	Linear	Linear	Training	-	15	15	20	0.00%	0	0	0.00%	0	0
10         Linear         Hyperbolic tangent signal         Preceptor Thining Rule         70         15         20         30,00%         0         0,00%         0           10         Linear         Symmetric land-limit         Preceptor Thining Rule         70         15         20         0,00%         0         0,00%         0           10         Linear         Name         Preceptor Thining Rule         70         15         20         0,00%         0         0         00%         0           10         Loce-Signoid         Hord-Imit         Preceptor Thining Rule         70         15         20         0,00%         0		Linear	Log-sigmoid	Training	-	15	15	20	100.00%	0	0	0.00%	0	0
10         Linear         None         Perceptoral Training Rule   70         15         15         20         60.00%         0         0         0.00%         0           10         Linear         None         Month         Perceptoral Training Rule   70         15         15         20         0.00%         0         0         0.00%         0           10         Log-signoid         Inter-limit         Perceptoral Training Rule   70         15         15         20         0.00%         0         0         0.00%         0           10         Log-signoid         Log-signoid         Log-signoid         Perceptoral Training Rule   70         15         15         20         0.00%         0         0         0.00%         0           10         Log-signoid         Log-signoid         Everytoral Training Rule   70         15         15         20         0.00%         0         0         0.00%         0           10         Hyperbolic tangent signoid         Brack Index I		Linear	Hyperbolic tangent sigmoid	Training		15	15	20	20.00%	0	0	%00.0	0	0
10         Log-signoid         Mone         Perceptron' Training Rule         70         15         15         20         0.00%         0         0         0.00%         0           10         Log-signoid         Interest         Perceptron' Training Rule         70         15         15         20         0.00%         0         0         0.00%         0           10         Log-signoid         Log-signoid         Reverpton' Training Rule         70         15         15         20         0.00%         0         0         0.00%         0           10         Log-signoid         Ryper-loir Langum signoid         Breveptron' Training Rule         70         15         15         20         0.00%         0         0         0.00%         0           10         Hyper-loir Langum signoid         Breveptron' Training Rule         70         15         15         20         0.00%         0         0         0.00%         0<		Linear	Symmetric hard-limit	Perceptron Training Rule	-	15	15	20	20.00%	0	0	0.00%	0	0
10         Log-signoid         Linear         Perception Thaning Rale 70         15         21         0.00%         0         0         0.00%         0           10         Log-signoid         Linear         Perception Thaning Rale 70         15         21         20         0.00%         0         0         0.00%         0           10         Log-signoid         Experience         Lease and Annual Control Thaning Rale 70         15         20         0.00%         0         0         0.00%         0           10         Log-signoid         Symmetric bunchlinit         Perception Thaning Rale 70         15         20         0.00%         0         0         0.00%         0           10         Hyperbolic tangent signoid         Perception Thaning Rale 70         15         20         0.00%         0         0         0.00%         0           10         Hyperbolic tangent signoid         Perception Thaning Rale 70         15         20         0.00%         0         0         0.00%         0           10         Hyperbolic tangent signoid         Perception Thaning Rale 70         15         20         0.00%         0         0         0         0         0         0         0         0		Linear	None			15	15	20	0.00%	0	0	0.00%	0	0
10         Log-signoid         Linear         Perceptor Thaning Rule         70         15         20         300%         0         0         0.00%         0           10         Log-signoid         Lice-signoid         Lice-signoid         Log-signoid         Lice-signoid         Perceptor Thaning Rule         70         15         20         1000%         0         0         0.00%         0           10         Log-signoid         Hyperbolic tangent signoid         March         Perceptor Thaning Rule         70         15         20         0.00%         0         0         0.00%         0           10         Log-signoid         Name         Perceptor Thaning Rule         70         15         20         0.00%         0         0         0.00%         0 <td></td> <td>Log-sigmoid</td> <td>Hard-limit</td> <td>Perceptron Training Rule</td> <td></td> <td>15</td> <td>15</td> <td>20</td> <td>%00.0</td> <td>0</td> <td>0</td> <td>0.00%</td> <td>0</td> <td>0</td>		Log-sigmoid	Hard-limit	Perceptron Training Rule		15	15	20	%00.0	0	0	0.00%	0	0
10         Log-signoid         Log-signoid         Log-signoid         Perceptron Training Rule         70         15         15         20         1000%         0         0         0           10         Log-signoid         Spannetric land-limit         Perceptron Training Rule         70         15         15         20         0.00%         0         0         0.00%         0           10         Log-signoid         Symmetric land-limit         Perceptron Training Rule         70         15         20         0.00%         0         0         0.00%         0	$\vdash$	Log-sigmoid	Linear		$\vdash$	15	15	20	20.00%	0	0	0.00%	0	0
110         Log-signoid         Hyperbolic tangent signoid         Perceptron Training Rule         70         15         20         0.00%         0         0         0.00%         0           10         Log-signoid         Symmetric bard-limit         Perceptron Training Rule         70         15         15         20         0.00%         0         0         0.00%         0           10         Hyperbolic tangent signoid         Innear         Perceptron Training Rule         70         15         15         20         0.00%         0         0         0.00%         0           10         Hyperbolic tangent signoid         Hard-limit         Perceptron Training Rule         70         15         15         20         0.00%         0         0         0.00%         0           10         Hyperbolic tangent signoid         Hyperbolic tangent signoid         Hyperbolic tangent signoid         Perceptron Training Rule         70         15         15         20         0.00%         0         0         0.00%         0           10         Hyperbolic tangent signoid         Perceptron Training Rule         70         15         15         20         0.00%         0         0         0.00%         0         0         0<	$\vdash$	Log-sigmoid	Log-sigmoid	Perceptron Training Rule		15	15	20	100.00%	0	0	0.00%	0	0
10         Logs/ground         Symmetric hard-limit         Perceptron Training Rule         70         15         20         0.00%         0         0         0           10         Logs/ground         Name-tric hard-limit         Perceptron Training Rule         70         15         20         0.00%         0         0         0.00%         0           10         Hyperbolic tangent sigmoid         Hard-limit         Perceptron Training Rule         71         15         20         0.00%         0         0         0.00%         0           10         Hyperbolic tangent sigmoid         Assigmoid         Perceptron Training Rule         70         15         20         0.00%         0         0         0.00%         0           10         Hyperbolic tangent sigmoid         Symmetric hard-limit         Hard-limit         Perceptron Training Rule         70         15         20         0.00%         0         0         0.00%         0           10         Hyperbolic tangent sigmoid         Perceptron Training Rule         70         15         20         0.00%         0         0         0.00%         0         0         0.00%         0         0         0         0         0         0         0	_	Log-sigmoid	Hyperbolic tangent sigmoid	Perceptron Training Rule	$\vdash$	15	15	20	0.00%	0	0	0.00%	0	0
10         Log-signoid         None         Perceptron Training Rule         70         15         15         20         0.00%         0         0         0.00%         0           10         Hyperbolic augent sigmoid         Hard-limit         Perceptron Training Rule         70         15         15         20         0.00%         0         0         0.00%         0           10         Hyperbolic augent sigmoid         Linear         Perceptron Training Rule         70         15         15         20         0.00%         0         0         0.00%         0           10         Hyperbolic tangent sigmoid         Perceptron Training Rule         70         15         15         20         0.00%         0         0         0.00%         0           10         Hyperbolic tangent sigmoid         Perceptron Training Rule         70         15         20         0.00%         0         0         0.00%         0           10         Symmetric bard-limit         Barcelling         Perceptron Training Rule         70         15         20         0.00%         0         0         0.00%         0           10         Symmetric bard-limit         Barcelling         Perceptron Training Rule         70		Log-sigmoid	Symmetric hard-limit	Training		15	15	20	%00.0	0	0	%00.0	0	0
10         Hyperbolic tangent signoid         Investignent Hard-limit         Perceptron Training Rule         70         15         15         20         0.00%         0         0         0.00%         0           10         Hyperbolic tangent signoid         Log-signoid         Perceptron Training Rule         70         15         20         0.00%         0         0         0.00%         0           10         Hyperbolic tangent signoid         Perceptron Training Rule         70         15         20         0.00%         0         0         0.00%         0	$\vdash$	Log-sigmoid	None		-	15	15	20	0.00%	0	0	0.00%	0	0
10         Hyperbolic tangent sigmoid         Perceptron         Training Rale         70         15         20         0.00%         0         0         0.00%         0           10         Hyperbolic tangent sigmoid         Hyperbolic tangent sigmoid         Perceptron Training Rale         70         15         20         0.00%         0         0         0.00%         0           10         Hyperbolic tangent sigmoid         Hyperbolic tangent sigmoid         Hyperbolic tangent sigmoid         Perceptron         Training Rale         70         15         20         0.00%         0         0         0.00%         0           10         Symmetric bard-limit         Long-sigmoid         Perceptron Training Rale         70         15         20         0.00%         0         0         0.00%         0         <		Hyperbolic tangent sigmoid	Hard-limit	Training		15	15	20	0.00%	0	0	0.00%	0	0
10         Hyperbolic tangent sigmoid         Perceptron Training Rale         70         15         20         0.00%         0         0.00%         0           10         Hyperbolic tangent sigmoid         Perceptron Training Rale         70         15         20         0.00%         0         0         0.00%         0           10         Hyperbolic tangent sigmoid         Perceptron Training Rale         70         15         20         0.00%         0         0         0.00%         0           10         Hyperbolic tangent sigmoid         Perceptron Training Rale         70         15         20         0.00%         0         0         0.00%         0           10         Symmetric hard-limit         Lard-limit         Location Training Rale         70         15         15         20         0.00%         0         0         0.00%           10         Symmetric hard-limit         Symmetric hard-limit         Perceptron Training Rale         70         15         15         20         0.00%         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0 <t< td=""><td></td><td>Hyperbolic tangent sigmoid</td><td>Linear</td><td></td><td>-</td><td>15</td><td>15</td><td>20</td><td>%00.0</td><td>0</td><td>0</td><td>0.00%</td><td>0</td><td>0</td></t<>		Hyperbolic tangent sigmoid	Linear		-	15	15	20	%00.0	0	0	0.00%	0	0
10         Hyperbolic tangent sigmoid         Hyperbolic tangent sigmoid         Perceptron Training Rule         70         15         15         20         0.00%         0         0         0           10         Hyperbolic tangent sigmoid         Symmetric hard-limit         Perceptron Training Rule         70         15         15         20         0.00%         0 </td <td></td> <td>Hyperbolic tangent sigmoid</td> <td>Log-sigmoid</td> <td></td> <td>-</td> <td>15</td> <td>15</td> <td>20</td> <td>%00.0</td> <td>0</td> <td>0</td> <td>0.00%</td> <td>0</td> <td>0</td>		Hyperbolic tangent sigmoid	Log-sigmoid		-	15	15	20	%00.0	0	0	0.00%	0	0
10         Hyperbolic tangent sigmoid         Symmetric hard-limit         Perceptron Training Rule         70         15         15         20         0.00%         0         0.00%         0           10         Hyperbolic tangent sigmoid         Receptron Training Rule         70         15         15         20         0.00%         0         0         0.00%         0           10         Symmetric hard-limit         Innear         Perceptron Training Rule         70         15         20         0.00%         0         0         0.00%         0           10         Symmetric hard-limit         Linear         Perceptron Training Rule         70         15         20         0.00%         0<	-	Hyperbolic tangent sigmoid	Hyperbolic tangent sigmoid	Perceptron Training Rule		15	15	20	%00.0	0	0	%00.0	0	0
10         Hyperbolic tangent sigmoid         None         Perceptron Training Rule         70         15         20         0.00%         0         0         0.00%         0           10         Symmetric hard-limit         Hard-limit         Hard-limit         Linear         Perceptron Training Rule         70         15         20         0.00%         0         0         0.00%         0           10         Symmetric hard-limit         Linear-limit         Hyperbolic tangent signoid         Perceptron Training Rule         70         15         20         0.00%         0         0         0.00%         0	_	Hyperbolic tangent sigmoid	Symmetric hard-limit		-	15	15	20	%00.0	0	0	%00.0	0	0
10         Symmetric hard-limit         Description Training Rule         70         15         20         0.00%         0         0         0.00%         0           10         Symmetric hard-limit         Log-signoid         Perceptron Training Rule         70         15         20         0.00%         0         0         0.00%         0           10         Symmetric hard-limit         Hyperbolic tangent signoid         Perceptron Training Rule         70         15         20         0.00%         0         0         0.00%         0           10         Symmetric hard-limit         Perceptron Training Rule         70         15         20         0.00%         0         0         0.00%         0           10         Hard-limit         Mard-limit         Perceptron Training Rule         70         15         20         0.00%         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0 <t< td=""><td></td><td>Hyperbolic tangent sigmoid</td><td>None</td><td>Perceptron Training Rule</td><td></td><td>15</td><td>15</td><td>20</td><td>0.00%</td><td>0</td><td>0</td><td>%00.0</td><td>0</td><td>0</td></t<>		Hyperbolic tangent sigmoid	None	Perceptron Training Rule		15	15	20	0.00%	0	0	%00.0	0	0
10         Symmetric hard-limit         Linear         Perceptron Training Rule         70         15         15         20         0.00%         0         0         0.00%         0           10         Symmetric hard-limit         Hyperbolic tangent sigmoid         Perceptron Training Rule         70         15         15         20         0.00%         0         0         0.00%         0           10         Symmetric hard-limit         Hyperbolic tangent sigmoid         Perceptron Training Rule         70         15         20         0.00%         0         0         0.00%         0           10         Symmetric hard-limit         None         Perceptron Training Rule         70         15         15         20         0.00%         0         0         0.00%         0 <t< td=""><td>-</td><td>Symmetric hard-limit</td><td>Hard-limit</td><td>Perceptron Training Rule</td><td>-</td><td>15</td><td>15</td><td>20</td><td>20.00%</td><td>0</td><td>0</td><td>%00.0</td><td>0</td><td>0</td></t<>	-	Symmetric hard-limit	Hard-limit	Perceptron Training Rule	-	15	15	20	20.00%	0	0	%00.0	0	0
10         Symmetric hard-limit         Log-sigmoid         Perceptron Training Rule         70         15         15         20         0.00%         0         0         0.00%         0           10         Symmetric hard-limit         Hyperbolic tangent sigmoid         Perceptron Training Rule         70         15         15         20         0.00%         0         0         0.00%         0           10         Symmetric hard-limit         Hyperbolic tangent sigmoid         Perceptron Training Rule         70         15         15         20         0.00%         0         0         0.00%         0           10         Hard-limit         Hard-limit         Designoid         Gradient Descent         70         15         15         20         0.00%         0         0         0.00%         0           10         Hard-limit         Log-sigmoid         Gradient Descent         70         15         15         20         0.00%         0         0         0.00%         0           10         Hard-limit         Gradient Descent         70         15         15         20         0.00%         0         0         0.00%         0           10         Innear         Gradient Descent <td></td> <td>Symmetric hard-limit</td> <td>Linear</td> <td>Perceptron Training Rule</td> <td></td> <td>15</td> <td>15</td> <td>20</td> <td>%00.0</td> <td>0</td> <td>0</td> <td>%00'0</td> <td>0</td> <td>0</td>		Symmetric hard-limit	Linear	Perceptron Training Rule		15	15	20	%00.0	0	0	%00'0	0	0
10         Symmetric hard-limit         Hyperbolic tangent sigmoid         Perceptron Training Rule         70         15         15         20         0.00%         0		Symmetric hard-limit	Log-sigmoid	Perceptron Training Rule		15	15	20	%00.0	0	0	%00.0	0	0
10         Symmetric hard-limit         Symmetric hard-limit         Perceptron Training Rule         70         15         15         20         0.00%         0         0         0.00%         0           10         Symmetric hard-limit         None         Perceptron Training Rule         70         15         15         20         0.00%         0		Symmetric hard-limit	Hyperbolic tangent sigmoid	Training		15	15	20	%00.0	0	0	%00'0	0	0
10         Symmetric hard-limit         None         Perceptron Training Rule         70         15         20         0.00%         0         0         0.00%         0           10         Hard-limit         Hard-limit         Hard-limit         Linear         Gradient Descent         70         15         15         20         50.00%         0		Symmetric hard-limit	Symmetric hard-limit	Training		15	15	20	%00.0	0	0	%00.0	0	0
10         Hard-limit         Hard-limit         Gradient Descent         70         15         16         50.00%         0         0         0           10         Hard-limit         Linear         Gradient Descent         70         15         15         20         50.00%         0         0         0         0           10         Hard-limit         Log-signoid         Gradient Descent         70         15         15         20         50.00%         0 <t< td=""><td>-</td><td>Symmetric hard-limit</td><td>None</td><td>Training</td><td>-</td><td>15</td><td>15</td><td>20</td><td>%00.0</td><td>0</td><td>0</td><td>%00'0</td><td>0</td><td>0</td></t<>	-	Symmetric hard-limit	None	Training	-	15	15	20	%00.0	0	0	%00'0	0	0
10         Hard-limit         Linear         Gradient Descent         70         15         15         20         0.00%         0         0.00%         0           10         Hard-limit         Log-sigmoid         Gradient Descent         70         15         15         20         50.00%         0         0         0         0           10         Hard-limit         Log-sigmoid         Gradient Descent         70         15         15         20         50.00%         0		Hard-limit	Hard-limit	Gradient Descent	20	15	15	20	20.00%	0	0	%00.0	0	0
10         Hard-limit         Log-sigmoid         Gradient Descent         70         15         15         20         50.00%         0         0         0.00%         0           10         Hard-limit         Hyperbolic tangent sigmoid         Gradient Descent         70         15         15         20         0.00%         0 <t< td=""><td>_</td><td>Hard-limit</td><td>Linear</td><td>Gradient Descent</td><td>20</td><td>15</td><td>15</td><td>20</td><td>%00.0</td><td>0</td><td>0</td><td>%00.0</td><td>0</td><td>0</td></t<>	_	Hard-limit	Linear	Gradient Descent	20	15	15	20	%00.0	0	0	%00.0	0	0
10         Hard-limit         Hyperbolic tangent signoid         Gradient Descent         70         15         20         0.00%         0         0         0.00%         0           10         Hard-limit         Symmetric hard-limit         Gradient Descent         70         15         20         50.00%         0         0         0.00%         0           10         Hard-limit         None         Gradient Descent         70         15         15         20         50.00%         0         0         0.00%         0           10         Linear         Hard-limit         Gradient Descent         70         15         15         20         0.00%         0 </td <td></td> <td>  Hard-limit</td> <td>Log-sigmoid</td> <td>Gradient Descent</td> <td>20</td> <td>15</td> <td>15</td> <td>20</td> <td> 20.00%</td> <td>0</td> <td>0</td> <td>%00'0</td> <td>0</td> <td>0</td>		Hard-limit	Log-sigmoid	Gradient Descent	20	15	15	20	20.00%	0	0	%00'0	0	0
10         Hard-limit         Symmetric hard-limit         Gradient Descent         70         15         20         50.00%         0         0.00%         0           10         Hard-limit         None         Gradient Descent         70         15         20         50.00%         0         0         0.00%         0           10         Linear         Hard-limit         Gradient Descent         70         15         15         20         0.00%         0		Hard-limit	Hyperbolic tangent sigmoid	Gradient Descent	20	15	15	20	%00.0	0	0	%00'0	0	0
10         Hard-limit         None         Gradient Descent         70         15         20         50.00%         0         0.00%         0           10         Linear         Hard-limit         Gradient Descent         70         15         20         0.00%         0         0         0.00%         0           10         Linear         Linear         Log-signoid         Gradient Descent         70         15         15         20         0.00%         0         0         0.00%         0           10         Linear         Log-signoid         Gradient Descent         70         15         15         20         0.00%         0	$\vdash$	Hard-limit	Symmetric hard-limit	Gradient Descent	20	15	15	20	20.00%	0	0	%00'0	0	0
10         Linear         Hard-limit         Gradient Descent         70         15         20         0.00%         0         0.00%         0           10         Linear         Linear         Linear         Linear         Gradient Descent         70         15         15         20         0.00%         0         0         0.00%         0           10         Linear         Log-signoid         Gradient Descent         70         15         15         20         0.00%         0         0         0.00%         0           10         Linear         Symmetric hard-limit         Gradient Descent         70         15         15         20         0.00%         0		Hard-limit	None	Gradient Descent	20	15	15	20	20.00%	0	0	%00.0	0	0
10         Linear         Linear         Linear         Gradient Descent         70         15         20         0.00%         0         0         0.00%         0           10         Linear         Log-sigmoid         Gradient Descent         70         15         20         50.00%         0         0         0.00%         0           10         Linear         Hyperbolic tangent sigmoid         Gradient Descent         70         15         15         20         0.00%         0 </td <td><math>\vdash</math></td> <td>Linear</td> <td>Hard-limit</td> <td>Gradient Descent</td> <td>20</td> <td>15</td> <td>15</td> <td>20</td> <td>0.00%</td> <td>0</td> <td>0</td> <td>0.00%</td> <td>0</td> <td>0</td>	$\vdash$	Linear	Hard-limit	Gradient Descent	20	15	15	20	0.00%	0	0	0.00%	0	0
10         Linear         Log-sigmoid         Gradient Descent         70         15         20         50.00%         0         0.00%         0           10         Linear         Hyperbolic tangent sigmoid         Gradient Descent         70         15         20         0.00%         0         0         0.00%         0           10         Linear         Symmetric hard-limit         Gradient Descent         70         15         20         0.00%         0		Linear	Linear	Gradient Descent	20	15	15	20	0.00%	0	0	0.00%	0	0
10         Linear         Hyperbolic tangent signoid         Gradient Descent         70         15         20         0.00%         0         0.00%         0           10         Linear         Symmetric hard-limit         Gradient Descent         70         15         20         0.00%         0         0         0.00%         0           10         Linear         None         Gradient Descent         70         15         20         0.00%         0 </td <td></td> <td>Linear</td> <td>Log-sigmoid</td> <td>Gradient Descent</td> <td>20</td> <td>15</td> <td>15</td> <td>20</td> <td>20.00%</td> <td>0</td> <td>0</td> <td>0.00%</td> <td>0</td> <td>0</td>		Linear	Log-sigmoid	Gradient Descent	20	15	15	20	20.00%	0	0	0.00%	0	0
10         Linear         Symmetric hard-limit         Gradient Descent         70         15         20         0.00%         0         0.00%         0           10         Linear         None         Gradient Descent         70         15         20         0.00%         0 </td <td></td> <td>Linear</td> <td>Hyperbolic tangent sigmoid</td> <td>Gradient Descent</td> <td>20</td> <td>15</td> <td>15</td> <td>20</td> <td>%00.0</td> <td>0</td> <td>0</td> <td>%00'0</td> <td>0</td> <td>0</td>		Linear	Hyperbolic tangent sigmoid	Gradient Descent	20	15	15	20	%00.0	0	0	%00'0	0	0
10         Linear         None         Gradient Descent         70         15         20         0.00%         0         0.00%         0           10         Log-sigmoid         Hard-limit         Gradient Descent         70         15         20         0.00%         0         0         0.00%         0           10         Log-sigmoid         Linear         Gradient Descent         70         15         20         0.00%         0         0         0.00%         0           10         Log-sigmoid         Log-sigmoid         Gradient Descent         70         15         20         0.00%         0         0         0.00%         0		Linear	Symmetric hard-limit	Gradient Descent	20	15	15	20	%00.0	0	0	%00.0	0	0
10         Log-sigmoid         Hard-limit         Gradient Descent         70         15         20         0.00%         0         0         0.00%         0           10         Log-sigmoid         Linear         Gradient Descent         70         15         15         20         0.00%         0         0         0.00%         0           10         Log-sigmoid         Log-sigmoid         Gradient Descent         70         15         15         20         0.00%         0         0         0.00%         0		Linear	None	Gradient Descent	20	15	15	20	%00.0	0	0	%00'0	0	0
10         Log-sigmoid         Linear         Gradient Descent         70         15         20         0.00%         0         0         0.00%         0           10         Log-sigmoid         Log-sigmoid         Gradient Descent         70         15         15         20         0.00%         0         0         0.00%         0		Log-sigmoid	Hard-limit	Gradient Descent	20	15	15	20	%00.0	0	0	%00.0	0	0
10 Log-sigmoid Log-sigmoid Gradient Descent 70 15 15 20 0.00% 0 0	-	Log-sigmoid	Linear	Gradient Descent	20	15	15	20	0.00%	0	0	0.00%	0	0
	+-	Log-sigmoid	Log-sigmoid	Gradient Descent	20	15	15	20	%00.0	0	0	0.00%	0	0

