Single Layer Perceptron

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***Abstract*—Single Layer Perceptron is a supervised machine learning algorithm applicable to classification problems of linearly separable data.**

I. Introduction

It is a one layer feed forward network. The input to the activation function is:

$$y = b + \sum_{i=1}^{n} w_i.x_i \tag{1}$$

Where b is the bias, w is weight and x is the input and i represents input instances. The Learning Process for the perceptron is to find the vector w of weights w_0 through w_n that define a hyperplane separating the classes. Algorithm begins with some initial weights vector w_i and loops through the training set, one training sample at a time and makes decisions on adjustment of weights with each input sample. It is a mistake-driven algorithm, as it updates w when it makes a mistake; i.e., when it wrongly predicts the label of the current training example otherwise, doesnt update w when it correctly predicts the label of the current training example.

II. Package Details

I have created an R package that contains a function that implements the simple perceptron algorithm. I have followed the steps to create R packages mentioned on a blog[1]. Fig. 2 shows the documentation of the created package. Fig. **??** shows the lookup result fo the perceptron function.

III. Fake data

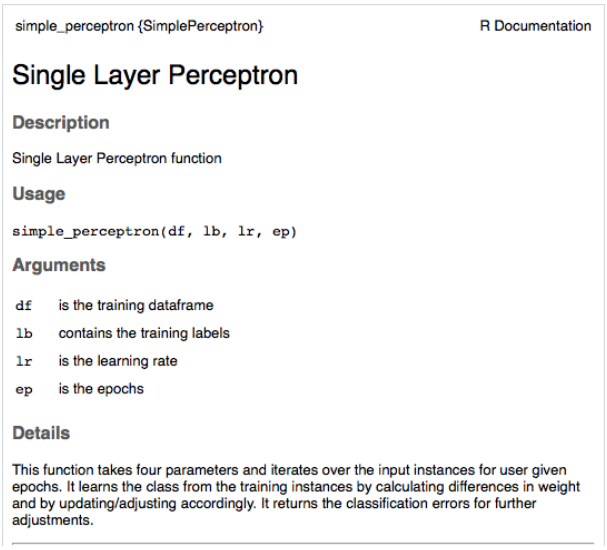
I have created a dataset as follow:

```
data_gen <- function(n){}
x <- matrix(
    runif(2*n,0,1),
     ncol=2,byrow=T
 )
 y <- rbinom(n, 1, 0.55)
 x <- cbind(x,y)
 colnames(x) <- c("a","b","c")
 }
```

I have called the perceptron function using the above dataset:

```
simple_perceptron(x[,1:2],x[,3],1,15)
```

[1]https://hilaryparker.com/2014/04/29/writing-an-r-package-from-scratch/


simple_perceptron {SimplePerceptron} R Documentation

Single Layer Perceptron

Description

Single Layer Perceptron function

Usage

```
simple_perceptron(df, lb, lr, ep)
```

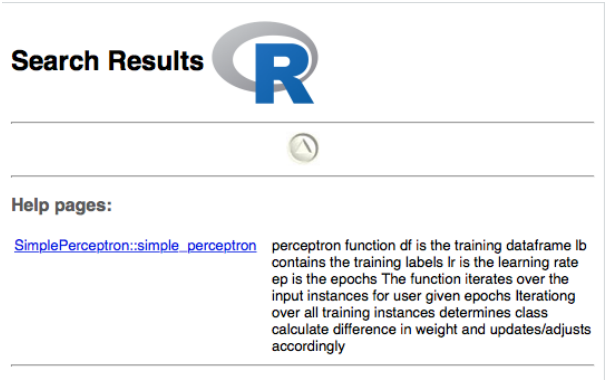
Arguments

df	is the training dataframe
lb	contains the training labels
lr	is the learning rate
ep	is the epochs

Details

This function takes four parameters and iterates over the input instances for user given epochs. It learns the class from the training instances by calculating differences in weight and by updating/adjusting accordingly. It returns the classification errors for further adjustments.

Fig. 1. Function description


Search Results

Help pages:

SimplePerceptron::simple_perceptron	perceptron function df is the training dataframe lb contains the training labels lr is the learning rate ep is the epochs The function iterates over the input instances for user given epochs Iterationg over all training instances determines class calculate difference in weight and updates/adjusts accordingly

Fig. 2. Function Lookup

IV. GitHub Link

https://github.com/moicha/Simple-Perceptron-In-R/