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Weather probability in Australia

Abstract:

The main idea of this project is to be able to predict if its going to rain the next day in Australia. I use a 10 years Data Set of numerous Australian weather stations.

The data:

The data set used for this project was obtained in Kaggle, this is a real data set taken from 10 years of measurements made by numerous Australian weather stations.

Link: https://www.kaggle.com/jsphyg/weather-dataset-rattle-package

The data set has 142k instances, but the program doesn't really need that much, so I only used 4000 instances. And I only use 13 weights to make the prediction work.

Arranging and cleaning the data:

I use a simple split function, so I get half of the data set that I have and use it for training and then the other half for testing. Then we remove the titles row, and all the rows that are incomplete. With this we are sure that we are only going to use complete data.

Algorithm:

I use the logistic regression algorithm to get the hypothesis and the gradients needed to the logistic part of the program.

```
def hy(weights, x):
  """ This function makes the hypothesis for the Logistic regressios
      weights: are the parameters that multiplies their respective x
      x: are the values from one sample
```

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```
  """

  hyp = 0

  for i in range(len(weights)):

    hyp+=(weights[i]*x[i])

  hyp = hyp * (-1)

  hyp = 1/(1+ math.exp (hyp))

  return hyp


def gD(weights,x,y,a):

  """ Gradient descent function """

  temp=list(weights)

  for j in range(len(weights)):

      acum=0

      for i in range(len(x)):

          err=hy(weights,x[i])-y[i]

          acum+=err*x[i][j]

      temp[j]=weights[j]-a*(1/len(x))*acum

  return temp
```

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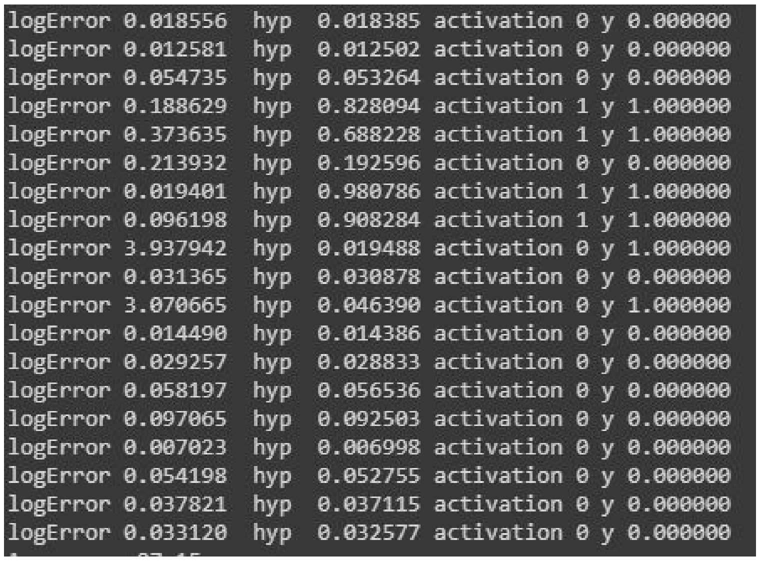
Running:

When running the program prints the error of that epoch, we use logarithm error to get the difference between the hypothesis and the real output. After a certain number of epochs, or if the error is lower than .20, the program stops. When it stops you get a plot of the error, and a final program gives you the accuracy of the program,this part is tested with data that the program has never seen. If the hyp is higher than .5 then it's considered as a 1 if it's lower than a .5 it's considered as a 0.



```
logError 0.018556  hyp  0.018385 activation 0 y 0.000000
logError 0.012581  hyp  0.012502 activation 0 y 0.000000
logError 0.054735  hyp  0.053264 activation 0 y 0.000000
logError 0.188629  hyp  0.828094 activation 1 y 1.000000
logError 0.373635  hyp  0.688228 activation 1 y 1.000000
logError 0.213932  hyp  0.192596 activation 0 y 0.000000
logError 0.019401  hyp  0.980786 activation 1 y 1.000000
logError 0.096198  hyp  0.908284 activation 1 y 1.000000
logError 3.937942  hyp  0.019488 activation 0 y 1.000000
logError 0.031365  hyp  0.030878 activation 0 y 0.000000
logError 3.070665  hyp  0.046390 activation 0 y 1.000000
logError 0.014490  hyp  0.014386 activation 0 y 0.000000
logError 0.029257  hyp  0.028833 activation 0 y 0.000000
logError 0.058197  hyp  0.056536 activation 0 y 0.000000
logError 0.097065  hyp  0.092503 activation 0 y 0.000000
logError 0.007023  hyp  0.006998 activation 0 y 0.000000
logError 0.054198  hyp  0.052755 activation 0 y 0.000000
logError 0.037821  hyp  0.037115 activation 0 y 0.000000
logError 0.033120  hyp  0.032577 activation 0 y 0.000000
```

The image shows what the test program print

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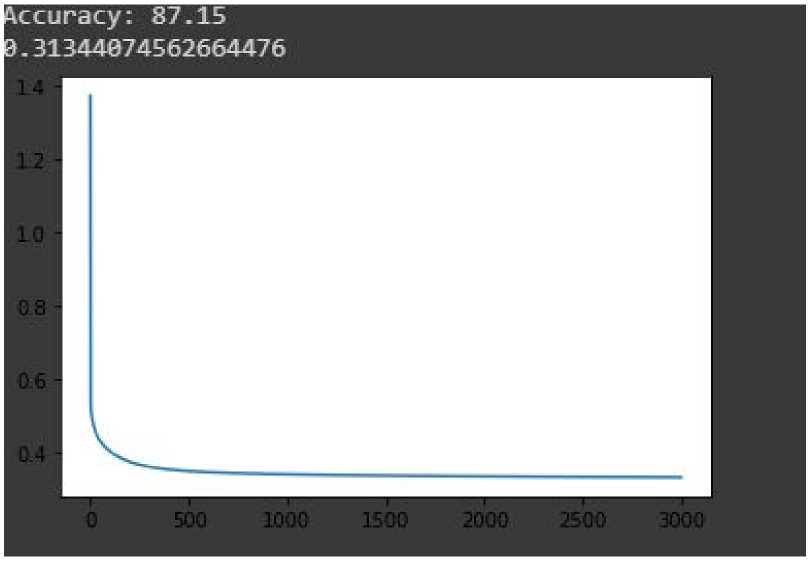

```
Accuracy: 87.15
0.31344074562664476
```

This shows the accuracy and the error graph