Table B.12: Training - Image in binary with Leaves\_3 - Part 4

		Transfer 1	Transfer functions		Ratio		(in percentage %	(2)		Species		51	Species	
Folder	Hidden L.	1st	2nd	Training algorithm	Train		tion Te	Test Quant. images	% ssacons	Epoch	Duration	Success %	Epoch	Duration
Leaves_3	10	Log-sigmoid	Hyperbolic tangent sigmoid	Gradient Descent	20	15	15	20	%00.0	0	0	%00.0	0	0
Leaves_3	10	Log-sigmoid	Symmetric hard-limit	Gradient Descent	2	15	15		%00.0	0	0	%00.0	0	0
Leaves_3	10	Log-sigmoid	None	Gradient Descent	20	15	15	20	%00.0	0	0	0.00%	0	0
Leaves_3	10	Hyperbolic tangent sigmoid	Hard-limit	Gradient Descent	20	15	15	20	20.00%	0	0	%00.0	0	0
Leaves_3	10	Hyperbolic tangent sigmoid	Linear	Gradient Descent	20	15	15		20.00%	0	0	%00.0	0	0
_	10	Hyperbolic tangent sigmoid	Log-sigmoid	Gradient Descent	20	15	15		%00:0	0		%00.0	0	0
Leaves_3	10	Hyperbolic tangent sigmoid	Hyperbolic tangent sigmoid	Gradient Descent	22	15	15		%00.0	0		%00.0	0	0
Leaves_3	10	Hyperbolic tangent sigmoid	Symmetric hard-limit	Gradient Descent	20	15	15	20	20.00%	0	0	%00.0	0	0
Leaves_3 1	10	Hyperbolic tangent sigmoid	None	Gradient Descent	2	15	15		100.00%	0		%00.0	0	0
Leaves_3	10	Symmetric hard-limit	Hard-limit	Gradient Descent	20	15	15	20	%00.0	0	0	%00.0	0	0
Leaves_3	10	Symmetric hard-limit	Linear	Gradient Descent	20	15	15		100.00%	0	0	0.00%	0	0
Leaves_3	10	Symmetric hard-limit	Log-sigmoid	Gradient Descent	22	15	15	20	%00.0	0	0	0.00%	0	0
Leaves_3	10	Symmetric hard-limit	Hyperbolic tangent sigmoid	Gradient Descent	20	15	15		%00.0	0	0	%00.0	0	0
Leaves_3	10	Symmetric hard-limit	Symmetric hard-limit	Gradient Descent	20	15	15		%00.0	0	0	%00.0	0	0
Leaves_3	10	Symmetric hard-limit	None	Gradient Descent	2	15	15		20.00%	0	0	%00.0	0	0
Leaves_3	10	Hard-limit	Hard-limit	Stochastic Approximation to Gradient Descent		15	15		20.00%	0	0	%00.0	0	0
Leaves_3 1	10	Hard-limit	Linear	Stochastic Approximation to Gradient Descent	t 70	15	15		%00.0	0	0	%00.0	0	0
Leaves_3	10	Hard-limit	Log-sigmoid	Stochastic Approximation to Gradient Descent		15	15		%00.0	0		%00.0	0	0.01
Leaves_3	10	Hard-limit	Hyperbolic tangent sigmoid	Stochastic Approximation to Gradient Descent	t 70	15	15	20	%00.0	0	0	0.00%	0	0
Leaves_3	10	Hard-limit	Symmetric hard-limit	Stochastic Approximation to Gradient Descent	t 70	15	15	20	%00.0	0		0.00%	0	0
Leaves_3	10	Hard-limit	None	Stochastic Approximation to Gradient Descent	t 70	15	15	20	20.00%	0	0	%00.0	0	0
Leaves_3 1	10	Linear	Hard-limit	Stochastic Approximation to Gradient Descent	t 70	15	15		%00.0	0	0	%00.0	0	0
Leaves_3	10	Linear	Linear	Stochastic Approximation to Gradient Descent	t 70	15	15	20	%00.0	0	0	%00.0	0	0
_	10	Linear	Log-sigmoid	Stochastic Approximation to Gradient Descent		15	15		20.00%	0		%00.0	0	0
	10	Linear	Hyperbolic tangent sigmoid	Stochastic Approximation to Gradient Descent		15	15		%00.0	0		0.00%	0	0
Leaves_3	10	Linear	Symmetric hard-limit	Stochastic Approximation to Gradient Descent	t 70	15	15		20.00%	0	0	%00.0	0	0
Leaves_3	10	Linear	None	Stochastic Approximation to Gradient Descent	t 70	15	15		100.00%	0	0	0.00%	0	0
Leaves_3	10	Log-sigmoid	Hard-limit	Stochastic Approximation to Gradient Descent	t 70	15	15	20	%00.0	0	0	%00.0	0	0
Leaves_3	10	Log-sigmoid	Linear	Stochastic Approximation to Gradient Descent	t 70	15	15		20.00%	0	0	%00.0	0	0
Leaves_3 1	10	Log-sigmoid	Log-sigmoid	Stochastic Approximation to Gradient Descent	t 70	15	15		20.00%	0	0	0.00%	0	0
Leaves_3 1	10	Log-sigmoid	Hyperbolic tangent sigmoid	Stochastic Approximation to Gradient Descent	t 70	15	15		%00:0	0	0	%00.0	0	0
Leaves_3	10	Log-sigmoid	Symmetric hard-limit	Stochastic Approximation to Gradient Descent	t 70	15	15		20.00%	0	0	%00.0	0	0
	10	Log-sigmoid	None	Stochastic Approximation to Gradient Descent	t 70	15	15		%00.0	0	0	0.00%	0	0
Leaves_3 1	10	Hyperbolic tangent sigmoid	Hard-limit	Stochastic Approximation to Gradient Descent		15	15		100.00%	0		%00.0	0	0
	10	Hyperbolic tangent sigmoid	Linear	Stochastic Approximation to Gradient Descent		15	15		%00.0			0.00%	0	0
Leaves_3 ]	10	Hyperbolic tangent sigmoid	Log-sigmoid	Stochastic Approximation to Gradient Descent	H	15	15		%00.0	0		%00.0	0	0
Leaves_3 1	10	Hyperbolic tangent sigmoid	Hyperbolic tangent sigmoid	Stochastic Approximation to Gradient Descent	t 70	15	15	20	100.00%	0	0	%00.0	0	0
Leaves_3	10	Hyperbolic tangent sigmoid	Symmetric hard-limit	Stochastic Approximation to Gradient Descent	t 70	15	15		20.00%	0		%00.0	0	0
Leaves_3	10	Hyperbolic tangent sigmoid	None	Stochastic Approximation to Gradient Descent	t 70	15	15	20	20.00%	0	0	%00.0	0	0
Leaves_3	10	Symmetric hard-limit	Hard-limit	Stochastic Approximation to Gradient Descent	t 70	15	15		%00.0	0	0	%00.0	0	0
Leaves_3	10	Symmetric hard-limit	Linear	Stochastic Approximation to Gradient Descent	t 70	15	15	20	%00.0	0	0	%00.0	0	0
Leaves_3	10	Symmetric hard-limit	Log-sigmoid	Stochastic Approximation to Gradient Descent	t 70	15	15		%00.0	0	0	%00.0	0	0
-	10	Symmetric hard-limit	Hyperbolic tangent sigmoid	Stochastic Approximation to Gradient Descent		15	15	Н	20.00%	0	0	0.00%	0	0
	10	Symmetric hard-limit	Symmetric hard-limit	Stochastic Approximation to Gradient Descent	Н	15	15	П	0.00%	0	0	0.00%	0	0
Leaves_3 1	10	Symmetric hard-limit	None	Stochastic Approximation to Gradient Descent	t 70	15	15	20	20.00%	0	0	0.00%	0	0

# Appendix C

Training results for the characteristics of the image

Table C.1: Training - Characteristics of the image with Leaves\_1 - Part 1  $\,$ 

		Transfer	Transfer functions	Rati	Ratio (in percentage %	;e %)			Species			Species	
Folder	Hidden L.	1st	2nd	Training algorithm Train	n   Validation	Test	Quant. images	% ssəcons	Epoch	Duration	Success %	Epoch	Duration
Leaves_1	2	Hard-limit	Hard-limit	Perceptron Training Rule 80	10	10	66	0.00%	0	0	0.00%	0	0
Leaves_1	2	Hard-limit	Linear	Perceptron Training Rule 80	10	10	66	0.00%	0	0	0.00%	0	0
Leaves_1	2	Hard-limit	Log-sigmoid		10	10	66	10.00%	0	0	0.00%	0	0
Leaves_1	2	Hard-limit	Hyperbolic tangent sigmoid	Perceptron Training Rule 80	10	10	66	10.00%	0	0	%00.0	0	0
Leaves_1	2	Hard-limit	Symmetric hard-limit	Perceptron Training Rule 80	10	10	66	0.00%	0	0	0.00%	0	0
Leaves_1	2	Hard-limit	None	Perceptron Training Rule 80	10	10	66	20.00%	0	0	0.00%	0	0
Leaves_1	2	Linear	Hard-limit	Perceptron Training Rule 80	10	10	66	0.00%	0	0	0.00%	0	0
Leaves_1	2	Linear	Linear	Perceptron Training Rule 80	10		66	20.00%	0	0	0.00%	0	0
Leaves_1	2	Linear	Log-sigmoid	Perceptron Training Rule 80	10	10	66	10.00%	0	0	%00.0	0	0
Leaves_1	2	Linear	Hyperbolic tangent sigmoid	Perceptron Training Rule 80	10	10	66	10.00%	0	0	0.00%	0	0
Leaves_1	2	Linear	Symmetric hard-limit	Perceptron Training Rule 80	10	10	66	10.00%	0	0	%00.0	0	0
Leaves_1	2	Linear	None	Perceptron Training Rule 80	10	10	66	20.00%	0	0	0.00%	0	0
Leaves_1	2	Log-sigmoid	Hard-limit	Perceptron Training Rule 80	10	10	66	0.00%	0	0	%00.0	0	0
Leaves_1	2	Log-sigmoid	Linear	Perceptron Training Rule 80	10	10	66	20.00%	0	0	0.00%	0	0
Leaves_1	2	Log-sigmoid	Log-sigmoid	Perceptron Training Rule 80	10	10	66	10.00%	0	0	0.00%	0	0
Leaves_1	2	Log-sigmoid	Hyperbolic tangent sigmoid	Perceptron Training Rule 80	10	10	66	10.00%	0	0	10.00%	0	0
Leaves_1	2	Log-sigmoid	Symmetric hard-limit	Perceptron Training Rule 80	10	10	66	10.00%	0	0	0.00%	0	0
Leaves_1	2	Log-sigmoid	None	Perceptron Training Rule 80	10	10	66	20.00%	0	0	%00.0	0	0
Leaves_1	2	Hyperbolic tangent sigmoid	Hard-limit	Perceptron Training Rule 80	10	10	66	10.00%	0	0	10.00%	0	0
Leaves_1	2	Hyperbolic tangent sigmoid	Linear	Perceptron Training Rule 80	10	10	66	0.00%	0	0	0.00%	0	0
Leaves_1	2	Hyperbolic tangent sigmoid	Log-sigmoid	Perceptron Training Rule 80	10		66	20.00%	0	0	0.00%	0	0
Leaves_1	2	Hyperbolic tangent sigmoid	Hyperbolic tangent sigmoid	Perceptron Training Rule 80	10	10	66	10.00%	0	0	0.00%	0	0
Leaves_1	2	Hyperbolic tangent sigmoid	Symmetric hard-limit	Perceptron Training Rule   80	10	10	66	10.00%	0	0	0.00%	0	0
Leaves_1	2	Hyperbolic tangent sigmoid	None	Perceptron Training Rule 80	10		66	0.00%	0	0	10.00%	0	0
Leaves_1	2	Symmetric hard-limit	Hard-limit	Perceptron Training Rule 80	10	10	66	0.00%	0	0	0.00%	0	0
Leaves_1	2	Symmetric hard-limit	Linear	Rule	10		66	20.00%	0	0	0.00%	0	0
Leaves_1	2	Symmetric hard-limit	Log-sigmoid	Training Rule	10		99	10.00%	0	0	0.00%	0	0
Leaves_1	2	Symmetric hard-limit	Hyperbolic tangent sigmoid	Perceptron Training Rule   80	10		66	0.00%	0	0	0.00%	0	0
Leaves_1	2	Symmetric hard-limit	Symmetric hard-limit	Perceptron Training Rule   80	10	10	66	0.00%	0	0	%00.0	0	0
Leaves_1	2	Symmetric hard-limit	None	ing Rule	10		66	0.00%	0	0	10.00%	0	0
Leaves_1	2	Hard-limit	Hard-limit	Gradient Descent 80	10		66	10.00%	0	0	0.00%	0	0
Leaves_1	2	Hard-limit	Linear	Gradient Descent 80	10		66	10.00%	0	0	0.00%	0	0
Leaves_1	2	Hard-limit	Log-sigmoid		10		66	0.00%	0	0	0.00%	0	0
Leaves_1	2	Hard-limit	Hyperbolic tangent sigmoid		10		66	10.00%	0	0	0.00%	0	0
Leaves_1	2	Hard-limit	Symmetric hard-limit	Gradient Descent 80	10	10	66	30.00%	0	0	0.00%	0	0
Leaves_1	2	Hard-limit	None	Gradient Descent 80	10	10	66	0.00%	0	0	0.00%	0	0
Leaves_1	2	Linear	Hard-limit	Gradient Descent 80	10		66	0.00%	0	0	0.00%	0	0
Leaves_1	2	Linear	Linear	Gradient Descent 80	10		66	20.00%	0	0	%00.0	0	0
Leaves_1	2	Linear	Log-sigmoid	Gradient Descent 80	10		66	0.00%	0	0	0.00%	0	0
Leaves_1	2	Linear	Hyperbolic tangent sigmoid		10		66	10.00%	0	0	0.00%	0	0
Leaves_1	2	Linear	Symmetric hard-limit		10		66	0.00%	0	0	0.00%	0	0
Leaves_1	2	Linear	None	Gradient Descent 80	10	10	66	10.00%	0	0	0.00%	0	0

Table C.2: Training - Characteristics of the image with Leaves\_1 - Part 2  $\,$ 

top         200         Conferent Descent         Town Multation			Transfer functions	functions		Ratio	Ratio (in percentage %)	nge %)			Species			Species	
2         Confesionabel         Hurb-limit         Confesionabel         Linearizational	Folder	Hidden L.	1st	2nd	Training algorithm	Train	$\vdash$	ш	Quant. images	Success	$\vdash$	Duration	Success %	Epoch	Duration
2         Importantial         Limon         Clarical Descript         State of the part of	Leaves_1	2	Log-sigmoid	Hard-limit	Gradient Descent	<u>8</u>	10	10	66	20.00%	0	0	0.00%	0	0
2         Disperigational Ingestigned Ingestignated Gradient Descent         81         10	Leaves_1	2	Log-sigmoid	Linear	Gradient Descent	80	10	10	66	%00.0	0	0	0.00%	0	0
2         Ione-element         Pyther foliation to import a lighted of Christiant Descent         80         10         10         99         10.00%         0           2         Hope-element         Symmetric bard-light and control of the co	Leaves_1	2	Log-sigmoid	Log-sigmoid	Gradient Descent	98	10	10	66	10.00%	0	0	0.00%	0	0
2         Local-claused         Symmetric bard-lating         Graduent Decent         89         10         99         10.00%         0           2         Hope-claused angued March-lating         Graduent Decent         81         10         10         99         10.00%         0         0           2         Hyper-lock engoned Spruncture land-lating         Graduent Decent         81         10         10         99         10.00%         0         0           2         Hyper-lock engoned Spruncture land-lating         Graduent Decent         81         10         10         99         10.00%         0         0           2         Hyper-lock engoned Spruncture land-lating         Graduent Decent         81         10         10         99         10.00%         0         0           2         Hyper-lock engoned Spruncture land-lating         Graduent Decent         81         10         10         99         10.00%         0         0           2         Hyper-lock engoned Spruncture land-lating         Graduent Decent         81         10         10         99         10.00%         0         0           2         Hyper-lock engoned Spruncture land-lating         Graduent Decent         81         10         10 <td>Leaves_1</td> <td>2</td> <td>Log-sigmoid</td> <td>Hyperbolic tangent sigmoid</td> <td>Gradient Descent</td> <td>98</td> <td>10</td> <td>10</td> <td>66</td> <td>10.00%</td> <td>0</td> <td>0</td> <td>%00.0</td> <td>0</td> <td>0</td>	Leaves_1	2	Log-sigmoid	Hyperbolic tangent sigmoid	Gradient Descent	98	10	10	66	10.00%	0	0	%00.0	0	0
2         Hoperbolic unique signael Anna Gradient Decents         80         10         99         10000%         0           2         Hyperbolic unique signael Anna Gradient Decents         Gradient Decents         81         10         99         10000%         0         0           2         Hyperbolic unique signael A limes         Gradient Decents         81         10         99         10000%         0         0           2         Hyperbolic unique signael A greenband Interaction of the control	Leaves_1	2	Log-sigmoid	Symmetric hard-limit	Gradient Descent	80	10	10	66	%00.0	0	0	0.00%	0	0
2         Hyperbold tangent algoard I Lunear         Gradient Descent         81         10         10         99         1000W         0           2         Hyperbold tangent algoard I Lunear         Gradient Descent         81         10         10         99         1000W         0           2         Hyperbold tangent algoard I Lungar Ingential Cardient Descent         81         10         10         99         1000W         0           2         Hyperbold tangent algoard I Lungar Ingential Cardient Descent         81         10         10         99         1000W         0           2         Symmetric Inach Innt         Lunear         Gradient Descent         81         10         10         99         1000W         0           2         Symmetric Inach Innt         Hunch Innt         Lunear         Gradient Descent         81         10         10         99         1000W         0           2         Symmetric Inach Innt         Hunch Innt         Annual Innt	Leaves_1	2	Log-sigmoid	None	Gradient Descent	98	10	10	66	10.00%	0	0	%00.0	0	0
2         Hyperbolk tungust signoid Log-signoid Log-signoid Log-signoid Log-signoid Log-signoid Log-signoid Log-signoid Log-signoid Log-signoid Conferent Descent         81         10         10         99         1000%         0           2         Hyperbolk tungust signoid Log-signoid Conferent Descent         80         10         10         99         1000%         0         0           2         Hyperbolk tungust signoid Symmetric Including Conferent Descent         80         10         10         99         1000%         0         0           2         Hyperbolk tungust signoid Symmetric Including Conferent Descent         80         10         10         99         1000%         0         0           2         Symmetric Including Signoid Symmetric Including Conference Conferen	Leaves_1	2	Hyperbolic tangent sigmoid	Hard-limit	Gradient Descent	8	10	10	66	10.00%	0	0	0.00%	0	0
2         Hyperbolic inquient signated (Exciliant Descent         81         10         10         99         10.00%         0           2         Hyperbolic inquient signated (Exciliant Descent         80         10         10         99         10.00%         0         0           2         Hyperbolic inquient signated (Superior State Descent         80         10         10         99         0.00%         0         0           2         Symmetric barchinat         Lucor         Gradient Descent         80         10         10         99         0.00%         0         0           2         Symmetric barchinat         Lucor         Gradient Descent         80         10         10         99         0.00%         0         0           2         Symmetric barchinat         Lucor         Gradient Descent         80         10         99         0.00%         0         0           2         Symmetric barchinat         Lucor         Symmetric barchinat         Symmetric barchina	Leaves_1	2	Hyperbolic tangent sigmoid	Linear	Gradient Descent	08	10	10	66	10.00%	0	0	0.00%	0	0
2         Hyperbolic tangenst signood Symmetric bard-land of Condatur Descent         83         10         10         99         0.00%         0         0           2         Symmetric bard-land         Condatur Descent         83         10         10         99         0.00%         0         0           2         Symmetric bard-lant         Gradual Descent         83         10         10         99         0.00%         0         0           2         Symmetric bard-lant         Log-signoid         Gradual Descent         83         10         10         99         0.00%         0         0           2         Symmetric bard-lant         Gradual Descent         80         10         10         99         0.00%         0         0           2         Symmetric bard-lant         Symmetric bard-lant         Symmetric bard-lant         Symmetric bard-lant         80         10         10         99         0.00%         0         0           2         Symmetric bard-lant         Symmetric bard-lant         Symmetric bard-lant         Symmetric bard-lant         80         10         10         99         10.00%         0         0           2         Symmetric bard-lant         Symmetric bard-lant <td>Leaves_1</td> <td>2</td> <td>Hyperbolic tangent sigmoid</td> <td>Log-sigmoid</td> <td>Gradient Descent</td> <td>80</td> <td>10</td> <td>10</td> <td>66</td> <td>10.00%</td> <td>0</td> <td>0</td> <td>0.00%</td> <td>0</td> <td>0</td>	Leaves_1	2	Hyperbolic tangent sigmoid	Log-sigmoid	Gradient Descent	80	10	10	66	10.00%	0	0	0.00%	0	0
2         Ripochelle tangent signand Numeric bard-limit         Graduen Descut         81         10         10         99         1000%         0         0           2         Symmetric bard-limit         Graduen Descut         81         10         10         99         1000%         0         0           2         Symmetric bard-limit         Linear         Graduen Descut         81         10         10         99         1000%         0         0           2         Symmetric bard-limit         Linear         Graduen Descut         81         10         10         99         1000%         0         0           2         Symmetric bard-limit         Linear         Graduen Descut         81         10         10         99         1000%         0         0           2         Symmetric bard-limit         Graduen Descut         81         10         10         99         1000%         0         0           2         Symmetric bard-limit         Graduen Descut         81         10         10         99         1000%         0         0           2         Arter Limit         Brock-limit         Stock-land Descut         81         10         10         99	Leaves_1	2	_	Hyperbolic tangent sigmoid	Gradient Descent	08	10	10	66	%00.0	0	0	%00.0	0	0
2         Hyporkolist unggen signored         Concional Descent         80         10         99         30.00%         0           2         Symmetric hard-limit         Linard-limit         Concional Descent         80         10         99         10.00%         0         0           2         Symmetric hard-limit         Linard-limit         Concional Descent         80         10         0         99         10.00%         0         0           2         Symmetric hard-limit         Symmetric hard-limit         March-limit         March-limit         10         99         10.00%         0         0           2         Symmetric hard-limit         March-limit         March-limit         March-limit         10         99         10.00%         0         0           2         Symmetric hard-limit         March-limit         March-limit         March-limit         10         99         10.00%         0         0           2         Symmetric hard-limit         Stochastic Approximation to Gradient Descent         80         10         10         99         10.00%         0         0           2         Symmetric hard-limit         Gradient Descent         80         10         10         99         10	Leaves_1	2	+	Symmetric hard-limit	Gradient Descent	08	10	10	66	0.00%	0	0	%00.0	0	0
2         Symmetric hard-limit         Gradient Descent         80         10         99         10.00%         0           2         Symmetric hard-limit         Linear         Gradient Descent         80         10         10         99         10.00%         0         0           2         Symmetric hard-limit         Linear         Gradient Descent         80         10         10         99         10.00%         0         0           2         Symmetric hard-limit         Symmetric parel-limit         Symmetric hard-limit         10         99         10.00%         0	Leaves 1	2	Hyperbolic tangent sigmoid	None	Gradient Descent	08	10	10	66	30.00%	0	0	0.00%	0	0
2         Symmetric bard-limit         Linear         Cerelisar Descent         80         10         10         99         0.00%         0         0           2         Symmetric bard-limit         Gredient Descent         80         10         10         99         0.00%         0         0           2         Symmetric bard-limit         Gredient Descent         80         10         10         99         0.00%         0         0           2         Symmetric bard-limit         Hard-limit         Mayer-limit         Gredient Descent         80         10         10         99         0.00%         0         0           2         Hard-limit         Hord-limit         Symmetric bard-limit         Symmetric bard-limit         Symmetric bard-limit         10         99         10.00%         0         0           2         Hard-limit         Symmetric bard-limit         Symmetric	Leaves_1	2	Symmetric hard-limit	Hard-limit	Gradient Descent	08	10	10	66	10.00%	0	0	0.00%	0	0
2         Symmetric hard-limit         Log-signoid         Gredient Descent         80         10         10         99         1000%         0           2         Symmetric hard-limit         Symmetric land-limit         Gredient Descent         80         10         10         99         1000%         0         0           2         Symmetric hard-limit         Symmetric land-limit         Gredient Descent         80         10         10         99         1000%         0         0           2         Hard-limit         Innat         Storiestic Approximation to Gradient Descent         80         10         10         99         1000%         0         0           2         Hard-limit         Innat         Storiestic Approximation to Gradient Descent         80         10         10         99         1000%         0         0           2         Hard-limit         Storiestic Approximation to Gradient Descent         80         10         10         99         1000%         0         0           2         Hard-limit         Storiestic Approximation to Gradient Descent         80         10         10         99         1000%         0         0           2         Linear         Incept	Leaves_1	2		Linear	Gradient Descent	8	10	10	66	0.00%	0	0	0.00%	0	0
2         Symmetric band-limit         Springetic band-limit         Symmetric band-limit         Gradient Descent         80         10         99         30.00%         0         0           2         Symmetric band-limit         Linear         Hard-limit         Linear         10         99         10.00%         0         0         0           2         Hard-limit         Linear         Linear         10         99         10.00%         0 </td <td>Leaves_1</td> <td>2</td> <td></td> <td>Log-sigmoid</td> <td>Gradient Descent</td> <td>98</td> <td>10</td> <td>10</td> <td>66</td> <td>0.00%</td> <td>0</td> <td>0</td> <td>0.00%</td> <td>0</td> <td>0</td>	Leaves_1	2		Log-sigmoid	Gradient Descent	98	10	10	66	0.00%	0	0	0.00%	0	0
2         Symmetric bard-limit         Genérate Decent         Grafient Decent         81         10         10         99         30,00%         0         0           2         Symmetric bard-limit         Stochastic Approximation to Cardent Decent         80         10         99         20,00%         0         0           2         Hard-limit         Linear         Stochastic Approximation to Cardent Decent         80         10         99         10,00%         0         0           2         Hard-limit         Linear         Stochastic Approximation to Cardent Decent         80         10         99         10,00%         0         0           2         Hard-limit         Stochastic Approximation to Cardent Decent         80         10         99         10,00%         0         0           2         Hard-limit         Stochastic Approximation to Cardent Decent         80         10         99         10,00%         0         0           2         Linear         Hard-limit         Stochastic Approximation to Cardent Decent         80         10         99         10,00%         0         0           2         Linear         Mycrobial Linear Approximation to Cardent Decent         80         10         99	Leaves_1	2	Symmetric hard-limit	Hyperbolic tangent sigmoid	Gradient Descent	08	10	10	66	10.00%	0	0	10.00%	0	0
2         Symmetric bard-limit         None         Gordenite Approximation to Gradent Descent         89         10         99         900%         0           2         Hard-limit         Linear         Linear         Stochastic Approximation to Gradent Descent         89         10         99         0.00%         0         0           2         Hard-limit         Long         10         99         10.00%         0         0         0           2         Hard-limit         Long         10         99         10.00%         0 <td>Leaves_1</td> <td>2</td> <td>Symmetric hard-limit</td> <td>Symmetric hard-limit</td> <td>Gradient Descent</td> <td>08</td> <td>10</td> <td>10</td> <td>66</td> <td>30.00%</td> <td>0</td> <td>0</td> <td>0.00%</td> <td>0</td> <td>0</td>	Leaves_1	2	Symmetric hard-limit	Symmetric hard-limit	Gradient Descent	08	10	10	66	30.00%	0	0	0.00%	0	0
2         Hard-limit         Hard-limit         Stochastic Approximation to Gradient Descent         80         10         99         1000%         0           2         Hard-limit         Linear         Log-signoid         Stochastic Approximation to Gradient Descent         80         10         99         1000%         0         0           2         Hard-limit         Stochastic Approximation to Gradient Descent         80         10         99         1000%         0         0         0           2         Hard-limit         Symmetric hard-limit         Stochastic Approximation to Gradient Descent         80         10         99         1000%         0         0         0           2         Linear         Linear         Linear         Linear         Linear         10         99         1000%         0 </td <td>Leaves_1</td> <td>2</td> <td>Symmetric hard-limit</td> <td>None</td> <td>Gradient Descent</td> <td>08</td> <td>10</td> <td>10</td> <td>66</td> <td>20.00%</td> <td>0</td> <td>0</td> <td>0.00%</td> <td>0</td> <td>0</td>	Leaves_1	2	Symmetric hard-limit	None	Gradient Descent	08	10	10	66	20.00%	0	0	0.00%	0	0
2         Hard-limit         Linear         Stochastic Approximation to Gradient Descent         80         10         99         1000%         0           2         Hard-limit         Log-signoid         Stochastic Approximation to Gradient Descent         80         10         99         10.00%         0         0           2         Hard-limit         Symmetric hard-limit         Stochastic Approximation to Gradient Descent         80         10         99         10.00%         0         0           2         Hard-limit         None         Stochastic Approximation to Gradient Descent         80         10         99         10.00%         0         0           2         Linear         Linear         Stochastic Approximation to Gradient Descent         80         10         10         99         10.00%         0         0           2         Linear         Linear         Stochastic Approximation to Gradient Descent         80         10         10         99         10.00%         0         0           2         Linear         Stochastic Approximation to Gradient Descent         80         10         10         99         10.00%         0         0           2         Linear         Stochastic Approximation to Gradient Desc	Leaves 1	2	Hard-limit	Hard-limit	Stochastic Approximation to Gradient Desce	╫	10	10	66	0.00%	0	0	0.00%	0	0
2         Hard-limit         Log-sigmoid         Stochastic Approximation to Gradient Descent         80         10         99         0.00%         0           2         Hard-limit         Hyperbolic tangent sigmoid         Stochastic Approximation to Gradient Descent         80         10         99         10.00%         0         0           2         Hard-limit         None         Sprumetric land-limit         Stochastic Approximation to Gradient Descent         80         10         99         10.00%         0         0           2         Linear         Log-sigmoid         Stochastic Approximation to Gradient Descent         80         10         99         10.00%         0         0           2         Linear         Brochastic Approximation to Gradient Descent         80         10         99         10.00%         0         0           2         Linear         Stochastic Approximation to Gradient Descent         80         10         99         10.00%         0	Leaves 1	1 6	Hard-limit	Linear	Stochastic Approximation to Gradient Desce	+	10	10	66	10.00%	0		%00.0	0	0
2         Hard-limit         Hyperbolic tangent sigmoid         Stochastic Approximation to Gradient Descent         80         10         99         10.00%         0           2         Hard-limit         Symmetric bard-limit         Stochastic Approximation to Gradient Descent         80         10         10         99         10.00%         0         0           2         Linear         Hard-limit         Nome         Stochastic Approximation to Gradient Descent         80         10         10         99         20.00%         0         0           2         Linear         Linear         Linear         10         99         20.00%         0         0           2         Linear         Linear         Linear         10         99         20.00%         0         0           2         Linear         Hyperbolic tangent signoid         Stochastic Approximation to Gradient Descent         80         10         10         99         20.00%         0         0           2         Linear         Symmetric bard-limit         Stochastic Approximation to Gradient Descent         80         10         10         99         0.00%         0         0           2         Linear         Symmetric bard-limit         Stocha	Leaves 1	1 6	Hard-limit	Log-sigmoid	Stochastic Approximation to Gradient Desce	+	10	10	66	2000	0	0	%00.0	0	
2         Hard-limit         Symmetric bard-limit         Stochastic Approximation to Gradient Descent 80         10         99         10.00%         0           2         Hard-limit         Symmetric bard-limit         Stochastic Approximation to Gradient Descent 80         10         99         10.00%         0         0           2         Linear         Hard-limit         Stochastic Approximation to Gradient Descent 80         10         10         99         0.00%         0         0           2         Linear         Hard-limit         Stochastic Approximation to Gradient Descent 80         10         10         99         0.00%         0         0           2         Linear         Exclusive Approximation to Gradient Descent 80         10         10         99         0.00%         0         0           2         Linear         Stochastic Approximation to Gradient Descent 80         10         10         99         0.00%         0         0           2         Linear         Stochastic Approximation to Gradient Descent 80         10         10         99         0.00%         0         0           2         Linear         Stochastic Approximation to Gradient Descent 80         10         10         99         0.00%         0	Leaves 1	- C	Hard-limit	Hymerbolic tangent sigmoid	Stochastic Approximation to Gradient Desce	+	10	10	00	10.00%			2000		
2         Hard-limit         Stochastic Approximation to Gradient Descent 80         10         95         20.0%         0           2         Linear         Hard-limit         Stochastic Approximation to Gradient Descent 80         10         99         20.0%         0         0           2         Linear         Linear         Linear         Linear         10.9         10.0%         0	Leaves 1	4 6	Hard-limit	Symmetric hard-limit	Stochastic Approximation to Gradient Desce	+	10	10	00	10.00%	0	0	2,00.0	0	
z         Integration         Footbasite Approximation to Gradient Descent         80         10         95         50.00%         0         0           2         Linear         Linear         Linear         Stochastic Approximation to Gradient Descent         80         10         99         0.00%         0         0           2         Linear         Ryperbolic tangent sigmoid         Stochastic Approximation to Gradient Descent         80         10         99         0.00%         0         0           2         Linear         Symmetric bard-limit         Stochastic Approximation to Gradient Descent         80         10         99         0.00%         0         0           2         Linear         Symmetric bard-limit         Stochastic Approximation to Gradient Descent         80         10         99         0.00%         0         0           2         Log-sigmoid         Lard-limit         Stochastic Approximation to Gradient Descent         80         10         10         99         0.00%         0         0           2         Log-sigmoid         Linear         Symmetric bard-limit         Stochastic Approximation to Gradient Descent         80         10         10         99         10.00%         0         0	Leaves 1	1 0	Hard-limit	None	Stochastic Approximation to Gradient Desce	+	10	101	00	20.00%			20000	0	
z         Interest         Stochastic Approximation to Gradient Descent         80         10         99         0.00%         0         0           2         Linear         Log-sigmoid         Hyper-bolic tangent sigmoid         Stochastic Approximation to Gradient Descent         80         10         10         99         20.00%         0         0           2         Linear         None         Stochastic Approximation to Gradient Descent         80         10         10         99         0.00%         0         0           2         Linear         None         Stochastic Approximation to Gradient Descent         80         10         10         99         0.00%         0         0         0           2         Log-sigmoid         Linear         Stochastic Approximation to Gradient Descent         80         10         10         99         0.00%         0         0         0           2         Log-sigmoid         Stochastic Approximation to Gradient Descent         80         10         10         99         0.00%         0 <td>Leaves-1</td> <td>4 6</td> <td>Timoon</td> <td>Hond limit</td> <td>Stochastic Approximation to Gradient Description to Gr</td> <td>+</td> <td>10</td> <td>101</td> <td>99</td> <td>0.00%</td> <td></td> <td>60.0</td> <td>0.00%</td> <td></td> <td></td>	Leaves-1	4 6	Timoon	Hond limit	Stochastic Approximation to Gradient Description to Gr	+	10	101	99	0.00%		60.0	0.00%		
z         Linear         Hyperbolic tangent sigmoid         Stochastic Approximation to Gradient Descent         80         10         10         99         20.00%         0         0           2         Linear         Symmetric hard-limit         Stochastic Approximation to Gradient Descent         80         10         99         0.00%         0         0           2         Log-sigmoid         Brachlimit         Stochastic Approximation to Gradient Descent         80         10         99         0.00%         0         0           2         Log-sigmoid         Brachlimit         Stochastic Approximation to Gradient Descent         80         10         10         99         0.00%         0         0           2         Log-sigmoid         Stochastic Approximation to Gradient Descent         80         10         10         99         0.00%         0         0           2         Log-sigmoid         Stochastic Approximation to Gradient Descent         80         10         10         99         0.00%	Leaves 1	2 6	Linear	Times.	Stochastic Approximation to Gradient Description to Chadient Description to Ch	+	10	101	99	0.00%		0.02	0.00%		
z         Linear         Conclusion         Physical production to Gradient Descent 80         10         10         99         20.00%         0           2         Linear         Symmetric hard-limit         Stochastic Approximation to Gradient Descent 80         10         10         99         0.00%         0         0           2         Linear         Symmetric hard-limit         Stochastic Approximation to Gradient Descent 80         10         10         99         0.00%         0         0           2         Log-sigmoid         Linear         Stochastic Approximation to Gradient Descent 80         10         10         99         0.00%         0         0           2         Log-sigmoid         Hyperbolic tangent sigmoid         Stochastic Approximation to Gradient Descent 80         10         10         99         10.00%         0         0           2         Log-sigmoid         Hyperbolic tangent sigmoid         Stochastic Approximation to Gradient Descent 80         10         10         99         10.00%         0         0           2         Log-sigmoid         Stochastic Approximation to Gradient Descent 80         10         10         99         10.00%         0         0           2         Log-sigmoid         Hyperbolic tangent sigm	Leaves-1	4]0	Linear	Log-ejamoid	Stochastic Approximation to Gradient Desce	+	101	101	00	20000			20000		
2         Linear         Hyperbolic tangent sigmoid         Stochastic Approximation to Gradient Descent         90         10         10         99         20.00         0         0           2         Linear         None         Marchimit         Stochastic Approximation to Gradient Descent         80         10         10         99         0.00%         0         0           2         Log-sigmoid         Harchimit         Stochastic Approximation to Gradient Descent         80         10         10         99         0.00%         0         0         0           2         Log-sigmoid         Log-sigmoid         Log-sigmoid         Log-sigmoid         Stochastic Approximation to Gradient Descent         80         10         10         99         0.00%         0         0           2         Log-sigmoid         Hyperbolic tangent sigmoid         Stochastic Approximation to Gradient Descent         80         10         10         99         0.00%         0         0           2         Log-sigmoid         Stochastic Approximation to Gradient Descent         80         10         10         99         0.00%         0         0         0           2         Log-sigmoid         Barchimit         Stochastic Approximation to Gradient Descent	Leaves_1	4 C	Linear	Urn onbolio tongent giornoid	Stochastic Approximation to Gradient Description to Chadient Description	+	10	10	99	20.00%			0.00%		
2         Linear         Synthetic nari-man         Stochastic Approximation to Gradient Descent         80         10         10         99         0.00%         0           2         Log-sigmoid         Hard-limit         Stochastic Approximation to Gradient Descent         80         10         99         0.00%         0         0           2         Log-sigmoid         Log-sigmoid         Log-sigmoid         Log-sigmoid         10         99         10.00%         0         0         0           2         Log-sigmoid         Log-sigmoid         Log-sigmoid         Expression Approximation to Gradient Descent         80         10         99         10.00%         0         0           2         Log-sigmoid         Hyperbolic tangent sigmoid         Stochastic Approximation to Gradient Descent         80         10         99         10.00%         0         0         0           2         Log-sigmoid         Brochastic Approximation to Gradient Descent         80         10         10         99         10.00%         0         0         0           2         Log-sigmoid         Incelastic Approximation to Gradient Descent         80         10         10         99         10.00%         0         0           2 <td>Leaves-1</td> <td>4 c</td> <td>Linear</td> <td>Cressotuic band limit</td> <td>Stochastic Approximation to Gradient Description to Chadient Description</td> <td>+</td> <td>10</td> <td></td> <td>99</td> <td>20.00%</td> <td></td> <td></td> <td>0.00%</td> <td></td> <td></td>	Leaves-1	4 c	Linear	Cressotuic band limit	Stochastic Approximation to Gradient Description to Chadient Description	+	10		99	20.00%			0.00%		
2         Long-signaid         Hard-limit         Stochastic Approximation to Gradient Descent         80         10         99         0.00%         0           2         Log-signoid         Linear         Stochastic Approximation to Gradient Descent         80         10         10         99         10.00%         0         0           2         Log-signoid         Linear         Stochastic Approximation to Gradient Descent         80         10         10         99         10.00%         0         0           2         Log-signoid         Log-signoid         Symmetric hard-limit         Stochastic Approximation to Gradient Descent         80         10         10         99         10.00%         0         0           2         Log-signoid         None         Symmetric hard-limit         Stochastic Approximation to Gradient Descent         80         10         10         99         10.00%         0         0           2         Log-signoid         Hyperbolic tangent signoid         Stochastic Approximation to Gradient Descent         80         10         10         99         10.00%         0         0           2         Hyperbolic tangent signoid         Stochastic Approximation to Gradient Descent         80         10         10         99 </td <td>reaves_1</td> <td>7 0</td> <td>Linear</td> <td>Symmetric nard-innit</td> <td>Stochastic Approximation to Gradient Descr</td> <td>+</td> <td>10</td> <td>10</td> <td>66</td> <td>0.00%</td> <td></td> <td></td> <td>0.00%</td> <td>0</td> <td></td>	reaves_1	7 0	Linear	Symmetric nard-innit	Stochastic Approximation to Gradient Descr	+	10	10	66	0.00%			0.00%	0	
2         Log-sigmoid         Hard-limit         Stochastic Approximation to Gradient Descent         80         10         99         0.00%         0           2         Log-sigmoid         Linear         Stochastic Approximation to Gradient Descent         80         10         10         99         10.00%         0         0           2         Log-sigmoid         Linear         Stochastic Approximation to Gradient Descent         80         10         99         10.00%         0         0           2         Log-sigmoid         Hyperbolic tangent sigmoid         Stochastic Approximation to Gradient Descent         80         10         10         99         10.00%         0         0           2         Log-sigmoid         Hard-limit         Stochastic Approximation to Gradient Descent         80         10         10         99         10.00%         0         0           2         Hyperbolic tangent sigmoid         Hard-limit         Stochastic Approximation to Gradient Descent         80         10         10         99         10.00%         0         0           2         Hyperbolic tangent sigmoid         Log-sigmoid         Stochastic Approximation to Gradient Descent         80         10         10         99         10.00%         0	Leaves_1	2	Linear	None	Stochastic Approximation to Gradient Desce	+	10	01	99	0.00%	0	0	0.00%	0	0
2         Log-sigmoid         Linear         Stochastic Approximation to Gradient Descent         80         10         99         10.00%         0         0           2         Log-sigmoid         Hoperbolic tangent sigmoid         Hoperbolic tangent sigmoid         Stochastic Approximation to Gradient Descent         80         10         10         99         10.00%         0         0           2         Log-sigmoid         Hyperbolic tangent sigmoid         Hyperbolic tangent sigmoid         Stochastic Approximation to Gradient Descent         80         10         10         99         10.00%         0         0           2         Log-sigmoid         Hyperbolic tangent sigmoid         Hard-limit         Stochastic Approximation to Gradient Descent         80         10         10         99         10.00%         0         0           2         Hyperbolic tangent sigmoid         Linear         Stochastic Approximation to Gradient Descent         80         10         10         99         0.00%         0         0         0           2         Hyperbolic tangent sigmoid         Linear         Stochastic Approximation to Gradient Descent         80         10         10         99         0.00%         0         0         0         0           2	Leaves_1	2	Log-sigmoid	Hard-limit	Stochastic Approximation to Gradient Desce	-	10	0	66	0.00%	0	0	0.00%	0	0
2         Log-sigmoid         Log-sigmoid         Stochastic Approximation to Gradient Descent         80         10         99         10.00%         0         0           2         Log-sigmoid         Hyperbolic tangent sigmoid         Stochastic Approximation to Gradient Descent         80         10         10         99         10.00%         0         0         0           2         Log-sigmoid         None         Stochastic Approximation to Gradient Descent         80         10         10         99         10.00%         0         0         0           2         Log-sigmoid         None         Stochastic Approximation to Gradient Descent         80         10         10         99         10.00%         0         0         0           2         Hyperbolic tangent sigmoid         Linear         Stochastic Approximation to Gradient Descent         80         10         10         99         20.00%         0         0         0           2         Hyperbolic tangent sigmoid         Stochastic Approximation to Gradient Descent         80         10         10         99         20.00%         0         0         0           2         Hyperbolic tangent sigmoid         Stochastic Approximation to Gradient Descent         80         10 <td>Leaves_1</td> <td>2</td> <td>Log-sigmoid</td> <td>Linear</td> <td>Stochastic Approximation to Gradient Desce</td> <td>-</td> <td>10</td> <td>10</td> <td>66</td> <td>10.00%</td> <td>0</td> <td>0</td> <td>0.00%</td> <td>0</td> <td>0</td>	Leaves_1	2	Log-sigmoid	Linear	Stochastic Approximation to Gradient Desce	-	10	10	66	10.00%	0	0	0.00%	0	0
2         Log-sigmoid         Hyperbolic tangent sigmoid         Stochastic Approximation to Gradient Descent         80         10         99         0.00%         0         0           2         Log-sigmoid         Symmetric hard-limit         Stochastic Approximation to Gradient Descent         80         10         10         99         0.00%         0         0           2         Hyperbolic tangent sigmoid         Hard-limit         Stochastic Approximation to Gradient Descent         80         10         10         99         0.00%         0         0           2         Hyperbolic tangent sigmoid         Linear         Stochastic Approximation to Gradient Descent         80         10         10         99         0.00%         0         0           2         Hyperbolic tangent sigmoid         Linear         Stochastic Approximation to Gradient Descent         80         10         10         99         0.00%         0         0           2         Hyperbolic tangent sigmoid         Symmetric hard-limit         Stochastic Approximation to Gradient Descent         80         10         10         99         0.00%         0         0           2         Hyperbolic tangent sigmoid         Stochastic Approximation to Gradient Descent         80         10         10	Leaves_1	2	Log-sigmoid	Log-sigmoid	Stochastic Approximation to Gradient Desce	$\dashv$	10	10	66	10.00%	0	0	0.00%	0	0
2         Log-sigmoid         Symmetric hard-limit         Stochastic Approximation to Gradient Descent         80         10         99         30.00%         0         0           2         Log-sigmoid         None         Stochastic Approximation to Gradient Descent         80         10         10         99         10.00%         0         0         0           2         Hyperbolic tangent sigmoid         Hard-limit         Stochastic Approximation to Gradient Descent         80         10         10         99         20.00%         0         0         0           2         Hyperbolic tangent sigmoid         Log-sigmoid         Stochastic Approximation to Gradient Descent         80         10         10         99         20.00%         0         0         0           2         Hyperbolic tangent sigmoid         Hyperbolic tangent sigmoid         Stochastic Approximation to Gradient Descent         80         10         10         99         0.00%         0         0         0           2         Hyperbolic tangent sigmoid         None         Stochastic Approximation to Gradient Descent         80         10         10         99         0.00%         0         0         0           2         Hyperbolic tangent sigmoid         Stochastic Approxi	Leaves_1	2	Log-sigmoid	Hyperbolic tangent sigmoid	Stochastic Approximation to Gradient Desce	-	10	10	66	0.00%	0	0	0.00%	0	0
2         Log-sigmoid         None         Stochastic Approximation to Gradient Descent         80         10         99         10.00%         0         0           2         Hyperbolic tangent sigmoid         Hard-limit         Stochastic Approximation to Gradient Descent         80         10         10         99         0.00%         0         0         0           2         Hyperbolic tangent sigmoid         Linear         Stochastic Approximation to Gradient Descent         80         10         10         99         20.00%         0	Leaves_1	2	Log-sigmoid	Symmetric hard-limit	Stochastic Approximation to Gradient Desce		10	10	66	30.00%	0	0	0.00%	0	0
2         Hyperbolic tangent sigmoid         Hard-limit         Stochastic Approximation to Gradient Descent         80         10         99         0.00%         0         0           2         Hyperbolic tangent sigmoid         Linear         Stochastic Approximation to Gradient Descent         80         10         10         99         20.00%         0         0           2         Hyperbolic tangent sigmoid         Symmetric hard-limit         Stochastic Approximation to Gradient Descent         80         10         10         99         0.00%         0	Leaves_1	2	Log-sigmoid	None	Stochastic Approximation to Gradient Desce	-	10	10	66	10.00%	0	0	0.00%	0	0
2         Hyperbolic tangent sigmoid         Linear         Stochastic Approximation to Gradient Descent         80         10         99         20.00%         0         0           2         Hyperbolic tangent sigmoid         Log-sigmoid         Stochastic Approximation to Gradient Descent         80         10         10         99         20.00%         0         0         0           2         Hyperbolic tangent sigmoid         Symmetric hard-limit         Stochastic Approximation to Gradient Descent         80         10         10         99         0.00%         0	Leaves_1	2	Hyperbolic tangent sigmoid	Hard-limit	Stochastic Approximation to Gradient Desce	-	10	10	66	0.00%	0	0	0.00%	0	0
2         Hyperbolic tangent sigmoid         Stochastic Approximation to Gradient Descent         80         10         99         20.00%         0         0           2         Hyperbolic tangent sigmoid         Symmetric hard-limit         Stochastic Approximation to Gradient Descent         80         10         10         99         0.00%         0         0           2         Hyperbolic tangent sigmoid         None         Stochastic Approximation to Gradient Descent         80         10         10         99         10.00%         0         0         0           2         Symmetric hard-limit         Hard-limit         Stochastic Approximation to Gradient Descent         80         10         10         99         0.00%         0<	Leaves_1	2	Hyperbolic tangent sigmoid	Linear	Stochastic Approximation to Gradient Desce		10	10	66	20.00%	0	0	0.00%	0	0
2         Hyperbolic tangent sigmoid         Hyperbolic tangent sigmoid         Stochastic Approximation to Gradient Descent         80         10         99         0.00%         0         0           2         Hyperbolic tangent sigmoid         Symmetric hard-limit         Stochastic Approximation to Gradient Descent         80         10         10         99         0.00%         0 <td>Leaves_1</td> <td>2</td> <td></td> <td>Log-sigmoid</td> <td>Stochastic Approximation to Gradient Desce</td> <td></td> <td>10</td> <td>10</td> <td>66</td> <td>20.00%</td> <td>0</td> <td>0</td> <td>%00.0</td> <td>0</td> <td>0</td>	Leaves_1	2		Log-sigmoid	Stochastic Approximation to Gradient Desce		10	10	66	20.00%	0	0	%00.0	0	0
2         Hyperbolic tangent sigmoid         Symmetric hard-limit         Stochastic Approximation to Gradient Descent         80         10         99         10.00%         0         0         0           2         Hyperbolic tangent sigmoid         None         Stochastic Approximation to Gradient Descent         80         10         10         99         0.00%         0         0         0           2         Symmetric hard-limit         Log-sigmoid         Stochastic Approximation to Gradient Descent         80         10         10         99         20.00%         0	Leaves_1	2	-	Hyperbolic tangent sigmoid	Stochastic Approximation to Gradient Desce	$\vdash$	10	10	66	%00.0	0	0	0.00%	0	0
2         Hyperbolic tangent sigmoid         None         Stochastic Approximation to Gradient Descent         80         10         99         0.00%         0         0         0           2         Symmetric hard-limit         Linear         Stochastic Approximation to Gradient Descent         80         10         10         99         20.00%         0         0         0           2         Symmetric hard-limit         Log-sigmoid         Stochastic Approximation to Gradient Descent         80         10         10         99         20.00%         0         0         0           2         Symmetric hard-limit         Hyperbolic tangent sigmoid         Stochastic Approximation to Gradient Descent         80         10         10         99         0.00%         0         0         0           2         Symmetric hard-limit         Stochastic Approximation to Gradient Descent         80         10         10         99         10.00%         0         0         0         0           2         Symmetric hard-limit         Stochastic Approximation to Gradient Descent         80         10         10         99         10.00%         0         0         0         0         0           2         Symmetric hard-limit         None	Leaves_1	2	Hyperbolic tangent sigmoid	Symmetric hard-limit	Stochastic Approximation to Gradient Desce		10	10	66	10.00%	0	0	0.00%	0	0
2         Symmetric hard-limit         Hard-limit         Stochastic Approximation to Gradient Descent         80         10         99         20.00%         0         0         0           2         Symmetric hard-limit         Log-sigmoid         Stochastic Approximation to Gradient Descent         80         10         10         99         20.00%         0         0         0           2         Symmetric hard-limit         Hyperbolic tangent sigmoid         Stochastic Approximation to Gradient Descent         80         10         10         99         0.00%         0         0         0           2         Symmetric hard-limit         Stochastic Approximation to Gradient Descent         80         10         10         99         10.00%         0         0         0         0           2         Symmetric hard-limit         Stochastic Approximation to Gradient Descent         80         10         10         99         10.00%         0         0         0         0         0           2         Symmetric hard-limit         None         Stochastic Approximation to Gradient Descent         80         10         10         99         10.00%         0         0         0         0         0         0         0         0	Leaves_1	2	_	None	Stochastic Approximation to Gradient Desce		10	10	66	%00.0	0	0	0.00%	0	0
2         Symmetric hard-limit         Linear         Stochastic Approximation to Gradient Descent         80         10         99         20.00%         0         0         0           2         Symmetric hard-limit         Log-sigmoid         Stochastic Approximation to Gradient Descent         80         10         10         99         20.00%         0 <td>Leaves_1</td> <td>2</td> <td>Symmetric hard-limit</td> <td>Hard-limit</td> <td>Stochastic Approximation to Gradient Desce</td> <td></td> <td>10</td> <td>10</td> <td>66</td> <td>20.00%</td> <td>0</td> <td>0</td> <td>%00.0</td> <td>0</td> <td>0</td>	Leaves_1	2	Symmetric hard-limit	Hard-limit	Stochastic Approximation to Gradient Desce		10	10	66	20.00%	0	0	%00.0	0	0
Symmetric hard-limit Log-sigmoid Stochastic Approximation to Gradient Descent 80 10 10 99 20.00% 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	Leaves_1	2	Symmetric hard-limit	Linear	Stochastic Approximation to Gradient Desce		10	10	66	20.00%	0	0	0.00%	0	0
Symmetric hard-limit Hyperbolic tangent sigmoid Stochastic Approximation to Gradient Descent 80 10 99 0.00% 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	Leaves_1	2	Symmetric hard-limit	Log-sigmoid	Stochastic Approximation to Gradient Desce	$\vdash$	10	10	66	20.00%	0	0	0.00%	0	0
2 Symmetric hard-limit Stochastic Approximation to Gradient Descent 80 10 10 99 10.00% 0 0 0 1 Symmetric hard-limit None Stochastic Approximation to Gradient Descent 80 10 10 99 20.00% 0 0 0	Leaves_1	2	Symmetric hard-limit	Hyperbolic tangent sigmoid	Stochastic Approximation to Gradient Desce		10	10	66	%00.0	0	0	10.00%	0	0
2 Symmetric hard-limit None Stochastic Approximation to Gradient Descent 80 10 10 99 20.00% 0 0	Leaves_1	2	Symmetric hard-limit	Symmetric hard-limit	Stochastic Approximation to Gradient Desce		10	10	66	10.00%	0	0	%00.0	0	0
	Leaves_1	2	Symmetric hard-limit	None	Stochastic Approximation to Gradient Desce	-	10	10	66	20.00%	0	0	10.00%	0	0

Table C.3: Training - Characteristics of the image with Leaves\_1 - Part 3  $\,$ 

		Transfer functions	functions		Katio	(in percentage %	e %)			Species			Species	
Folder	Hidden L.	1st	2nd	Training algorithm	Train	Validation	Test	Quant. images	% ssacons	Epoch	Duration	% ssəcons	Epoch	Duration
Leaves_1	10	Hard-limit	Hard-limit	Perceptron Training Rule	20	15	15	66	%00.0	0	0.01	0.00%	0	0
Leaves_1	10	Hard-limit	Linear	Perceptron Training Rule	20	15	15	66	%00.0	0	0	0.00%	0	0
Leaves_1	10	Hard-limit	Log-sigmoid	Perceptron Training Rule	20	15	15	66	20.00%	0	0	0.00%	0	0
Leaves_1	10	Hard-limit	Hyperbolic tangent sigmoid	Perceptron Training Rule	20	15	15	66	20.00%	0	0	0.00%	0	0
Leaves_1	10	Hard-limit	Symmetric hard-limit	Perceptron Training Rule	20	15		66	%00.0	0	0	0.00%	0	0
Leaves_1	10	Hard-limit	None	Perceptron Training Rule	20	15	15	66	%00.0	0	0	0.00%	0	0
Leaves_1	10	Linear	Hard-limit	Perceptron Training Rule	20	15	15	66	%00.0	0	0	0.00%	0	0
Leaves_1	10	Linear	Linear	Perceptron Training Rule	20	15	15	66	10.00%	0	0	0.00%	0	0
Leaves_1	10	Linear	Log-sigmoid	Perceptron Training Rule	20	15	15	66	10.00%	0	0	0.00%	0	0
Leaves_1	10	Linear	Hyperbolic tangent sigmoid	Perceptron Training Rule	20	15	15	66	%00.0	0	0	0.00%	0	0
Leaves_1	10	Linear	Symmetric hard-limit	Perceptron Training Rule	20	15	15	66	30.00%	0	0	0.00%	0	0
Leaves_1	10	Linear	None	Perceptron Training Rule	20	15	15	66	10.00%	0	0	0.00%	0	0
Leaves_1	10	Log-sigmoid	Hard-limit	Perceptron Training Rule	20	15	15	66	%00.0	0	0	0.00%	0	0
Leaves_1	10	Log-sigmoid	Linear	Perceptron Training Rule	20	15	15	66	20.00%	0	0	0.00%	0	0
Leaves_1	10	Log-sigmoid	Log-sigmoid	Perceptron Training Rule	20	15		66	20.00%	0	0	%00.0	0	0
Leaves_1	10	Log-sigmoid	Hyperbolic tangent sigmoid	Perceptron Training Rule	20	15	15	66	%00.0	0	0	0.00%	0	0
Leaves_1	10	Log-sigmoid	Symmetric hard-limit	Perceptron Training Rule	20	15		66	10.00%	0	0	%00.0	0	0
Leaves_1	10	Log-sigmoid	None	Perceptron Training Rule	20	15	15	66	%00.0	0	0	0.00%	0	0
Leaves_1	10	Hyperbolic tangent sigmoid	Hard-limit	Perceptron Training Rule	20	15	15	66	20.00%	0	0	0.00%	0	0
Leaves_1	10	Hyperbolic tangent sigmoid	Linear	Perceptron Training Rule	20	15		66	20.00%	0	0	0.00%	0	0
Leaves_1	10	Hyperbolic tangent sigmoid	Log-sigmoid	Perceptron Training Rule	20	15	15	66	20.00%	0	0	0.00%	0	0
Leaves_1	10	Hyperbolic tangent sigmoid	Hyperbolic tangent sigmoid	Perceptron Training Rule	20	15	15	66	%00.0	0	0	10.00%	0	0
Leaves_1	10	Hyperbolic tangent sigmoid	Symmetric hard-limit	Perceptron Training Rule	20	15	15	66	10.00%	0	0	0.00%	0	0
Leaves_1	10	Hyperbolic tangent sigmoid	None	Perceptron Training Rule	20	15		66	20.00%	0	0	300.01	0	0
Leaves_1	10	Symmetric hard-limit	Hard-limit	Perceptron Training Rule	20	15	15	66	10.00%	0	0	0.00%	0	0
Leaves_1	10	Symmetric hard-limit	Linear	Perceptron Training Rule	20	15	15	66	10.00%	0	0	300.01	0	0
Leaves_1	10	Symmetric hard-limit	Log-sigmoid	Perceptron Training Rule	20	15		66	10.00%	0	0	10.00%	0	0
Leaves_1	10	Symmetric hard-limit	Hyperbolic tangent sigmoid	Perceptron Training Rule	20	15		66	20.00%	0	0	%00'0	0	0
Leaves_1	10	Symmetric hard-limit	Symmetric hard-limit	Perceptron Training Rule	20	15		66	20.00%	0	0	%00'0	0	0
Leaves_1	10	Symmetric hard-limit	None	Perceptron Training Rule	20	15		66	20.00%	0	0	0.00%	0	0
Leaves_1	10	Hard-limit	Hard-limit	Gradient Descent	20	15		66	20.00%	0	0	0.00%	0	0
Leaves_1	10	Hard-limit	Linear	Gradient Descent	20	15		66	10.00%	0	0	0.00%	0	0
Leaves_1	10	Hard-limit	Log-sigmoid	Gradient Descent	20	15		66	0.00%	0	0	0.00%	0	0
Leaves_1	10	Hard-limit	Hyperbolic tangent sigmoid	Gradient Descent	20	15		66	%00:0	0	0	%00'0	0	0
Leaves_1	10	Hard-limit	Symmetric hard-limit	Gradient Descent	20	15	15	66	10.00%	0	0	%00'0	0	0
Leaves_1	10	Hard-limit	None	Gradient Descent	20	15		66	10.00%	0	0	%00'0	0	0
Leaves_1	10	Linear	Hard-limit	Gradient Descent	20	15	15	66	20.00%	0	0	%00.0	0	0
Leaves_1	10	Linear	Linear	Gradient Descent	20	15		66	10.00%	0	0	300.01	0	0
Leaves_1	10	Linear	Log-sigmoid	Gradient Descent	20	15	15	66	10.00%	0	0	10.00%	0	0
Leaves_1	10	Linear	Hyperbolic tangent sigmoid	Gradient Descent	20	15	15	66	%00:0	0	0	%00'0	0	0
Leaves_1	10	Linear	Symmetric hard-limit	Gradient Descent	20	15	15	66	10.00%	0	0	%00.0	0	0
Leaves_1	10	Linear	None	Gradient Descent	20	15	15	66	10.00%	0	0	%00.0	0	0
Leaves_1	10	Log-sigmoid	Hard-limit	Gradient Descent	20	15	15	66	10.00%	0	0	%00.0	0	0

Table C.4: Training - Characteristics of the image with Leaves\_1 - Part  $4\,$ 

		Transfer functions	functions		Ratio	Ratio (in percentage %)	se %)			Species		Spe	Species	
Folder Hid	Hidden L.	1st	2nd	Training algorithm	Train	Validation	Test	Quant. images	Saccess %	Epoch Duration	tion Success	%	Epoch D	Duration
Leaves_1 10		Log-sigmoid	Linear	Gradient Descent	20	15	15	66	%00.0	0 0	0.00%	0 9	0	
Leaves_1   10		Log-sigmoid	Log-sigmoid	Gradient Descent	20	15	15	66	10.00%	0 0	%00·0	0 9	0	
Leaves_1 10		Log-sigmoid	Hyperbolic tangent sigmoid	Gradient Descent	20	15	15	66	%00.0	0 0	0.00%	0 %	0	
Leaves_1 10		Log-sigmoid	Symmetric hard-limit	Gradient Descent	20	15	15	66	10.00%	0 0	0.00%	0 %	0	
Leaves_1 10		Log-sigmoid	None	Gradient Descent	02	15	15	66	10.00%	0 0	10.00%	0 %	0	
Leaves_1 10		Hyperbolic tangent sigmoid	Hard-limit	Gradient Descent	20	15	15	66	30.00%	0 0	0.00%	0 %	0	
Leaves_1 10		Hyperbolic tangent sigmoid	Linear	Gradient Descent	20	15	15	66	20.00%	0 0	0.00%	0 %	0	
Leaves_1 10		Hyperbolic tangent sigmoid	Log-sigmoid	Gradient Descent	20	15	15	66	10.00%	0 0	0.00%	0	0	
Leaves_1 10		Hyperbolic tangent sigmoid	Hyperbolic tangent sigmoid	Gradient Descent	20	15	15	66	10.00%	0 0	0.00%	0	0	
Leaves_1 10		-	Symmetric hard-limit	Gradient Descent	20	15	15	66	20.00%	0 0	0.00%	0 %	0	
$\vdash$		+	None	Gradient Descent	20	15	15	66	0.00%	0 0	0.00%	0 %	0	
Leaves_1 10		Symmetric hard-limit	Hard-limit	Gradient Descent	70	15	15	66	20.00%	0 0	0.00%	0 %	0	
Leaves_1 10		Symmetric hard-limit	Linear	Gradient Descent	20	15	15	66	10.00%	0 0	0.00%	0 %	0	
Leaves_1 10		Symmetric hard-limit	Log-sigmoid	Gradient Descent	20	15	15	66	10.00%	0 0	0.00%	0 %	0	
Leaves_1 10		Symmetric hard-limit	angent sigmoid	Gradient Descent	20	15	15	66	10.00%	0 0	0.00%	0 %	0	
Leaves_1 10		Symmetric hard-limit	Symmetric hard-limit	Gradient Descent	20	15	15	66	10.00%	0 0	0.00%	0 %	0	
Leaves_1 10		Symmetric hard-limit	None	Gradient Descent	20	15	15	66	20.00%	0 0	0.00%	0 %	0	
Leaves_1 10		Hard-limit	Hard-limit	Stochastic Approximation to Gradient Descent	t 70	15	15	66	10.00%	0 0	0.00%	0 ,	0	
Leaves_1 10		Hard-limit	Linear	Gradient	+	15	15	66	20.00%	0 0	0.00%		0	
L		Hard-limit	Log-sigmoid	Stochastic Approximation to Gradient Descent	+	15	15	66	10.00%		0.00%		0	
-		Hard-limit	Hyperbolic tangent sigmoid	Stochastic Approximation to Gradient Descent	+	15	15	66	0.00%		0.00%		0	
۲.		Hard-limit	Symmetric hard-limit	Stochastic Approximation to Gradient Descent	+	15	15	66	0.00%		0.00%		0	
Leaves_1 10		Hard-limit	None	Stochastic Approximation to Gradient Descent	-	15	15	66	0.00%	0 0	0.00%		0	
Leaves_1 10		Linear	Hard-limit	Stochastic Approximation to Gradient Descent	t 70	15	15	66	30.00%	0 0	0.00%	0 %	0	
Leaves_1 10		Linear	Linear	Stochastic Approximation to Gradient Descent	t 70	15	15	66	0.00%	0 0	0.00%	0 %	0	
Leaves_1 10		Linear	Log-sigmoid	Stochastic Approximation to Gradient Descent	t 70	15	15	66	10.00%	0 0	0.00%	0 %	0	
Leaves_1 10		Linear	Hyperbolic tangent sigmoid	Stochastic Approximation to Gradient Descent	t 70	15	15	66	%00.0	0 0	0.00%	0	0	
Leaves_1 10		Linear	Symmetric hard-limit	Stochastic Approximation to Gradient Descent	t 70	15	15	66	%00.0	0 0	0.00%	0 %	0	
Leaves_1 10		Linear	None	Stochastic Approximation to Gradient Descent	t 70	15	15	66	%00.0	0 0	0.00%	0 %	0	
Leaves_1 10		Log-sigmoid	Hard-limit	Stochastic Approximation to Gradient Descent	t 70	15	15	66	20.00%	0 0	0.00%	0 %	0	
Leaves_1 10		Log-sigmoid	Linear	Stochastic Approximation to Gradient Descent	t 70	15	15	66	%00.0	0 0	0.00%	0 %	0	
Leaves_1 10		Log-sigmoid	Log-sigmoid	Stochastic Approximation to Gradient Descent	t 70	15	15	66	20.00%	0 0	0.00%	0 0	0	
Leaves_1   10		Log-sigmoid	gmoi	Stochastic Approximation to Gradient Descent	t 70	15	15	66	10.00%	0 0	0.00%		0	
		Log-sigmoid	netric hard-limit	Stochastic Approximation to Gradient Descent 7	t 70	15	15	66	10.00%		0.00%		0	
Leaves_1 10		-		Stochastic Approximation to Gradient Descent	t 20	15	15	66	0.00%		0.00%		0	
$\dashv$		-	Hard-limit	Stochastic Approximation to Gradient Descent	t 20	15	15	66	%00.0	0 0	0.00%		0	
Leaves_1 10		Hyperbolic tangent sigmoid		Stochastic Approximation to Gradient Descent	t 70	15	15	66	20.00%	0 0	0.00%		0	
Leaves_1 10		Hyperbolic tangent sigmoid	Log-sigmoid	Stochastic Approximation to Gradient Descent	t 70	15	15	66	20.00%	0 0	0.00%	0 9	0	
Leaves_1 10		Hyperbolic tangent sigmoid	cangent sigmoi	Stochastic Approximation to Gradient Descent	t 70	15	15	66	%00.0	0 0	0.00%	0 %	0	
Leaves_1 10		-	Symmetric hard-limit	Stochastic Approximation to Gradient Descent	t 70	15	15	66	10.00%	0 0	0.00%	0	0	
Leaves_1 10		$\vdash$	None	Stochastic Approximation to Gradient Descent	t 70	15	15	66	%00.0	0 0	10.00	0 %	0	
Leaves_1 10		Symmetric hard-limit	Hard-limit	Stochastic Approximation to Gradient Descent	t 70	15	15	66	10.00%	0 0	0.00%		0	
Leaves_1 10		Symmetric hard-limit	Linear	Stochastic Approximation to Gradient Descent	t 70	15	15	66	%00.0	0 0	0.00%	0	0	
Leaves_1 10		Symmetric hard-limit	Log-sigmoid	Stochastic Approximation to Gradient Descent	t 70	15	15	66	10.00%	0 0	0.00%	0 %	0	
Leaves_1 10		Symmetric hard-limit	Hyperbolic tangent sigmoid	Stochastic Approximation to Gradient Descent	t 70	15	15	66	0.00%	0 0	0.00%	0 %	0	
		Symmetric hard-limit	Symmetric hard-limit	Stochastic Approximation to Gradient Descent	$\vdash$	15	15	66	10.00%	0 0	0.00%		0	
Leaves_1 10		Symmetric hard-limit	None	Stochastic Approximation to Gradient Descent	t 70	15	15	66	10.00%	0 0	0.00%	0 %	0	

Table C.5: Training - Characteristics of the image with Leaves\_2 - Part 1  $\,$ 

	Transfer	Transfer functions	Ratio (in	(in percentage %	(%			Species		Species	
Folder Hidden L.	1st	2nd	Training algorithm Train V	Validation	Test	Quant. images	% ssəcons	Epoch   Duration	n Success %	Epoch	Duration
Leaves_2 2	Hard-limit	Hard-limit	g Rule	0	10		6.19%	0 0	0.00%	0	0
Leaves_2 2	Hard-limit	Linear	Training Rule 80	10	10	1564	6.19%	0 0	1.04%	0	0
Leaves_2 2	Hard-limit	Log-sigmoid	Perceptron Training Rule 80 11	10	10	1564	4.12%	0 0.01	4.17%	0	0
Leaves_2 2	Hard-limit	Hyperbolic tangent sigmoid	Perceptron Training Rule 80 1	10	10	1564	13.40%	0 0	1.04%	0	0
Leaves_2 2	Hard-limit	Symmetric hard-limit	Perceptron Training Rule   80   10	10   1	10	1564	7.22%	0 0	0.00%	0	0
Leaves_2 2	Hard-limit	None	Perceptron Training Rule 80 1	10	10	1564	6.19%	0 0	1.04%	0	0
Leaves_2 2	Linear	Hard-limit	Perceptron Training Rule 80 11	10	10	1564	9.28%	0 0	1.04%	0	0
Leaves_2 2	Linear	Linear	Rule 80	10	10	1564	11.34%	0 0	3.13%	0	0
Leaves_2 2	Linear	Log-sigmoid	Perceptron Training Rule 80 11	10	10	1564	10.31%	0 0	1.04%	0	0
Leaves_2 2	Linear	Hyperbolic tangent sigmoid	Perceptron Training Rule 80 11	10	10	1564	8.25%	0 0	1.04%	0	0
Leaves_2 2	Linear	Symmetric hard-limit	Perceptron Training Rule 80 11	10	10	1564	7.22%	0 0	0.00%	0	0
Leaves_2 2	Linear	None	Perceptron Training Rule 80 11	10	10	1564	10.31%	0 0	3.13%	0	0
Leaves_2 2	Log-sigmoid	Hard-limit	Perceptron Training Rule 80 11	10	10	1564	8.25%	0 0	0.00%	0	0
Leaves_2 2	Log-sigmoid	Linear	80	10	10	1564	4.12%	0 0	0.00%	0	0
-	Log-sigmoid	Log-sigmoid	Rule 80	10	10	1564	8.25%	0 0	1.04%	0	0
Leaves_2 2	Log-sigmoid	Hyperbolic tangent sigmoid	Perceptron Training Rule 80 1	10	10	1564	8.25%	0 0	2.08%	0	0
-	Log-sigmoid	Symmetric hard-limit	Perceptron Training Rule 80 10	10	10	1564	7.22%	0 0	2.08%	0	0
Leaves_2 2	Log-sigmoid	None	Rule 80	10	10	1564	8.25%	0 0	0.00%	0	0
Leaves_2 2	Hyperbolic tangent sigmoid	Hard-limit	Perceptron Training Rule 80 1	10	10	1564	12.37%	0 0	1.04%	0	0
Leaves_2 2	Hyperbolic tangent sigmoid	Linear	Perceptron Training Rule 80 1	10	10	1564	10.31%	0 0	1.04%	0	0
Leaves_2 2	Hyperbolic tangent sigmoid	Log-sigmoid	Perceptron Training Rule 80 1	10	10	1564	8.25%	0 0	1.04%	0	0
Leaves_2 2	Hyperbolic tangent sigmoid	Hyperbolic tangent sigmoid	Perceptron Training Rule 80 11	10	10	1564	6.19%	0 0	1.04%	0	0
Leaves_2 2	Hyperbolic tangent sigmoid	Symmetric hard-limit	Rule 80	10	10	1564	6.19%	0 0	0.00%	0	0
	Hyperbolic tangent sigmoid		Training Rule 80	10	10	1564	2.06%	0 0	2.08%	0	0
Leaves_2 2	Symmetric hard-limit	Hard-limit	Perceptron Training Rule 80 1	10	10	1564	12.37%	0 0	1.04%	0	0
Leaves_2 2	Symmetric hard-limit	Linear	Rule 80	10	10	1564	80.00	0 0	0.00%	0	0
Leaves_2 2	Symmetric hard-limit	Log-sigmoid	Rule 80	10	10	1564	7.22%	0 0	0.00%	0	0
Leaves_2 2	Symmetric hard-limit	Hyperbolic tangent sigmoid		10	10	1564	12.37%	0 0	0.00%	0	0
Leaves_2 2	Symmetric hard-limit	Symmetric hard-limit	Training Rule 80		10	1564	4.12%	0 0	0.00%	0	0
Leaves_2 2	Symmetric hard-limit	None	ng Rule 80		10	1564	10.31%	0 0	1.04%	0	0
Leaves_2 2	Hard-limit	Hard-limit			10	1564	13.40%		1.04%	0	0
Leaves_2 2	Hard-limit	Linear	Gradient Descent 80 1	10	10	1564	8.25%	0 0	0.00%	0	0
Leaves_2 2	Hard-limit	Log-sigmoid		10	10	1564	7.22%	0 0	1.04%	0	0
Leaves_2 2	Hard-limit	Hyperbolic tangent sigmoid	08		10	1564	5.15%	0 0	2.08%	0	0
Leaves_2 2	Hard-limit	Symmetric hard-limit	80	10	10	1564	2.06%	0 0	0.00%	0	0
Leaves_2 2	Hard-limit	None		10	10	1564	11.34%	0 0	0.00%	0	0
Leaves_2 2	Linear	Hard-limit	08	10	10	1564	7.22%	0 0	2.08%	0	0
Leaves_2 2	Linear	Linear	80		10	1564	12.37%	0 0	2.08%	0	0
Leaves_2 2	Linear	Log-sigmoid		10	10	1564	7.22%	0 0	0.00%	0	0
Leaves_2 2	Linear	Hyperbolic tangent sigmoid	08		10	1564	14.43%		1.04%	0	0
Leaves_2 2	Linear	Symmetric hard-limit		10   1	10	1564	6.19%	0 0	3.13%	0	0
Leaves_2 2	Linear	None	80		10	1564	7.22%	0 0	0.00%	0	0
	Log-sigmoid	Hard-limit	80		10	1564	5.15%	0 0	0.00%	0	0
	Log-sigmoid	Linear	80	10	10	1564	8.25%	0 0	2.08%	0	0
Leaves_2 2	Log-sigmoid	Log-sigmoid	Gradient Descent 80 11	10	10	1564	10.31%	0 0	1.04%	0	0

Table C.6: Training - Characteristics of the image with Leaves\_2 - Part 2  $\,$ 

		Transfer 1	Transfer functions		Ratio	o (in percentage %	(% e.2)			Species		S	Species	
Folder	Hidden L.	1st	2nd	Training algorithm	Train		Test	Quant. images	Success %	$\vdash$	Duration	Success %   I	$\vdash$	Duration
Leaves_2	2	Log-sigmoid	Hyperbolic tangent sigmoid	Gradient Descent	8	10	10	1564	11.34%	0	0	1.04%	0	0
Leaves_2	2	Log-sigmoid	Symmetric hard-limit	Gradient Descent	8	10	10	1564	10.31%	0	0	0.00%	0	0
Leaves_2	2	Log-sigmoid	None	Gradient Descent	08	10	10	1564	10.31%	0	0	3.13% 0		0
Leaves_2	2	Hyperbolic tangent sigmoid	Hard-limit	Gradient Descent	98	10	10	1564	8.25%	0	0	0.00%	0	
Leaves 2	2	Hyperbolic tangent sigmoid	Linear	Gradient Descent	8	10	10	1564	9.28%	0	0	0.00%	0	
Leaves_2	2	Hyperbolic tangent sigmoid	Log-sigmoid	Gradient Descent	8	10	10	1564	14.43%	0	0	0.00%	0	
Leaves_2	2	Hyperbolic tangent sigmoid	Hyperbolic tangent sigmoid	Gradient Descent	8	10	10	1564	8.25%	0	0	1.04% 0	0	
Leaves 2	2	Hyperbolic tangent sigmoid	Symmetric hard-limit	Gradient Descent	8	10	10	1564	8.25%	0	0	0.00%	0	
Leaves_2	2	Hyperbolic tangent sigmoid	None	Gradient Descent	98	10	10	1564	8.25%	0	0	2.08% 0	0	
Leaves_2	2	Symmetric hard-limit	Hard-limit	Gradient Descent	8	10	10	1564	8.25%	0	0	2.08% 0	0	
Leaves_2	2	Symmetric hard-limit	Linear	Gradient Descent	08	10	10	1564	10.31%	0	0	2.08%	0 0	
Leaves_2	2	Symmetric hard-limit	Log-sigmoid	Gradient Descent	8	10	10	1564	7.22%	0	0	0.00%	0	
Leaves 2	2	Symmetric hard-limit	Hyperbolic tangent sigmoid	Gradient Descent	8	10	10	1564	4.12%	0	0	1.04% 0	0	
Leaves_2	2	Symmetric hard-limit	Symmetric hard-limit	Gradient Descent	80	10	10	1564	8.25%	0	0	1.04% 0	0 (	
Leaves_2	2	Symmetric hard-limit	None	Gradient Descent	8	10	10	1564	6.19%	0	0	1.04%	0 0	
Leaves_2	2	Hard-limit	Hard-limit	Stochastic Approximation to Gradient Descent		10		1564	8.25%	0	0	2.08%	0 0	
Leaves_2	2	Hard-limit	Linear	Stochastic Approximation to Gradient Descent	e 80	10	10	1564	7.22%	0	0	0.00%	0 (	
Leaves 2	2	Hard-limit	Log-sigmoid	Stochastic Approximation to Gradient Descent	98 1	10	10	1564	11.34%	0	0	2.08%	0	
Leaves_2	2	Hard-limit	Hyperbolic tangent sigmoid	Stochastic Approximation to Gradient Descent	e 80	10	10	1564	11.34%	0	0	0.00%	0 (	
Leaves_2	2	Hard-limit	Symmetric hard-limit	Stochastic Approximation to Gradient Descent	8	10	10	1564	7.22%	0	0	1.04% 0	0	
Leaves 2	2	Hard-limit	None	Stochastic Approximation to Gradient Descent	98 1	10	10	1564	8.25%	0	0	1.04% 0	0	
Leaves_2	2	Linear	Hard-limit	Stochastic Approximation to Gradient Descent	t 80	10	10	1564	14.43%	0	0	0.00%	0 0	
Leaves_2	2	Linear	Linear	Stochastic Approximation to Gradient Descent	98	10	10	1564	7.22%	0	0	2.08%	0 0	
Leaves_2	2	Linear	Log-sigmoid	Stochastic Approximation to Gradient Descent	t 80	10	10	1564	16.49%	0	)   0		0 0	
Leaves_2	2	Linear	Hyperbolic tangent sigmoid	Stochastic Approximation to Gradient Descent	-	10	10	1564	10.31%				0 (	
Leaves_2	2	Linear	Symmetric hard-limit	Stochastic Approximation to Gradient Descent		10	10	1564	7.22%	0	0	0.00% 0	0 (	
Leaves_2	2	Linear	None	Stochastic Approximation to Gradient Descent		10		1564	9.28%	0		1.04% 0	0 (	
Leaves_2	2	Log-sigmoid	Hard-limit	Stochastic Approximation to Gradient Descent	98	10	10	1564	8.25%	0	0	1.04% 0	0 (	
Leaves_2	2	Log-sigmoid	Linear	Stochastic Approximation to Gradient Descent	t 80	10		1564	10.31%	0	) 0	0   %00.0	0 (	
Leaves_2	2	Log-sigmoid	Log-sigmoid	Stochastic Approximation to Gradient Descent	-	10		1564	8.25%	0	0		0 0	
Leaves 2	2	Log-sigmoid	Hyperbolic tangent sigmoid	Stochastic Approximation to Gradient Descent		10	10	1564	13.40%	0			0 0	
Leaves_2	2	Log-sigmoid	Symmetric hard-limit	Stochastic Approximation to Gradient Descent		10	10	1564	7.22%					
Leaves_2	2	Log-sigmoid	None	Stochastic Approximation to Gradient Descent	t 80	10	10	1564	9.28%	0	0 1	1.04% 0	0 (	
Leaves_2	2	Hyperbolic tangent sigmoid	Hard-limit	Stochastic Approximation to Gradient Descent	t 80	10	10	1564	12.37%	0	) 0	0.00%	0 (	
Leaves_2	2	Hyperbolic tangent sigmoid	Linear	Stochastic Approximation to Gradient Descent	t 80	10	10	1564	8.25%	0	) 0	0.00%	0 (	
Leaves_2	2	Hyperbolic tangent sigmoid	Log-sigmoid	Stochastic Approximation to Gradient Descent	e 80	10	10	1564	6.19%	0	0	2.08% 0	0 (	
Leaves_2	2	Hyperbolic tangent sigmoid	Hyperbolic tangent sigmoid	Stochastic Approximation to Gradient Descent	98	10	10	1564	11.34%	0	0	0.00%	0	
Leaves_2	2	Hyperbolic tangent sigmoid	Symmetric hard-limit	Stochastic Approximation to Gradient Descent	98	10	10	1564	12.37%	0	0.02	1.04% 0	0	
Leaves 2	2	Hyperbolic tangent sigmoid	None	Stochastic Approximation to Gradient Descent	e 80	10	10	1564	12.37%	0	0	0.00%	0 0	
Leaves_2	2	Symmetric hard-limit	Hard-limit	Stochastic Approximation to Gradient Descent	8	10	10	1564	5.15%	0			0	
Leaves_2	2	Symmetric hard-limit	Linear	Stochastic Approximation to Gradient Descent	8	10	10	1564	10.31%	0	0	1.04% 0	0	
Leaves 2	2	Symmetric hard-limit	Log-sigmoid	Stochastic Approximation to Gradient Descent	98	10	10	1564	10.31%	0	0	0.00%	0	
Leaves_2	2	Symmetric hard-limit	Hyperbolic tangent sigmoid	Stochastic Approximation to Gradient Descent	t 80	10	10	1564	14.43%	0	0	1.04% 0	0 (	
Leaves_2	2	Symmetric hard-limit	Symmetric hard-limit	Stochastic Approximation to Gradient Descent		10		1564	10.31%		0		0 0	
Leaves_2	2	Symmetric hard-limit	None	Stochastic Approximation to Gradient Descent	80	10	10	1564	9.28%	0	0	4.17%	0	

Table C.7: Training - Characteristics of the image with Leaves\_2 - Part 3  $\,$ 

		Transfer	Transfer functions	Ratio	Ratio (in percentage %)	;e %)			Species			Species	
Folder	Hidden L.	1st	2nd	Training algorithm Train	Validation	Test	Quant. images	% ssecons	Epoch	Duration	Success %	Epoch	Duration
Leaves_2	10	Hard-limit	Hard-limit	Perceptron Training Rule   70	15	15	1564	9.28%	0	0	4.17%	0	0
Leaves_2	10	Hard-limit	Linear	Perceptron Training Rule 70	15	15	1564	8.25%	0	0	1.04%	0	0
Leaves_2	10	Hard-limit	Log-sigmoid	Perceptron Training Rule 70	15	15	1564	9.28%	0	0	0.00%	0	0
_	10	Hard-limit	Hyperbolic tangent sigmoid	Perceptron Training Rule 70	15	15	1564	4.12%	0	0	2.08%	0	0
Leaves_2	10	Hard-limit	Symmetric hard-limit	Perceptron Training Rule 70	15	15	1564	9.28%	0	0	2.08%	0	0
Leaves_2	10	Hard-limit	None	Perceptron Training Rule 70	15	15	1564	12.37%	0	0	0.00%	0	0
Leaves_2	10	Linear	Hard-limit	Perceptron Training Rule 70	15	15	1564	10.31%	0	0	0.00%	0	0
+	10	Linear	Linear		15	15	1564	8.25%	0	0	1.04%	0	0
Leaves_2	10	Linear	Log-sigmoid		15	15	1564	5.15%	0	0	0.00%	0	0
Leaves_2	10	Linear	Hyperbolic tangent sigmoid		15	15	1564	7.22%	0	0	1.04%	0	0
Leaves_2	10	Linear	Symmetric hard-limit	Perceptron Training Rule 70	15	15	1564	6.19%	0	0	1.04%	0	0
_	10	Linear	None	Perceptron Training Rule 70	15	15	1564	13.40%	0	0	0.00%	0	0
-	10	Log-sigmoid	Hard-limit	Perceptron Training Rule 70	15	15	1564	6.19%	0	0	2.08%	0	0
Leaves_2	10	Log-sigmoid	Linear	Perceptron Training Rule 70	15	15	1564	6.19%	0	0	0.00%	0	0
Leaves_2	10	Log-sigmoid	Log-sigmoid	Perceptron Training Rule 70	15	15	1564	15.46%	0	0	0.00%	0	0
Leaves_2	10	Log-sigmoid	Hyperbolic tangent sigmoid	Perceptron Training Rule 70	15	15	1564	8.25%	0	0	0.00%	0	0
Leaves_2	10	Log-sigmoid	Symmetric hard-limit	Perceptron Training Rule 70	15	15	1564	12.37%	0	0	1.04%	0	0
Leaves_2	10	Log-sigmoid	None	Perceptron Training Rule 70	15	15	1564	5.15%	0	0	0.00%	0	0
+	10	Hyperbolic tangent sigmoid	Hard-limit	Perceptron Training Rule 70	15	15	1564	6.19%	0	0	0.00%	0	0
Leaves_2	10	Hyperbolic tangent sigmoid	Linear	Perceptron Training Rule 70	15	15	1564	4.12%	0	0	1.04%	0	0
+	10	Hyperbolic tangent sigmoid	Log-sigmoid		15	15	1564	9.28%	0	0	0.00%	0	0
+	10	Hyperbolic tangent sigmoid	Hyperbolic tangent sigmoid		15	15	1564	8.25%	0	0	1.04%	0	0
+	10	Hyperbolic tangent sigmoid	Symmetric hard-limit	Perceptron Training Rule 70	15	15	1564	9.28%	0	0	2.08%	0	0
+	10	Hyperbolic tangent sigmoid	None	Training Rule	15	15	1564	8.25%	0	0	0.00%	0	0
+	10	Symmetric hard-limit	Hard-limit	Perceptron Training Rule 70	15	15	1564	5.15%	0	0	2.08%	0	0
Leaves_2	10	Symmetric hard-limit	Linear	Perceptron Training Rule 70	15	15	1564	6.19%	0	0	0.00%	0	0
Leaves_2	10	Symmetric hard-limit	Log-sigmoid	Perceptron Training Rule 70	15	15	1564	6.19%	0	0	1.04%	0	0
Leaves_2	10	Symmetric hard-limit	Hyperbolic tangent sigmoid	Perceptron Training Rule 70	15	15	1564	3.09%	0	0	1.04%	0	0
Leaves_2	10	Symmetric hard-limit	Symmetric hard-limit	Perceptron Training Rule 70	15	15	1564	11.34%	0	0	0.00%	0	0
Leaves_2	10	Symmetric hard-limit	None	Perceptron Training Rule 70	15	15	1564	8.25%	0	0	1.04%	0	0
Leaves_2	10	Hard-limit	Hard-limit	Gradient Descent 70	15	15	1564	12.37%	0	0.01	1.04%	0	0
Leaves_2	10	Hard-limit	Linear	Gradient Descent 70	15	15	1564	12.37%	0	0	0.00%	0	0
	10	Hard-limit	Log-sigmoid	Gradient Descent 70	15	15	1564	5.15%	0	0	2.08%	0	0
Leaves_2	10	Hard-limit	Hyperbolic tangent sigmoid	Gradient Descent 70	15	15	1564	10.31%	0	0	1.04%	0	0
Leaves_2	10	Hard-limit	Symmetric hard-limit	Gradient Descent 70	15	15	1564	10.31%	0	0	0.00%	0	0
Leaves_2	10	Hard-limit	None	Gradient Descent 70	15	15	1564	14.43%	0	0	1.04%	0	0
Leaves_2	10	Linear	Hard-limit	Gradient Descent 70	15	15	1564	10.31%	0	0	1.04%	0	0
Leaves_2	10	Linear	Linear	Gradient Descent 70	15	15	1564	9.28%	0	0	4.17%	0	0
Leaves_2	10	Linear	Log-sigmoid	Gradient Descent 70	15	15	1564	8.25%	0	0	1.04%	0	0
Leaves_2	10	Linear	Hyperbolic tangent sigmoid	Gradient Descent 70	15	15	1564	9.28%	0	0	4.17%	0	0
Leaves_2	10	Linear	Symmetric hard-limit	Gradient Descent 70	15	15	1564	9.28%	0	0	0.00%	0	0
Leaves_2	10	Linear	None	Gradient Descent 70	15	15	1564	4.12%	0	0	2.08%	0	0
Leaves_2	10	Log-sigmoid	Hard-limit	Gradient Descent 70	15	15	1564	9.28%	0	0	2.08%	0	0
Leaves_2	10	Log-sigmoid	Linear	Gradient Descent 70	15	15	1564	12.37%	0	0	0.00%	0	0
Leaves_2	10	Log-sigmoid	Log-sigmoid	Gradient Descent 70	15	15	1564	10.31%	0	0	0.00%	0	0

Table C.8: Training - Characteristics of the image with Leaves\_2 - Part  $4\,$ 

		E				.,	É				ŀ		-	
[]	Hidden I	101	Transfer functions	The interest of the second sec	Katio	ニト	age %)	1	00	Species	+	·- H	$\vdash$	
roider	nidden L.	+	ZIIQ	Training algorithm	TLa	+	$\dashv$	+	Ω	+	Duranon	02 20	росп	Duration
Leaves_2	10	Log-sigmoid	Hyperbolic tangent sigmoid	Gradient Descent	20	15	15	1564	8.25%	0 0		1.04%		
Leaves_2	10	Log-sigmoid	Symmetric hard-limit	Gradient Descent	20	15	15	1564	5.15%	0 0	0	0.00%	0	0
Leaves_2	10	Log-sigmoid	None	Gradient Descent	20	15	15	1564	7.22%	0 0		1.04%	0	0
Leaves_2	10	Hyperbolic tangent sigmoid	Hard-limit	Gradient Descent	20	15	15	1564	6.19%	0 0		1.04%	0	0
Leaves_2	10	Hyperbolic tangent sigmoid	Linear	Gradient Descent	20	15	15	1564	13.40%	0		%00.0	0	0
Leaves_2	10	Hyperbolic tangent sigmoid	Log-sigmoid	Gradient Descent	20	15	15	1564	6.19%	0 0			0	0
Leaves_2	10	Hyperbolic tangent sigmoid	Hyperbolic tangent sigmoid	Gradient Descent	20	15	15	1564	6.19%	0		0.00%	0	0
Leaves_2	10	Hyperbolic tangent sigmoid	Symmetric hard-limit	Gradient Descent	20	15	15	1564	15.46%	0 0		0.00%	0	0
Leaves_2	10	Hyperbolic tangent sigmoid	None	Gradient Descent	20	15	15	1564	8.25%	0		0.00%	0	0
Leaves_2	10	Symmetric hard-limit	Hard-limit	Gradient Descent	20	15	15	1564	12.37%	0 0		1.04%	0	0
Leaves_2	10	Symmetric hard-limit	Linear	Gradient Descent	20	15	15	1564	5.15%	0 0		0.00%	0	0
Leaves_2	10	Symmetric hard-limit	Log-sigmoid	Gradient Descent	20	15	15	1564	6.19%	0 0		0.00%	0	0
Leaves_2	10	Symmetric hard-limit	Hyperbolic tangent sigmoid	Gradient Descent	20	15	15	1564	4.12%	0 0		1.04%	0	0
Leaves_2	10	Symmetric hard-limit	Symmetric hard-limit	Gradient Descent	20	15	15	1564	9.28%	0 0		0.00%	0	0
Leaves_2	10	Symmetric hard-limit	None	Gradient Descent	20	15	15	1564	8.25%	0 0		1.04%	0	0
Leaves_2	10	Hard-limit	Hard-limit	Stochastic Approximation to Gradient Descent		15	15	1564	9.28%	0 0		2.08%	0	0
Leaves_2	10	Hard-limit	Linear	Stochastic Approximation to Gradient Descent		15	15	1564	8.25%	0			0	0
Leaves_2	10	Hard-limit	Log-sigmoid	Stochastic Approximation to Gradient Descent	ıt 70	15	15	1564	5.15%	0 0		2.08%	0	0
Leaves_2	10	Hard-limit	Hyperbolic tangent sigmoid	Stochastic Approximation to Gradient Descent	ıt 20	15	15	1564	6.19%	0 0		0.00%	0	0
Leaves_2	10	Hard-limit	Symmetric hard-limit	Stochastic Approximation to Gradient Descent	t 70	15	15	1564	6.19%	0 0		1.04%	0	0
Leaves 2	10	Hard-limit	None	Stochastic Approximation to Gradient Descent	rt 70	15	15	1564	3.09%	0 0		1.04%	0	0
Leaves_2	10	Linear	Hard-limit	Stochastic Approximation to Gradient Descent	t 70	15	15	1564	11.34%	0 0		0.00%	0	0
Leaves_2	10	Linear	Linear	Stochastic Approximation to Gradient Descent	t 70	15	15	1564	8.25%	0 0		1.04%	0	0
Leaves_2	10	Linear	Log-sigmoid	Stochastic Approximation to Gradient Descent	ıt 20	15	15	1564	12.37%	0 0		2.08%	0	0
Leaves_2	10	Linear	Hyperbolic tangent sigmoid	Stochastic Approximation to Gradient Descent	1 70	15	15	1564	12.37%	0		1.04%	0	0
Leaves_2	10	Linear	Symmetric hard-limit	Stochastic Approximation to Gradient Descent	t 70	15	15	1564	10.31%	0 0		0.00%	0	0
Leaves_2	10	Linear	None	Stochastic Approximation to Gradient Descent	1t 20	15	15	1564	6.19%	0 0		1.04%	0	0
Leaves_2	10	Log-sigmoid	Hard-limit	Stochastic Approximation to Gradient Descent	t 70	15	15	1564	7.22%	0 0		0.00%	0	0
Leaves_2	10	Log-sigmoid	Linear	Stochastic Approximation to Gradient Descent	t 70	15	15	1564	7.22%	0 0		1.04%	0	0
Leaves_2	10	Log-sigmoid	Log-sigmoid	Stochastic Approximation to Gradient Descent	1 70	15	15	1564	11.34%	0		1.04%	0	0
Leaves_2	10	Log-sigmoid	Hyperbolic tangent sigmoid	Stochastic Approximation to Gradient Descent	ıt 70	15	15	1564	8.25%	0		1.04%	0	0
Leaves_2	10	Log-sigmoid	Symmetric hard-limit	Stochastic Approximation to Gradient Descent		15	15	1564	10.31%	0 0				0
Leaves_2	10	Log-sigmoid	None	Stochastic Approximation to Gradient Descent		15	15	1564	8.25%	0 0		0.00%		0
Leaves_2	10	Hyperbolic tangent sigmoid	Hard-limit	Stochastic Approximation to Gradient Descent		15	15	1564	3.09%			0.00%		0
Leaves_2	10	Hyperbolic tangent sigmoid	Linear	Stochastic Approximation to Gradient Descent	ıt 20	15	15	1564	12.37%	0 0		0.00%	0	0
Leaves_2	10	Hyperbolic tangent sigmoid	Log-sigmoid	Stochastic Approximation to Gradient Descent	ıt 20	15	15	1564	9.28%	0 0		0.00%	0	0
Leaves_2	10	Hyperbolic tangent sigmoid	Hyperbolic tangent sigmoid	Stochastic Approximation to Gradient Descent		15	15	1564	12.37%	0 0		1.04%	0	0
Leaves_2	10	Hyperbolic tangent sigmoid	Symmetric hard-limit	Stochastic Approximation to Gradient Descent	ıt 20	15	15	1564	11.34%	0 0		0.00%	0	0
Leaves_2	10	Hyperbolic tangent sigmoid	None	Stochastic Approximation to Gradient Descent	ıt 70	15	15	1564	7.22%	0 0		%00.0	0	0
Leaves_2	10	Symmetric hard-limit	Hard-limit	Stochastic Approximation to Gradient Descent	ıt 70	15	15	1564	14.43%	0 0		1.04%	0	0
Leaves_2	10	Symmetric hard-limit	Linear	Stochastic Approximation to Gradient Descent		15	15	1564	7.22%	0 0			0	0
Leaves_2	10	Symmetric hard-limit	Log-sigmoid	Stochastic Approximation to Gradient Descent		15	15	1564	8.25%	0 0		1.04%		0
Leaves_2	10	Symmetric hard-limit	Hyperbolic tangent sigmoid	Stochastic Approximation to Gradient Descent	ıt 20	15	15	1564	8.25%	0 0		1.04%	0	0
Leaves_2	10	Symmetric hard-limit	Symmetric hard-limit	Stochastic Approximation to Gradient Descent		15	15	1564	6.19%	0 0		1.04%	0	0
Leaves_2	10	Symmetric hard-limit	None	Stochastic Approximation to Gradient Descent	ıt 20	15	15	1564	6.19%	0	0	0.00%	0	0

Table C.9: Training - Characteristics of the image with Leaves\_3 - Part 1  $\,$ 

		Transfer	Transfer functions	Ratio (in	(in percentage	(%			Species			Species	
Folder	Hidden L.	1st	2nd	corithm Train	Validation	Test	Quant. images	% ssecons	Epoch	Duration	% ssəcons	Epoch	Duration
Leaves_3	2	Hard-limit	Hard-limit	80		10	20	20.00%	0	0	0.00%	0	0
Leaves_3	2	Hard-limit	Linear	Perceptron Training Rule 80 10		10	20	%00.0	0	0	0.00%	0	0
Leaves_3	2	Hard-limit	Log-sigmoid	Perceptron Training Rule 80 10		10	20	20.00%	0	0	0.00%	0	0
Leaves_3	2	Hard-limit	Hyperbolic tangent sigmoid	Perceptron Training Rule 80 10		10	20	%00.0	0	0	0.00%	0	0
Leaves_3	2	Hard-limit	Symmetric hard-limit	Perceptron Training Rule 80 10		10	20	20.00%	0	0	0.00%	0	0
Leaves_3	2	Hard-limit	None	Perceptron Training Rule 80 10		10	20	%00.0	0	0	0.00%	0	0
Leaves_3	2	Linear	Hard-limit	Perceptron Training Rule 80 10		10	20	%00.0	0	0	0.00%	0	0
Leaves_3	2	Linear	Linear	Perceptron Training Rule 80 10		10	20	20.00%	0	0	0.00%	0	0
Leaves_3	2	Linear	Log-sigmoid	Perceptron Training Rule 80 10		10	20	20.00%	0	0	0.00%	0	0
Leaves_3	2	Linear	Hyperbolic tangent sigmoid	Perceptron Training Rule 80 10		10	20	%00.0	0	0	0.00%	0	0
Leaves_3	2	Linear	Symmetric hard-limit	Perceptron Training Rule 80 10		10	20	%00.0	0	0	0.00%	0	0
Leaves_3	2	Linear	None	Perceptron Training Rule 80 10		10	20	%00.0	0	0	0.00%	0	0
Leaves_3	2	Log-sigmoid	Hard-limit	Perceptron Training Rule 80 10		10	20	20.00%	0	0	0.00%	0	0
Leaves_3	2	Log-sigmoid	Linear	Perceptron Training Rule 80 10		10	20	20.00%	0	0	0.00%	0	0
Leaves_3	2	Log-sigmoid	Log-sigmoid			10	20	0.00%	0	0	0.00%	0	0
Leaves_3	2	Log-sigmoid	Hyperbolic tangent sigmoid	Perceptron Training Rule 80 10		10	20	%00:0	0	0	0.00%	0	0
Leaves_3	2	Log-sigmoid	Symmetric hard-limit	Perceptron Training Rule 80 10		10	20	50.00%	0	0	0.00%	0	0
Leaves_3	2	Log-sigmoid	None	Perceptron Training Rule 80 10		10	20	50.00%	0	0	0.00%	0	0
Leaves_3	2	Hyperbolic tangent sigmoid	Hard-limit	Perceptron Training Rule 80 10		10	20	100.00%	0	0	0.00%	0	0
Leaves_3	2	Hyperbolic tangent sigmoid	Linear	Perceptron Training Rule 80 10		10	20	20.00%	0	0	0.00%	0	0
Leaves_3	2	Hyperbolic tangent sigmoid	Log-sigmoid	Perceptron Training Rule 80 10		10	20	%00.0	0	0	0.00%	0	0
Leaves_3	2	Hyperbolic tangent sigmoid	_			10	20	20.00%	0	0	0.00%	0	0
Leaves_3	2	Hyperbolic tangent sigmoid	-	Training Rule 80		10	20	0.00%	0	0	0.00%	0	0
Leaves_3	2	Hyperbolic tangent sigmoid	_	Training Rule 80		10	20	%00.0	0	0	0.00%	0	0
Leaves_3	2	Symmetric hard-limit	Hard-limit	Perceptron Training Rule 80 10		10	20	%00.0	0	0	0.00%	0	0
Leaves_3	2	Symmetric hard-limit	Linear	Perceptron Training Rule 80 10		10	20	20.00%	0	0	0.00%	0	0
Leaves_3	2	Symmetric hard-limit	Log-sigmoid	Perceptron Training Rule 80 10		10	20	20.00%	0	0	0.00%	0	0
Leaves_3	2	Symmetric hard-limit	Hyperbolic tangent sigmoid	Perceptron Training Rule 80 10	10	10	20	20.00%	0	0	0.00%	0	0
Leaves_3	2	Symmetric hard-limit	Symmetric hard-limit	Training Rule 80			20	%00.0	0	0	0.00%	0	0
Leaves_3	2	Symmetric hard-limit	None				20	%00.0	0	0	0.00%	0	0
Leaves_3	2	Hard-limit	Hard-limit	08		10	20	%00'0	0	0	%00:0	0	0
Leaves_3	2	Hard-limit	Linear			10	20	%00.0	0	0	0.00%	0	0
Leaves_3	2	Hard-limit	Log-sigmoid			10	20	%00'0	0	0	0.00%	0	0
Leaves_3	2	Hard-limit	Hyperbolic tangent sigmoid			10	20	20.00%	0	0	0.00%	0	0
Leaves_3	2	Hard-limit	Symmetric hard-limit	Gradient Descent 80   10		10	20	20.00%	0	0	0.00%	0	0
Leaves_3	2	Hard-limit	None			10	20	20.00%	0	0	0.00%	0	0
Leaves_3	2	Linear	Hard-limit			10	20	%00.0	0	0	0.00%	0	0
Leaves_3	2	Linear	Linear			10	20	%00.0	0	0	0.00%	0	0
Leaves_3	2	Linear	Log-sigmoid			10	20	%00.0	0	0	0.00%	0	0
Leaves_3	2	Linear	Hyperbolic tangent sigmoid			10	20	20.00%	0	0	0.00%	0	0
Leaves_3	2	Linear	Symmetric hard-limit			10	20	%00.0	0	0	0.00%	0	0
Leaves_3	2	Linear	None			10	20	50.00%	0	0	0.00%	0	0
Leaves_3	2	Log-sigmoid	Hard-limit			10	20	%00.0	0	0	0.00%	0	0
Leaves_3	2	Log-sigmoid	Linear	Gradient Descent 80 10		10	20	0.00%	0	0	0.00%	0	0
Leaves_3	2	Log-sigmoid	Log-sigmoid	Gradient Descent 80 10		10	20	%00.0	0	0	%00.0	0	0

Table C.10: Training - Characteristics of the image with Leaves\_3 - Part  $2\,$ 

		Transfer	Transfer functions		Ratio (in	(in percentage %	e %)			Species			Species	
Folder	Hidden L.	1st	2nd	Training algorithm	Train Va	Validation	بد	Quant. images	Success %	Epoch	Duration	Success %	Epoch	Duration
Leaves_3 2	2	Log-sigmoid	Hyperbolic tangent sigmoid	Gradient Descent	80 10		10 20	0	0.00%	0	0	0.00%	0	0
Leaves_3 2	2	Log-sigmoid	Symmetric hard-limit	Gradient Descent	80 10		10 20	0	20.00%	0	0	%00.0	0	0
Leaves_3 2	2	Log-sigmoid	None	Gradient Descent	80 10		10 20	0	20.00%	0	0	0.00%	0	0
Leaves_3 2	2	Hyperbolic tangent sigmoid	Hard-limit	Gradient Descent			10 20	0	0.00%	0	0	%00.0	0	0
Leaves_3 2	2	Hyperbolic tangent sigmoid	Linear	Gradient Descent	80 10		10 20	0	%00.0	0	0	%00.0	0	0
Leaves_3 2	2	Hyperbolic tangent sigmoid	Log-sigmoid	Gradient Descent			10 20	0	20.00%	0	0	0.00%	0	0
Leaves_3 2	2	Hyperbolic tangent sigmoid	Hyperbolic tangent sigmoid	Gradient Descent				0	0.00%	0	0	%00.0	0	0
Leaves_3 2	2	Hyperbolic tangent sigmoid	Symmetric hard-limit	Gradient Descent	80 10		10 20	0	20.00%	0	0	%00.0	0	0
Leaves_3 2	2	Hyperbolic tangent sigmoid	None	Gradient Descent	80 10		10 20	0	100.00%	0	0	0.00%	0	0
Leaves_3 2	2	Symmetric hard-limit	Hard-limit	Gradient Descent	80 10		10 20	0	0.00%	0	0	%00.0	0	0
Leaves_3 2	2	Symmetric hard-limit	Linear	Gradient Descent				0	0.00%	0	0	%00.0	0	0
Leaves_3 2	2	Symmetric hard-limit	Log-sigmoid	Gradient Descent	80 10		10 20	0	20.00%	0	0	0.00%	0	0
Leaves_3 2	2	Symmetric hard-limit	Hyperbolic tangent sigmoid	Gradient Descent	80 10		10 20	0	0.00%	0	0	%00.0	0	0
Leaves_3 2	2	Symmetric hard-limit	Symmetric hard-limit	Gradient Descent	80 10		10 20	0	20.00%	0	0	%00.0	0	0
Leaves_3 2	2	Symmetric hard-limit	None	Gradient Descent	<u>&amp;</u>			0	0.00%	0	0	%00.0	0	0
Leaves_3 2	2	Hard-limit	Hard-limit	Stochastic Approximation to Gradient Descent	80		10 20	0	20.00%	0	0	%00.0	0	0
Leaves_3 2	2	Hard-limit	Linear	Stochastic Approximation to Gradient Descent	t 80 10		10 20	0	0.00%	0	0	%00.0	0	0
Leaves_3 2	2	Hard-limit	Log-sigmoid	Stochastic Approximation to Gradient Descent	<u>&amp;</u>		10 20	0	%00.0	0	0	%00.0	0	0
Leaves_3 2	2	Hard-limit	Hyperbolic tangent sigmoid	Stochastic Approximation to Gradient Descent	t 80 10		10 20	0	20.00%	0	0	0.00%	0	0
Leaves_3 2	2	Hard-limit	Symmetric hard-limit	Stochastic Approximation to Gradient Descent	t 80 10		10 20	0	0.00%	0	0	%00.0	0	0
Leaves_3 2	2	Hard-limit	None	Stochastic Approximation to Gradient Descent	t 80 10		10 20	0	%00.0	0	0	%00.0	0	0
Leaves_3 2	2	Linear	Hard-limit	Stochastic Approximation to Gradient Descent	<u>&amp;</u>		10 20	0	100.00%	0	0	%00.0	0	0
Leaves_3 2	2	Linear	Linear	Stochastic Approximation to Gradient Descent	t 80 10		10 20	0	0.00%	0	0	%00.0	0	0
Leaves_3 2	2	Linear	Log-sigmoid	Stochastic Approximation to Gradient Descent	90		10 20	0	0.00%	0	0	0.00%	0	0
Leaves_3 2	2	Linear	Hyperbolic tangent sigmoid	Stochastic Approximation to Gradient Descent	92			0	20.00%	0	0	%00.0	0	0
Leaves_3 2	2	Linear	Symmetric hard-limit	Stochastic Approximation to Gradient Descent	98		10 20	0	20.00%	0	0	%00.0	0	0
Leaves_3 2	2	Linear	None	Stochastic Approximation to Gradient Descent	98			0	0.00%	0	0	0.00%	0	0
Leaves_3 2	2	Log-sigmoid	Hard-limit	Stochastic Approximation to Gradient Descent	98		10 20	0	20.00%	0	0	%00.0	0	0
Leaves_3 2	2	Log-sigmoid	Linear	Stochastic Approximation to Gradient Descent	98		10 20	0	%00.0	0	0	%00.0	0	0
Leaves_3 2	2	Log-sigmoid	Log-sigmoid	Stochastic Approximation to Gradient Descent   8	t 80 10		10 20	0	20.00%	0	0	0.00%	0	0
Leaves_3 2	2	Log-sigmoid	Hyperbolic tangent sigmoid	Stochastic Approximation to Gradient Descent	t 80 10		10 20	0	%00.0	0	0	%00.0	0	0
Leaves_3 2	2	Log-sigmoid	Symmetric hard-limit	Stochastic Approximation to Gradient Descent   8	30	(		0	%00.0	0	0	0.00%	0	0
	2	Log-sigmoid		Stochastic Approximation to Gradient Descent	30	_	10 20	0	0.00%	0	0	0.00%	0	0
Leaves_3 2	2	Hyperbolic tangent sigmoid	Hard-limit	Stochastic Approximation to Gradient Descent	30			0	%00:0	0	0	%00.0	0	0
Leaves_3 2	2	Hyperbolic tangent sigmoid	Linear	Stochastic Approximation to Gradient Descent	30			0	20.00%	0	0	0.00%	0	0
Leaves_3 2	2	Hyperbolic tangent sigmoid	Log-sigmoid	Stochastic Approximation to Gradient Descent	30			0	20.00%	0	0	0.00%	0	0
Leaves_3 2	2	Hyperbolic tangent sigmoid	Hyperbolic tangent sigmoid	Stochastic Approximation to Gradient Descent	t 80 10		10 20	0	20.00%	0	0	%00.0	0	0
Leaves_3 2	2	Hyperbolic tangent sigmoid	Symmetric hard-limit	Stochastic Approximation to Gradient Descent	8		10 20	0	0.00%	0	0	%00.0	0	0
Leaves_3 2	2	Hyperbolic tangent sigmoid	None	Stochastic Approximation to Gradient Descent	t 80 10		10 20	0	%00.0	0	0	%00.0	0	0
Leaves_3 2	2	Symmetric hard-limit	Hard-limit	Stochastic Approximation to Gradient Descent	8		10 20	0	20.00%	0	0	%00.0	0	0
Leaves_3 2	2	Symmetric hard-limit	Linear	Stochastic Approximation to Gradient Descent	t 80 10		10 20	0	0.00%	0	0	%00.0	0	0
Leaves_3 2	2	Symmetric hard-limit	Log-sigmoid	Stochastic Approximation to Gradient Descent	08		10 20	0	20.00%	0	0	%00.0	0	0
Leaves_3 2	2	Symmetric hard-limit	Hyperbolic tangent sigmoid	Stochastic Approximation to Gradient Descent	t 80 10		10 20	0	100.00%	0	0	%00.0	0	0
$\vdash$	2	Symmetric hard-limit	Symmetric hard-limit	Stochastic Approximation to Gradient Descent	80			0	20.00%	0	0	0.00%	0	0
Leaves_3 2	2	Symmetric hard-limit	None	Stochastic Approximation to Gradient Descent	t 80 10		10 20	0	20.00%	0	0	%00.0	0	0

Table C.11: Training - Characteristics of the image with Leaves\_3 - Part 3  $\,$ 

	_	Transfer	Transfer functions		Katio	(in percentage %)	_  S   S			Species	<b>S</b> 8		Species	
Folder	Hidden L.	1st	2nd	Training algorithm	Train		Test	Quant. images	Success	%   Epoch	h Duration	η Success %	Epoch	Duration
Leaves_3	10	Hard-limit	Hard-limit	Perceptron Training Rule	20	15	15	20	0.00%	0	0	0.00%	0	0
Leaves_3	10	Hard-limit	Linear	Perceptron Training Rule	20	15	15	20	0.00%	0	0	0.00%	0	0
Leaves_3	10	Hard-limit	Log-sigmoid	Perceptron Training Rule		15	15	20	0.00%	0	0	0.00%	0	0
Leaves_3	10	Hard-limit	Hyperbolic tangent sigmoid	Perceptron Training Rule	20	15	15	20	0.00%	0	0	0.00%	0	0
Leaves_3	10	Hard-limit	Symmetric hard-limit	Perceptron Training Rule	20	15	15	20	0.00%	0	0	0.00%	0	0
Leaves_3	10	Hard-limit	None	Perceptron Training Rule	20	15	15	20	20.00%	0	0	0.00%	0	0
Leaves_3	10	Linear	Hard-limit	Perceptron Training Rule	20	15	15	20	50.00%	0	0	0.00%	0	0
Leaves_3	10	Linear	Linear	Perceptron Training Rule	20	15	15	20	20.00%	0	0	0.00%	0	0
Leaves_3	10	Linear	Log-sigmoid	Perceptron Training Rule	20	15	15	20	20.00%	0	0	0.00%	0	0
Leaves_3	10	Linear	Hyperbolic tangent sigmoid		20	15	15	20	0.00%	0	0	0.00%	0	0
Leaves_3	10	Linear	Symmetric hard-limit	Perceptron Training Rule	20	15	15	20	20.00%	0	0	0.00%	0	0
Leaves_3	10	Linear	None	Perceptron Training Rule	20	15	15	20	50.00%	0	0	0.00%	0	0
Leaves_3	10	Log-sigmoid	Hard-limit	Perceptron Training Rule	20	15	15	20	0.00%	0	0	0.00%	0	0
Leaves_3	10	Log-sigmoid	Linear	Perceptron Training Rule	20	15	15	20	20.00%	0	0	0.00%	0	0
Leaves_3	10	Log-sigmoid	Log-sigmoid	Perceptron Training Rule	20	15	15	20	0.00%	0	0	0.00%	0	0
Leaves_3	10	Log-sigmoid	Hyperbolic tangent sigmoid	Perceptron Training Rule	20	15	15	20	20.00%	0	0	%00.0	0	0
Leaves_3	10	Log-sigmoid	Symmetric hard-limit	Perceptron Training Rule	20	15	15	20	0.00%	0	0	0.00%	0	0
Leaves_3	10	Log-sigmoid	None	Perceptron Training Rule	20	15	15	20	50.00%	0	0	%00.0	0	0
Leaves_3	10	Hyperbolic tangent sigmoid	Hard-limit	Perceptron Training Rule	20	15	15	20	0.00%	0	0	0.00%	0	0
Leaves_3	10	Hyperbolic tangent sigmoid	Linear	Perceptron Training Rule	20	15	15	20	20.00%	0	0	0.00%	0	0
Leaves_3	10	Hyperbolic tangent sigmoid	Log-sigmoid	Perceptron Training Rule	20	15	15	20	20.00%	0	0	0.00%	0	0
Leaves_3	10	Hyperbolic tangent sigmoid	Hyperbolic tangent sigmoid		20	15	15	20	0.00%	0	0	0.00%	0	0
Leaves_3	10	Hyperbolic tangent sigmoid	Symmetric hard-limit	Perceptron Training Rule	70	15	15	20	0.00%	0	0	0.00%	0	0
Leaves_3	10	Hyperbolic tangent sigmoid	None		20	15	15	20	20.00%	0	0	0.00%	0	0
Leaves_3	10	Symmetric hard-limit	Hard-limit	Perceptron Training Rule	20	15	15	20	0.00%	0	0	0.00%	0	0
Leaves_3	10	Symmetric hard-limit	Linear	Perceptron Training Rule	20	15	15	20	0.00%	0	0	0.00%	0	0
Leaves_3	10	Symmetric hard-limit	Log-sigmoid	Perceptron Training Rule	20	15	15	20	20.00%	0	0	%00.0	0	0
Leaves_3	10	Symmetric hard-limit	Hyperbolic tangent sigmoid	Perceptron Training Rule	20	15	15	20	0.00%	0	0	0.00%	0	0
Leaves_3	10	Symmetric hard-limit	Symmetric hard-limit	Perceptron Training Rule	20	15	15	20	0.00%	0	0	0.00%	0	0
Leaves_3	10	Symmetric hard-limit	None	Perceptron Training Rule	20	15	15	20	20.00%	0	0	0.00%	0	0
Leaves_3	10	Hard-limit	Hard-limit	Gradient Descent	02	15	15	20	20.00%	0	0	%00.0	0	0
Leaves_3	10	Hard-limit	Linear	Gradient Descent	20	15	15	20	100.00%	0	0	0.00%	0	0
Leaves_3	10	Hard-limit	Log-sigmoid	Gradient Descent	20	15	15	20	0.00%	0	0	0.00%	0	0
Leaves_3	10	Hard-limit	Hyperbolic tangent sigmoid	Gradient Descent	20	15	15	20	20.00%	0	0	0.00%	0	0
Leaves_3	10	Hard-limit	Symmetric hard-limit	Gradient Descent	20	15	15	20	0.00%	0	0	0.00%	0	0
Leaves_3	10	Hard-limit	None	Gradient Descent	20	15	15	20	20.00%	0	0	0.00%	0	0
Leaves_3	10	Linear	Hard-limit	Gradient Descent	20	15	15	20	0.00%	0	0	0.00%	0	0
Leaves_3	10	Linear	Linear	Gradient Descent	20	15	15	20	%00.0	0	0	0.00%	0	0
Leaves_3	10	Linear	Log-sigmoid	Gradient Descent	70	15	15	20	0.00%	0	0	0.00%	0	0
Leaves_3	10	Linear	Hyperbolic tangent sigmoid	Gradient Descent	20	15	15	20	0.00%	0	0	0.00%	0	0
Leaves_3	10	Linear	Symmetric hard-limit	Gradient Descent	20	15	15	20	100.00%	0	0	0.00%	0	0
Leaves_3	10	Linear	None	Gradient Descent	20	15	15	20	20.00%	0	0	0.00%	0	0
Leaves_3	10	Log-sigmoid	Hard-limit	Gradient Descent	20	15	15	20	20.00%	0	0	0.00%	0	0
Leaves_3	10	Log-sigmoid	Linear	Gradient Descent	20	15	15	20	0.00%	0	0	0.00%	0	0
Leaves 3	10			J	1	,			///					

Table C.12: Training - Characteristics of the image with Leaves\_3 - Part  $4\,$ 

Polity (1987)         Hybrid (1987)         Polity (			E			-		(4)							
10         Indee@gounded         Experience of Long-Signoud         Gradient Descent         70         15         15         10         20         6000000         0           10         Hope-Schoole taggerst signoudd         Symunetric bander agroadd         Candient Descent         70         15         15         20         6000000         0           10         Hyper-Choic taggerst signoudd         Long-Signoudd         Candient Descent         70         15         15         20         6000000         0           10         Hyper-Choic taggerst signoudd         Long-Signoud         Candient Descent         70         15         15         20         6000000         0           10         Hyper-Choic taggerst signoudd         Long-Bescut         70         15         15         20         6000000         0           10         Hyper-Choic taggerst signoudd         Candient Descent         70         15         15         20         6000000         0         0           10         Hyper-Choic taggerst signoudd         Candient Descent         70         15         15         20         6000000         0         0         0         0         0         0         0         0         0         0	Folder	Hidden I.	1st	runctions   2nd	Training algorithm	Trail	_	rage %	Onant		$\vdash$	Duration	Success %	Species	Duration
10         Liegesfignoed         Symmetre band-limit         Gradent Doesent         70         15         20         20,000%         0           10         Liegesfignoed         Anne Alley District         Gradent Doesent         70         15         20         50,000%         0           10         Hyperbole means algoried         Increase         Gradent Doesent         70         15         22         50,000%         0           10         Hyperbole means algoried         Increase         Gradent Doesent         70         15         22         50,000%         0           10         Hyperbole means algoried         Hyperbolic stagents         Gradent Doesent         70         15         22         50,000%         0           10         Hyperbolic means algoried         Gradent Doesent         70         15         22         50,000%         0           10         Symmetric back-hunt         Lorest         Gradent Doesent         70         15         22         50,000%         0           10         Symmetric back-hunt         Lorest         Gradent Doesent         70         15         22         50,000%         0           10         Symmetric back-hunt         Lorest         Doesent	Leaves_3	+	+	Hyperbolic tangent sigmoid	Gradient Descent	02	+	+	20		+	+		0	0
10         Hyperbolic numbers of graduard Doscott         70         15         35         20         60.00%         0           10         Hyperbolic numbers of graduard brown         Graduard Doscott         70         15         15         20         60.00%         0           10         Hyperbolic numbers of gradual brown         70         15         15         20         60.00%         0           10         Hyperbolic numbers of gradual grand brown         Graduard Doscott         70         15         15         20         60.00%         0           10         Hyperbolic numbers of gradual grand brown         Graduard Doscott         70         15         20         60.00%         0           10         Symmetric back hunt         Graduard Doscott         70         15         20         60.00%         0           10         Symmetric back hunt         Graduard Doscott         70         15         20         60.00%         0           10         Symmetric back hunt         Graduard Doscott         70         15         20         60.00%         0           10         Symmetric back hunt         Graduard Doscott         70         15         20         60.00%         0 <t< th=""><th>Leaves_3</th><td>+</td><td>Log-sigmoid</td><td>Symmetric hard-limit</td><td>Gradient Descent</td><td>202</td><td>15</td><td>15</td><td>20</td><td>20.00%</td><td>0</td><td></td><td>0.00%</td><td>0</td><td>0</td></t<>	Leaves_3	+	Log-sigmoid	Symmetric hard-limit	Gradient Descent	202	15	15	20	20.00%	0		0.00%	0	0
(b)         Hyperbolic magnetia standal filterial         Gendrach Descent         (b)         (b	Leaves_3	+	Log-sigmoid	None	Gradient Descent	20	15	15	20	20.00%	0		0.00%	0	0
10         Hyperbolic tangent signoid         Locale and Descent         70         15         15         20         0.00%         0           10         Hyperbolic tangent signoid         Locale and Descent         70         15         15         20         0.00%         0           10         Hyperbolic tangent signoid         Symmetric band-limit         Condent Descent         70         15         15         20         0.00%         0           10         Symmetric band-limit         Linear         Condent Descent         70         15         15         20         0.00%         0           10         Symmetric band-limit         Linear         Condent Descent         70         15         15         20         0.00%         0           10         Symmetric band-limit         Linear         Condent Descent         70         15         15         20         0.00%         0           10         Symmetric band-limit         Linear         Condent Descent         70         15         15         20         0.00%         0           10         Symmetric band-limit         Linear         Condent Descent         70         15         15         20         0.00%         0 <t< th=""><th>Leaves_3</th><td>_</td><td>Hyperbolic tangent sigmoid</td><td>Hard-limit</td><td>Gradient Descent</td><td>20</td><td>15</td><td>15</td><td>20</td><td>20.00%</td><td>0</td><td></td><td>0.00%</td><td>0</td><td>0</td></t<>	Leaves_3	_	Hyperbolic tangent sigmoid	Hard-limit	Gradient Descent	20	15	15	20	20.00%	0		0.00%	0	0
10         Hyperbolk tangent signand Hyperbolk tangent signand Grachent Descent         70         15         15         20         10.00%         0           10         Hyperbolk tangent signand Hyperbolk tangent signand Grachent Descent         70         15         15         20         0.00%         0           10         Hyperbolk tangent signand Hyperbolk tangent signand Hyperbolk tangent signand Hyperbolk tangent signand Grachent Descent         70         15         15         20         0.00%         0           10         Symmetric bard-limit         Innext         Grachent Descent         70         15         15         20         0.00%         0           10         Symmetric bard-limit         Hyperbolk tangent signand Grachent Descent         70         15         15         20         0.00%         0           10         Symmetric bard-limit         Hyperbolk tangent signand Grachent Descent         70         15         15         20         0.00%         0           10         Symmetric bard-limit         Grachent Descent         70         15         15         20         0.00%         0           10         Hard-limit         Hyperbolk tangent signand Grachent Descent         70         15         15         20         0.00%         0	Leaves_3	-	Hyperbolic tangent sigmoid	Linear	Gradient Descent	20	15	15	20	20.00%	0		%00:0	0	0
10         Hyperbolic tangent signoid of Conferint Descent         70         15         15         20         0.00%         0           10         Hyperbolic tangent signoid of Symmetric land-limit         Gradient Descent         70         15         15         20         10.00%         0           10         Symmetric hard-limit         Inflament         Gradient Descent         70         15         15         20         10.00%         0           10         Symmetric hard-limit         Inflament         Gradient Descent         70         15         15         20         10.00%         0           10         Symmetric hard-limit         Inprecipalic tangent signoid         Gradient Descent         70         15         15         20         10.00%         0           10         Symmetric hard-limit         Symmetric hard-limit         Symmetric hard-limit         Gradient Descent         70         15         15         20         10.00%         0           10         Symmetric hard-limit	Leaves_3	_	Hyperbolic tangent sigmoid	Log-sigmoid	Gradient Descent	20	15	15	20	%00.0	0		%00.0	0	0
10         Hyperbolk tangent signoid         Summetric hard-limit         Gradiant Descrit         70         15         20         10         0.00%         0           10         Symmetric hard-limit         Linchell Descrit         70         15         20         0.00%         0           10         Symmetric hard-limit         Linchell Descrit         70         15         20         0.00%         0           10         Symmetric hard-limit         Appealone tangent signed         Gendlint Descrit         70         15         20         0.00%         0           10         Symmetric hard-limit         Appealone tangent signed         Gendlint Descrit         70         15         15         20         0.00%         0           10         Symmetric hard-limit         Symmetric bard-limit         Symmetric hard-limit         Symmetric	Leaves_3	$\vdash$	Hyperbolic tangent sigmoid	Hyperbolic tangent sigmoid	Gradient Descent	20	15	15	20	0.00%	0		%00.0	0	0
10         Symmetric bard-limit         Hard-limit         Gradient Descent         70         15         15         20         0.00%         0           10         Symmetric bard-limit         Hard-limit         Hard-limit         Gradient Descent         70         15         15         20         60.00%         0           10         Symmetric bard-limit         Log-signoid         Gradient Descent         70         15         15         20         60.00%         0           10         Symmetric bard-limit         Log-signoid         Gradient Descent         70         15         15         20         60.00%         0           10         Symmetric bard-limit         March-limit         March-limit         Symmetric bard-limit         Symmetric bard-limit         30         15         15         20         60.00%         0           10         Hard-limit         Symmetric bard-limit	Leaves_3		Hyperbolic tangent sigmoid	Symmetric hard-limit	Gradient Descent	20	15	15	20	100.00%			%00.0	0	0
10         Symmetric bard-limit         Hand-limit         Gradient Descut         70         15         15         20         50.00%         0           10         Symmetric bard-limit         Linear         Gradient Descut         70         15         15         20         60.00%         0           10         Symmetric bard-limit         Hape-big         Linear         15         15         15         20         60.00%         0           10         Symmetric bard-limit         Hyper-big         Hyper-big         15         15         15         20         60.00%         0           10         Symmetric bard-limit         Hyper-big         Hyper-big         15         15         15         20         60.00%         0           10         Hard-limit         Hard-limit         Hard-limit         Hard-limit         Symmetric bard-limit         50.00%         0         10.00%         0           10         Hard-limit         Hard-limit         Hard-limit         Hard-limit         10         15         15         20         60.00%         0           10         Libear         Symmetric bard-limit         Symmetric bard-limit         Symmetric bard-limit         Symmetric bard-limit         Sy	Leaves_3	$\vdash$	Hyperbolic tangent sigmoid	None	Gradient Descent	20	15	15	20	0.00%			0.00%	0	0
10         Symmetric hard-limit         Linear         Gradient Descent         70         15         15         20         0.00%         0           10         Symmetric hard-limit         Expeginded         Gradient Descent         70         15         15         20         0.00%         0           10         Symmetric hard-limit         Symmetric bard-limit         Symmetric bard-limit         15         15         20         0.00%         0           10         Symmetric bard-limit         Bard-limit         Bard-limit         Bard-limit         15         15         20         0.00%         0           10         Hard-limit         Linear         Stochastic Approximation to Gradient Descent         70         15         15         20         0.00%         0           10         Hard-limit         Linear         Stochastic Approximation to Gradient Descent         70         15         15         20         0.00%         0           10         Hard-limit         Stochastic Approximation to Gradient Descent         70         15         20         0.00%         0           10         Hard-limit         Stochastic Approximation to Gradient Descent         70         15         15         20         0.00%	Leaves_3	$\vdash$	Symmetric hard-limit	Hard-limit	Gradient Descent	20	15	15	20	20.00%			%00.0	0	0
10         Symmetric hard-limit         Localizationed         Gradient Descuration         7         15         15         20         0.00%         0           10         Symmetric hard-limit         Symmetric bard-limit         Symmetric bard-limit         Symmetric bard-limit         15         15         20         0.00%         0           10         Symmetric bard-limit         Mard-limit         Hard-limit         Line 1         15         15         20         0.00%         0           10         Hard-limit         Line 1         Stochastic Approximation to Gradient Descuration 1         15         15         20         0.00%         0           10         Hard-limit         Stochastic Approximation to Gradient Descuration 1         15         15         20         0.00%         0           10         Hard-limit         Stochastic Approximation to Gradient Descuration 1         15         15         20         0.00%         0           10         Hard-limit         Stochastic Approximation to Gradient Descuration 1         15         20         0.00%         0           10         Linear         Linear         Linear         Stochastic Approximation to Gradient Descuration 1         15         20         0.00%         0	Leaves_3	_	Symmetric hard-limit	Linear	Gradient Descent	20	15	15	20	20.00%			%00.0	0	0
10         Symmetric hard-limit         Hyperbolic tangent signoid         Gradient Descent         70         15         15         20         0.00%         0           10         Symmetric hard-limit         Symmetric hard-limit         Symmetric hard-limit         Symmetric hard-limit         Stochastic Approximation to Gradient Descent         70         15         15         20         0.00%         0           10         Hard-limit         Linear         Stochastic Approximation to Gradient Descent         70         15         15         20         0.00%         0           10         Hard-limit         Linear         Hyperbolic tangent signoid         Stochastic Approximation to Gradient Descent         70         15         20         0.00%         0           10         Hard-limit         Robelastic Approximation to Gradient Descent         70         15         20         0.00%         0           10         Linear         Log-signoid         Stochastic Approximation to Gradient Descent         70         15         20         0.00%         0           10         Linear         Log-signoid         Stochastic Approximation to Gradient Descent         70         15         20         0.00%         0           10         Linear         Log-signoi	Leaves_3	-	Symmetric hard-limit	Log-sigmoid	Gradient Descent	20	15	15	20	0.00%			0.00%	0	0
10         Symmetric bard-limit         Symmetric bard-limit         Gradient Descent         70         15         15         20         0.00%         0           10         Symmetric bard-limit         Nonmetric bard-limit         Nonmetric bard-limit         Rochastic Approximation to Gradient Descent         70         15         20         50.00%         0           10         Hard-limit         Linear         Linear         Linear         15         20         10.00%         0           10         Hard-limit         Linear         Linear         Linear         15         20         10.00%         0           10         Hard-limit         Linear         Linear         Linear         Linear         15         20         10.00%         0           10         Hard-limit         Log-signoid         Stochastic Approximation to Gradient Descent         70         15         20         50.00%         0           10         Linear         Linear         Stochastic Approximation to Gradient Descent         70         15         20         50.00%         0           10         Linear         Log-signoid         Stochastic Approximation to Gradient Descent         70         15         20         50.00%         0 </th <th>Leaves_3</th> <th>-</th> <th>Symmetric hard-limit</th> <th>Hyperbolic tangent sigmoid</th> <th>Gradient Descent</th> <th>20</th> <th>15</th> <th>15</th> <th>20</th> <th>0.00%</th> <th>0</th> <th></th> <th>%00.0</th> <th>0</th> <th>0</th>	Leaves_3	-	Symmetric hard-limit	Hyperbolic tangent sigmoid	Gradient Descent	20	15	15	20	0.00%	0		%00.0	0	0
10         Symmetric hard-limit         Atomet         Gradient Descript         70         15         15         10         50.00%         0           10         Hard-limit         Innex         Stochastic Approximation to Gradient Descript         70         15         15         20         50.00%         0           10         Hard-limit         Linear         Stochastic Approximation to Gradient Descript         70         15         15         20         50.00%         0           10         Hard-limit         Stochastic Approximation to Gradient Descript         70         15         15         20         50.00%         0           10         Linear         Hard-limit         Stochastic Approximation to Gradient Descript         70         15         20         50.00%         0           10         Linear         Innear         Rochastic Approximation to Gradient Descript         70         15         20         50.00%         0           10         Linear         Innear         Stochastic Approximation to Gradient Descript         70         15         20         50.00%         0           10         Linear         Innear         Stochastic Approximation to Gradient Descript         70         15         20         50.0	Leaves_3		Symmetric hard-limit	Symmetric hard-limit	Gradient Descent	20	15	15	20	0.00%	0		%00.0	0	0
10.         Hard-limit         Brochastic Approximation to Gradient Descent         70         15         15         20         50.00%         0           10.         Hard-limit         Interd         Interd         Interd         15         15         15         15         20         50.00%         0           10.         Hard-limit         Linear         15         15         15         15         20         100.00%         0           10.         Hard-limit         None         Symmetric bard-limit         Stochastic Approximation to Gradient Descent         70         15         15         20         0.00%         0           10.         Hard-limit         None         Symmetric bard-limit         Stochastic Approximation to Gradient Descent         70         15         15         20         0.00%         0           10.         Linear         Discussion Approximation to Gradient Descent         70         15         15         20         0.00%         0           10.         Linear         Payer-bolic tangent sigmoid         Stochastic Approximation to Gradient Descent         70         15         20         0.00%         0           10.         Linear         Symmetric bard-limit         Stochastic Approximati	Leaves_3	-	Symmetric hard-limit	None	Gradient Descent	20	15	15	20	20.00%	0		%00.0	0	0
10         Hard-limit         Linear         Stochastic Approximation to Gradient Descent         70         15         15         20         0.00%         0           10         Hard-limit         Log-sigmoid         Stochastic Approximation to Gradient Descent         70         15         15         20         0.00%         0           10         Hard-limit         Symmetric land-limit         Stochastic Approximation to Gradient Descent         70         15         20         0.00%         0           10         Linear         Hard-limit         Stochastic Approximation to Gradient Descent         70         15         20         0.00%         0           10         Linear         Hard-limit         Stochastic Approximation to Gradient Descent         70         15         20         0.00%         0           10         Linear         Hard-limit         Stochastic Approximation to Gradient Descent         70         15         20         0.00%         0           10         Linear         Symmetric land-limit         Stochastic Approximation to Gradient Descent         70         15         20         0.00%         0           10         Linear         Symmetric land-limit         Stochastic Approximation to Gradient Descent         70         15 <th>Leaves_3</th> <th>_</th> <th>Hard-limit</th> <th>  Hard-limit</th> <th>Stochastic Approximation to Gradient Descent</th> <th></th> <th>15</th> <th>15</th> <th>20</th> <th>20.00%</th> <th></th> <th></th> <th>%00.0</th> <th>0</th> <th>0</th>	Leaves_3	_	Hard-limit	Hard-limit	Stochastic Approximation to Gradient Descent		15	15	20	20.00%			%00.0	0	0
10         Hard-limit         Log-signoid         Stochastic Approximation to Gradent Descent         70         15         20         100.00%         0           10         Hard-limit         Hyper-bolie tangent signoid         Stochastic Approximation to Gradent Descent         70         15         15         20         50.00%         0           10         Hard-limit         Nome and the contract of t	Leaves_3	-	Hard-limit	Linear	Stochastic Approximation to Gradient Descent	$\vdash$	15	15	20	0.00%			%00.0	0	0
100         Hard-limit         Hyperbolic tangent sigmoid         Stochastic Approximation to Gradient Descent         70         15         20         50.00%         0           10         Hard-limit         Symmetric bard-limit         Stochastic Approximation to Gradient Descent         70         15         15         20         0.00%         0           10         Limear         Hard-limit         Stochastic Approximation to Gradient Descent         70         15         15         20         0.00%         0           10         Limear         Linear         Linear         Byperbolic caugent sigmoid         Stochastic Approximation to Gradient Descent         70         15         20         0.00%         0           10         Limear         Byperbolic caugent sigmoid         Stochastic Approximation to Gradient Descent         70         15         15         20         0.00%         0           10         Limear         Symmetric bard-limit         Stochastic Approximation to Gradient Descent         70         15         15         20         0.00%         0           10         Limear         Nome         Symmetric bard-limit         Stochastic Approximation to Gradient Descent         70         15         15         20         0.00%         0	Leaves_3	-	Hard-limit	Log-sigmoid	Stochastic Approximation to Gradient Descent	H	15	15	20	100.00%			%00.0	0	0
10         Hard-limit         Symmetric bard-limit         Stochastic Approximation to Gradient Descent 70         15         20         0.00%         0           10         Linear         Hard-limit         Sochastic Approximation to Gradient Descent 70         15         20         0.00%         0           10         Linear         Linear         Linear         Sochastic Approximation to Gradient Descent 70         15         15         20         0.00%         0           10         Linear         Linear         Hayerbolic tangent sigmoid         Stochastic Approximation to Gradient Descent 70         15         20         0.00%         0           10         Linear         None         Symmetric hard-limit         Stochastic Approximation to Gradient Descent 70         15         20         0.00%         0           10         Linear         None         Symmetric hard-limit         Stochastic Approximation to Gradient Descent 70         15         15         20         0.00%         0           10         Log-sigmoid         Hard-limit         Stochastic Approximation to Gradient Descent 70         15         15         20         0.00%         0           10         Log-sigmoid         Hard-limit         Stochastic Approximation to Gradient Descent 70         15	Leaves_3	_	Hard-limit	Hyperbolic tangent sigmoid	Stochastic Approximation to Gradient Descent	H	15	15	20	20.00%			0.00%	0	0
100         Hard-limit         None         Stochastic Approximation to Gradient Descent         70         15         20         50.00%         0           10         Linear         Linear         Linear         Linear         Linear         Stochastic Approximation to Gradient Descent         70         15         20         50.00%         0           10         Linear         Linear         Linear         Stochastic Approximation to Gradient Descent         70         15         20         50.00%         0           10         Linear         Symmetric bard-limit         Stochastic Approximation to Gradient Descent         70         15         20         0.00%         0           10         Linear         Symmetric bard-limit         Stochastic Approximation to Gradient Descent         70         15         20         0.00%         0           10         Linear         None         Stochastic Approximation to Gradient Descent         70         15         20         0.00%         0           10         Log-sigmoid         Linear         Stochastic Approximation to Gradient Descent         70         15         20         0.00%         0           10         Log-sigmoid         Linear         Stochastic Approximation to Gradient Descent <t< th=""><th>Leaves_3</th><td>-</td><td>Hard-limit</td><td>Symmetric hard-limit</td><td>Stochastic Approximation to Gradient Descent</td><td><math>\vdash</math></td><td>15</td><td>15</td><td>20</td><td>0.00%</td><td>0</td><td></td><td>0.00%</td><td>0</td><td>0</td></t<>	Leaves_3	-	Hard-limit	Symmetric hard-limit	Stochastic Approximation to Gradient Descent	$\vdash$	15	15	20	0.00%	0		0.00%	0	0
110         Linear         Hard-limit         Stochastic Approximation to Gradient Descent         70         15         20         0.00%         0           10         Linear         Linear         Linear         Stochastic Approximation to Gradient Descent         70         15         15         20         0.00%         0           10         Linear         Hyperbolic tangent sigmoid         Stochastic Approximation to Gradient Descent         70         15         20         0.00%         0           10         Linear         Ryammetric hard-limit         Stochastic Approximation to Gradient Descent         70         15         20         0.00%         0           10         Log-sigmoid         Innear         Stochastic Approximation to Gradient Descent         70         15         20         0.00%         0           10         Log-sigmoid         Stochastic Approximation to Gradient Descent         70         15         20         0.00%         0           10         Log-sigmoid         Stochastic Approximation to Gradient Descent         70         15         20         0.00%         0           10         Log-sigmoid         Stochastic Approximation to Gradient Descent         70         15         20         0.00%         0	Leaves_3	$\vdash$	Hard-limit	None	Stochastic Approximation to Gradient Descent		15	15	20	20.00%			0.00%	0	0
10         Linear         Linear         Stochastic Approximation to Gradient Descent         70         15         20         50.00%         0           10         Linear         Logsalmoid         Stochastic Approximation to Gradient Descent         70         15         20         50.00%         0           10         Linear         Symmetric hard-limit         Stochastic Approximation to Gradient Descent         70         15         20         50.00%         0           10         Linear         Symmetric hard-limit         Stochastic Approximation to Gradient Descent         70         15         20         50.00%         0           10         Log-sigmoid         Linear         Stochastic Approximation to Gradient Descent         70         15         15         20         50.00%         0           10         Log-sigmoid         Log-sigmoid         Stochastic Approximation to Gradient Descent         70         15         15         20         50.00%         0           10         Log-sigmoid         Log-sigmoid         Stochastic Approximation to Gradient Descent         70         15         15         20         60.00%         0           10         Log-sigmoid         Hyperbolic tangent sigmoid         Stochastic Approximation to Gradient Descent	Leaves_3		Linear	Hard-limit	Stochastic Approximation to Gradient Descent		15	15	20	0.00%	0		0.00%	0	0
10         Linear         Log-sigmoid         Stochastic Approximation to Gradient Descent         70         15         20         0.00%         0           10         Linear         Hyperbolic tangent sigmoid         Stochastic Approximation to Gradient Descent         70         15         20         0.00%         0           10         Linear         Symmetric hard-limit         Stochastic Approximation to Gradient Descent         70         15         20         0.00%         0           10         Log-sigmoid         Hard-limit         Stochastic Approximation to Gradient Descent         70         15         20         0.00%         0           10         Log-sigmoid         Hyperbolic tangent sigmoid         Stochastic Approximation to Gradient Descent         70         15         20         0.00%         0           10         Log-sigmoid         Hyperbolic tangent sigmoid         Stochastic Approximation to Gradient Descent         70         15         20         0.00%         0           10         Log-sigmoid         Hyperbolic tangent sigmoid         Stochastic Approximation to Gradient Descent         70         15         20         0.00%         0           10         Hyperbolic tangent sigmoid         Hyperbolic tangent sigmoid         Hyperbolic tangent sigmoid	Leaves_3	-	Linear	Linear	Stochastic Approximation to Gradient Descent		15	15	20	20.00%	0		%00.0	0	0
10         Linear         Hyperbolic tangent sigmoid         Stochastic Approximation to Gradient Descent         70         15         15         20         50.00%         0           10         Linear         Symmetric hard-limit         Stochastic Approximation to Gradient Descent         70         15         15         20         50.00%         0           10         Linear         None         Stochastic Approximation to Gradient Descent         70         15         15         20         50.00%         0           10         Log-sigmoid         Hard-limit         Stochastic Approximation to Gradient Descent         70         15         15         20         50.00%         0           10         Log-sigmoid         Log-sigmoid         Symmetric hard-limit         Stochastic Approximation to Gradient Descent         70         15         15         20         50.00%         0           10         Log-sigmoid         Hyperbolic tangent sigmoid         Stochastic Approximation to Gradient Descent         70         15         20         50.00%         0           10         Hyperbolic tangent sigmoid         Incear         Stochastic Approximation to Gradient Descent         70         15         20         50.00%         0           10         Hyper	Leaves_3		Linear	Log-sigmoid	Stochastic Approximation to Gradient Descent		15	15	20	%00:0			%00.0	0	0
10         Linear         Symmetric hard-limit         Stochastic Approximation to Gradient Descent         70         15         15         20         0.00%         0           10         Linear         Symmetric hard-limit         Stochastic Approximation to Gradient Descent         70         15         15         20         50.00%         0           10         Log-sigmoid         Hard-limit         Stochastic Approximation to Gradient Descent         70         15         15         20         50.00%         0           10         Log-sigmoid         Linear         Stochastic Approximation to Gradient Descent         70         15         15         20         50.00%         0           10         Log-sigmoid         Hyperbolic tangent sigmoid         Stochastic Approximation to Gradient Descent         70         15         15         20         50.00%         0           10         Hyperbolic tangent sigmoid         Hard-limit         Stochastic Approximation to Gradient Descent         70         15         15         20         50.00%         0           10         Hyperbolic tangent sigmoid         Lochastic Approximation to Gradient Descent         70         15         15         20         50.00%         0           10         Hyperbolic tan	Leaves_3		Linear	Hyperbolic tangent sigmoid	Stochastic Approximation to Gradient Descent		15	15	20	20.00%	0		0.00%	0	0
10         Linear         None         Stochastic Approximation to Gradient Descent         70         15         20         50.00%         0           10         Log-signoid         Hard-limit         Stochastic Approximation to Gradient Descent         70         15         15         20         50.00%         0           10         Log-signoid         Log-signoid         Log-signoid         Stochastic Approximation to Gradient Descent         70         15         20         50.00%         0           10         Log-signoid         Hyperbolic tangent signoid         Hyperbolic tangent signoid         Stochastic Approximation to Gradient Descent         70         15         20         50.00%         0           10         Hyperbolic tangent signoid         Hyperbolic tangent signoid         Log-signoid         Stochastic Approximation to Gradient Descent         70         15         20         50.00%         0           10         Hyperbolic tangent signoid         Linear         Stochastic Approximation to Gradient Descent         70         15         20         50.00%         0           10         Hyperbolic tangent signoid         Stochastic Approximation to Gradient Descent         70         15         20         50.00%         0           10         Hyperbolic tangent	Leaves_3		Linear	Symmetric hard-limit	Stochastic Approximation to Gradient Descent		15	15	20	%00:0			%00.0	0	0
10         Log-sigmoid         Hard-limit         Stochastic Approximation to Gradient Descent         70         15         15         20         50.00%         0           10         Log-sigmoid         Linear         Stochastic Approximation to Gradient Descent         70         15         15         20         50.00%         0           10         Log-sigmoid         Hyperbolic tangent sigmoid         Stochastic Approximation to Gradient Descent         70         15         15         20         50.00%         0           10         Log-sigmoid         Hyperbolic tangent sigmoid         Stochastic Approximation to Gradient Descent         70         15         15         20         50.00%         0           10         Hyperbolic tangent sigmoid         Inact         Stochastic Approximation to Gradient Descent         70         15         15         20         50.00%         0           10         Hyperbolic tangent sigmoid         Inact         Stochastic Approximation to Gradient Descent         70         15         15         20         50.00%         0           10         Hyperbolic tangent sigmoid         Log-sigmoid         Stochastic Approximation to Gradient Descent         70         15         15         20         50.00%         0	Leaves_3	_	Linear	None	Stochastic Approximation to Gradient Descent		15	15	20	20.00%			0.00%	0	0
10         Log-sigmoid         Linear         Stochastic Approximation to Gradient Descent         70         15         20         50.00%         0           10         Log-sigmoid         Log-sigmoid         Stochastic Approximation to Gradient Descent         70         15         20         0.00%         0           10         Log-sigmoid         Hyperbolic tangent sigmoid         Stochastic Approximation to Gradient Descent         70         15         20         10.00%         0           10         Log-sigmoid         Mone         Stochastic Approximation to Gradient Descent         70         15         20         0.00%         0           10         Hyperbolic tangent sigmoid         Hard-limit         Stochastic Approximation to Gradient Descent         70         15         20         0.00%         0           10         Hyperbolic tangent sigmoid         Log-sigmoid         Hyperbolic tangent sigmoid         Stochastic Approximation to Gradient Descent         70         15         20         0.00%         0           10         Hyperbolic tangent sigmoid         Hyperbolic tangent sigmoid         Stochastic Approximation to Gradient Descent         70         15         20         0.00%         0           10         Hyperbolic tangent sigmoid         Hyperbolic tangent sigmo	Leaves_3	-	Log-sigmoid	Hard-limit	Stochastic Approximation to Gradient Descent	Н	15	15	20	20.00%			%00.0	0	0
10         Log-sigmoid         Log-sigmoid         Stochastic Approximation to Gradient Descent         70         15         20         0.00%         0           10         Log-sigmoid         Hyperbolic tangent sigmoid         Hyperbolic tangent sigmoid         Stochastic Approximation to Gradient Descent         70         15         20         50.00%         0           10         Log-sigmoid         None         Stochastic Approximation to Gradient Descent         70         15         20         50.00%         0           10         Hyperbolic tangent sigmoid         Hard-limit         Stochastic Approximation to Gradient Descent         70         15         20         0.00%         0           10         Hyperbolic tangent sigmoid         Linear         Stochastic Approximation to Gradient Descent         70         15         20         0.00%         0           10         Hyperbolic tangent sigmoid         Symmetric hard-limit         Stochastic Approximation to Gradient Descent         70         15         20         0.00%         0           10         Hyperbolic tangent sigmoid         Symmetric hard-limit         Hyperbolic tangent sigmoid         Stochastic Approximation to Gradient Descent         70         15         20         0.00%         0           10         Symmet	Leaves_3	_	Log-sigmoid	Linear	Stochastic Approximation to Gradient Descent		15	15	20	20.00%	0		%00.0	0	0
10         Log-signoid         Hyperbolic tangent signoid         Stochastic Approximation to Gradient Descent         70         15         20         100.00%         0           10         Log-signoid         Symmetric hard-limit         Stochastic Approximation to Gradient Descent         70         15         20         50.00%         0           10         Hyperbolic tangent signoid         Hard-limit         Stochastic Approximation to Gradient Descent         70         15         20         0.00%         0           10         Hyperbolic tangent signoid         Log-signoid         Linear         Stochastic Approximation to Gradient Descent         70         15         20         0.00%         0           10         Hyperbolic tangent signoid         Hyperbolic tangent signoid         Hyperbolic tangent signoid         Stochastic Approximation to Gradient Descent         70         15         20         0.00%         0           10         Hyperbolic tangent signoid         Hyperbolic tangent signoid         Stochastic Approximation to Gradient Descent         70         15         20         0.00%         0           10         Hyperbolic tangent signoid         Stochastic Approximation to Gradient Descent         70         15         20         0.00%         0           10         Symmet	Leaves_3		Log-sigmoid	Log-sigmoid	Stochastic Approximation to Gradient Descent	Н	15	15	20	0.00%	0		%00.0	0	0
10         Log-signoid         Symmetric hard-limit         Stochastic Approximation to Gradient Descent         70         15         20         50.00%         0           10         Log-signoid         None         Stochastic Approximation to Gradient Descent         70         15         20         50.00%         0           10         Hyperbolic tangent signoid         Hard-limit         Stochastic Approximation to Gradient Descent         70         15         20         0.00%         0           10         Hyperbolic tangent signoid         Line-signoid         Line-signoid         Stochastic Approximation to Gradient Descent         70         15         20         0.00%         0           10         Hyperbolic tangent signoid         Hyperbolic tangent signoid         Hyperbolic tangent signoid         Stochastic Approximation to Gradient Descent         70         15         20         0.00%         0           10         Hyperbolic tangent signoid         Symmetric hard-limit         Stochastic Approximation to Gradient Descent         70         15         20         0.00%         0           10         Symmetric hard-limit         Hard-limit         Stochastic Approximation to Gradient Descent         70         15         20         0.00%         0           10         Symmet	Leaves_3		Log-sigmoid	Hyperbolic tangent sigmoid	Stochastic Approximation to Gradient Descent		15	15	20	100.00%	0		%00.0	0	0
10         Log-sigmoid         None         Stochastic Approximation to Gradient Descent         70         15         15         20         50.00%         0           10         Hyperbolic tangent sigmoid         Hard-limit         Stochastic Approximation to Gradient Descent         70         15         20         0.00%         0           10         Hyperbolic tangent sigmoid         Log-sigmoid         Stochastic Approximation to Gradient Descent         70         15         20         0.00%         0           10         Hyperbolic tangent sigmoid         Hyperbolic tangent sigmoid         Hyperbolic tangent sigmoid         Stochastic Approximation to Gradient Descent         70         15         20         0.00%         0           10         Hyperbolic tangent sigmoid         Symmetric hard-limit         Stochastic Approximation to Gradient Descent         70         15         20         0.00%         0           10         Hyperbolic tangent sigmoid         Symmetric hard-limit         Hard-limit         Stochastic Approximation to Gradient Descent         70         15         20         0.00%         0           10         Symmetric hard-limit         Linear         Stochastic Approximation to Gradient Descent         70         15         20         0.00%         0 <td< th=""><th>Leaves_3</th><th></th><th>Log-sigmoid</th><th>Symmetric hard-limit</th><th>Stochastic Approximation to Gradient Descent</th><th></th><th>15</th><th>15</th><th>20</th><th>20.00%</th><th></th><th></th><th>0.00%</th><th>0</th><th>0</th></td<>	Leaves_3		Log-sigmoid	Symmetric hard-limit	Stochastic Approximation to Gradient Descent		15	15	20	20.00%			0.00%	0	0
10         Hyperbolic tangent sigmoid         Hard-limit         Stochastic Approximation to Gradient Descent         70         15         15         20         0.00%         0           10         Hyperbolic tangent sigmoid         Linear         Stochastic Approximation to Gradient Descent         70         15         20         0.00%         0           10         Hyperbolic tangent sigmoid         Stochastic Approximation to Gradient Descent         70         15         20         0.00%         0           10         Hyperbolic tangent sigmoid         Symmetric langent sigmoid         Stochastic Approximation to Gradient Descent         70         15         20         0.00%         0           10         Hyperbolic tangent sigmoid         None         Stochastic Approximation to Gradient Descent         70         15         20         0.00%         0           10         Symmetric hard-limit         Hard-limit         Stochastic Approximation to Gradient Descent         70         15         20         0.00%         0           10         Symmetric hard-limit         Log-sigmoid         Stochastic Approximation to Gradient Descent         70         15         20         50.00%         0           10         Symmetric hard-limit         Log-sigmoid         Stochastic Approximation	Leaves_3	-	Log-sigmoid	None	Stochastic Approximation to Gradient Descent	-	15	15	20	50.00%			0.00%	0	0
10         Hyperbolic tangent sigmoid         Linear         Stochastic Approximation to Gradient Descent         70         15         20         0.00%         0           10         Hyperbolic tangent sigmoid         Log-sigmoid         Stochastic Approximation to Gradient Descent         70         15         20         50.00%         0           10         Hyperbolic tangent sigmoid         Hyperbolic tangent sigmoid         Stochastic Approximation to Gradient Descent         70         15         20         50.00%         0           10         Hyperbolic tangent sigmoid         Nymmetric hard-limit         Byometric hard-limit         Approximation to Gradient Descent         70         15         20         0.00%         0           10         Symmetric hard-limit         Hard-limit         Stochastic Approximation to Gradient Descent         70         15         20         0.00%         0           10         Symmetric hard-limit         Log-sigmoid         Stochastic Approximation to Gradient Descent         70         15         20         50.00%         0           10         Symmetric hard-limit         Log-sigmoid         Stochastic Approximation to Gradient Descent         70         15         20         50.00%         0           10         Symmetric hard-limit         Sy	Leaves_3	_	Hyperbolic tangent sigmoid	Hard-limit	Stochastic Approximation to Gradient Descent	-	15	15	20	0.00%			0.00%	0	0
10         Hyperbolic tangent sigmoid         Log-sigmoid         Stochastic Approximation to Gradient Descent         70         15         15         20         100.00%         0           10         Hyperbolic tangent sigmoid         Hyperbolic tangent sigmoid         Stochastic Approximation to Gradient Descent         70         15         15         20         50.00%         0           10         Hyperbolic tangent sigmoid         Nametric hard-limit         Hyperbolic tangent sigmoid         Stochastic Approximation to Gradient Descent         70         15         20         50.00%         0           10         Symmetric hard-limit         Hard-limit         Hard-limit         Stochastic Approximation to Gradient Descent         70         15         20         50.00%         0           10         Symmetric hard-limit         Log-sigmoid         Stochastic Approximation to Gradient Descent         70         15         20         50.00%         0           10         Symmetric hard-limit         Hyperbolic tangent sigmoid         Stochastic Approximation to Gradient Descent         70         15         20         50.00%         0           10         Symmetric hard-limit         Hyperbolic tangent sigmoid         Stochastic Approximation to Gradient Descent         70         15         20         50.00	Leaves_3		Hyperbolic tangent sigmoid		Stochastic Approximation to Gradient Descent	-	15	15	20	0.00%			0.00%	0	0
10         Hyperbolic tangent sigmoid         Hyperbolic tangent sigmoid         Stochastic Approximation to Gradient Descent         70         15         20         50.00%         0           10         Hyperbolic tangent sigmoid         Symmetric hard-limit         Stochastic Approximation to Gradient Descent         70         15         15         20         0.00%         0           10         Symmetric hard-limit         Hard-limit         Stochastic Approximation to Gradient Descent         70         15         20         50.00%         0           10         Symmetric hard-limit         Line         Stochastic Approximation to Gradient Descent         70         15         20         50.00%         0           10         Symmetric hard-limit         Light         Stochastic Approximation to Gradient Descent         70         15         20         50.00%         0           10         Symmetric hard-limit         Hyperbolic tangent sigmoid         Stochastic Approximation to Gradient Descent         70         15         20         50.00%         0           10         Symmetric hard-limit         Symmetric hard-limit         Symmetric hard-limit         Stochastic Approximation to Gradient Descent         70         15         20         50.00%         0           10         Sym	Leaves_3	_	Hyperbolic tangent sigmoid	_	Stochastic Approximation to Gradient Descent		15	15	20	100.00%			0.00%	0	0
10         Hyperbolic tangent sigmoid         Symmetric hard-limit         Stochastic Approximation to Gradient Descent         70         15         20         0.00%         0           10         Hyperbolic tangent sigmoid         None         Stochastic Approximation to Gradient Descent         70         15         15         20         0.00%         0           10         Symmetric hard-limit         Hard-limit         Lice-sigmoid         Stochastic Approximation to Gradient Descent         70         15         20         10.000%         0           10         Symmetric hard-limit         Hyperbolic tangent sigmoid         Stochastic Approximation to Gradient Descent         70         15         20         10.000%         0           10         Symmetric hard-limit         Hyperbolic tangent sigmoid         Stochastic Approximation to Gradient Descent         70         15         20         50.00%         0           10         Symmetric hard-limit         Symmetric hard-limit         Symmetric hard-limit         Stochastic Approximation to Gradient Descent         70         15         20         50.00%         0           10         Symmetric hard-limit         None         Stochastic Approximation to Gradient Descent         70         15         20         50.00%         0	Leaves_3		Hyperbolic tangent sigmoid	Hyperbolic tangent sigmoid	Stochastic Approximation to Gradient Descent		15	15	20	20.00%			0.00%	0	0
10         Hyperbolic tangent sigmoid         None         Stochastic Approximation to Gradient Descent         70         15         20         0.00%         0           10         Symmetric hard-limit         Hard-limit         Linear         Stochastic Approximation to Gradient Descent         70         15         20         50.00%         0           10         Symmetric hard-limit         Log-sigmoid         Stochastic Approximation to Gradient Descent         70         15         20         50.00%         0           10         Symmetric hard-limit         Hyperbolic tangent sigmoid         Stochastic Approximation to Gradient Descent         70         15         20         50.00%         0           10         Symmetric hard-limit         Symmetric hard-limit         Symmetric hard-limit         Symmetric hard-limit         Stochastic Approximation to Gradient Descent         70         15         20         50.00%         0           10         Symmetric hard-limit         None         Stochastic Approximation to Gradient Descent         70         15         20         50.00%         0	Leaves_3	-	Hyperbolic tangent sigmoid	Symmetric hard-limit	Stochastic Approximation to Gradient Descent		15	15	20	0.00%	0		0.00%	0	0
10         Symmetric hard-limit         Hard-limit         Stochastic Approximation to Gradient Descent         70         15         20         50.00%         0           10         Symmetric hard-limit         Linear         Stochastic Approximation to Gradient Descent         70         15         20         100.00%         0           10         Symmetric hard-limit         Log-sigmoid         Stochastic Approximation to Gradient Descent         70         15         20         50.00%         0           10         Symmetric hard-limit         Symmetric hard-limit         Stochastic Approximation to Gradient Descent         70         15         20         50.00%         0           10         Symmetric hard-limit         Symmetric hard-limit         None         Stochastic Approximation to Gradient Descent         70         15         20         50.00%         0           10         Symmetric hard-limit         None         Stochastic Approximation to Gradient Descent         70         15         20         50.00%         0	Leaves_3		Hyperbolic tangent sigmoid	None	Stochastic Approximation to Gradient Descent		15	15	20	%00.0	0		%00.0	0	0
10         Symmetric hard-limit         Linear         Stochastic Approximation to Gradient Descent         70         15         20         100.00%         0           10         Symmetric hard-limit         Log-sigmoid         Stochastic Approximation to Gradient Descent         70         15         15         20         50.00%         0           10         Symmetric hard-limit         Hyperbolic tangent sigmoid         Stochastic Approximation to Gradient Descent         70         15         15         20         50.00%         0           10         Symmetric hard-limit         Symmetric hard-limit         Stochastic Approximation to Gradient Descent         70         15         15         20         50.00%         0           10         Symmetric hard-limit         None         Stochastic Approximation to Gradient Descent         70         15         15         20         50.00%         0	Leaves_3		Symmetric hard-limit	Hard-limit	Stochastic Approximation to Gradient Descent		15	15	20	20.00%	0		0.00%	0	0
10         Symmetric hard-limit         Log-sigmoid         Stochastic Approximation to Gradient Descent         70         15         20         50.00%         0           10         Symmetric hard-limit         Hyperbolic tangent sigmoid         Stochastic Approximation to Gradient Descent         70         15         15         20         50.00%         0           10         Symmetric hard-limit         Symmetric hard-limit         Stochastic Approximation to Gradient Descent         70         15         15         20         50.00%         0           10         Symmetric hard-limit         None         Stochastic Approximation to Gradient Descent         70         15         15         20         50.00%         0	Leaves_3	-	Symmetric hard-limit	Linear	Stochastic Approximation to Gradient Descent		15	15	20	100.00%			0.00%	0	0
Symmetric hard-limit Hyperbolic tangent sigmoid Stochastic Approximation to Gradient Descent 70 15 15 20 50.00% 0  Symmetric hard-limit Symmetric hard-limit Symmetric hard-limit Symmetric hard-limit None Symmetric hard-limit N	Leaves_3		Symmetric hard-limit	Log-sigmoid	Stochastic Approximation to Gradient Descent	$\dashv$	15	12	20	20.00%			0.00%	0	0
10 Symmetric hard-limit Symmetric hard-limit Stochastic Approximation to Gradient Descent 70 15 15 20 50.00% 0 10 Symmetric hard-limit None Stochastic Approximation to Gradient Descent 70 15 15 20 50.00% 0	Leaves_3	$\rightarrow$	Symmetric hard-limit	Hyperbolic tangent sigmoid	Stochastic Approximation to Gradient Descent	$\dashv$	15	15	20	20.00%			%00.0	0	0
10 Symmetric hard-limit None Stochastic Approximation to Gradient Descent 70 15 15 20	Leaves_3	_	Symmetric hard-limit	Symmetric hard-limit	Stochastic Approximation to Gradient Descent		15	15	20	50.00%			0.00%	0	0
	Leaves_5		Symmetric hard-limit	None	Stochastic Approximation to Gradient Descent	-	15	15	20	20.00%	0	0	0.00%	0	0