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Batch: B6

EXPERIMENT: 03

1. Explain the concept of bias in neural networks?

: Bias is a constant help the model to best fit on the given data. It is like the intercept which added to the linear equation. It is an additional parameter which is use to adjust the output along with the weighted summation of the inputs in neural network. The bias is a crucial parameter in neural networks that helps in fine-tuning the activation and output of each neuron. It contributes to the network's ability to learn complex relationships and make accurate predictions.

Formula:

Y=∑(wi \* xi) + B

Where, w=connection weights

B=Bias

x=inputs

1. Implementation of Backpropagation in neural network?

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Source code:

import numpy as np

import pandas as pd

from sklearn.datasets import load\_iris

from sklearn.model\_selection import train\_test\_split

import matplotlib.pyplot as plt

data=load\_iris()

x=data.data

y=data.target

y=pd.get\_dummies(y).values

print(y[:3])

x\_train,x\_test,y\_train,y\_test=train\_test\_split(x,y,test\_size=20,random\_state=4)

learning\_rate=0.1

iterations=5000

n=y\_train.size

input\_size=4

hidden\_size=2

output\_size=3

results=pd.DataFrame(columns=["mse","accuracy"])

np.random.seed(10)

w1=np.random.normal(scale=0.5,size=(input\_size,hidden\_size))

w2=np.random.normal(scale=0.5,size=(hidden\_size,output\_size))

def sigmoid(x):

return 1/(1+np.exp(-x))

def mean\_squared\_error(y\_pred,y\_true):

return ((y\_pred-y\_true)\*\*2).sum()/(2\*y\_pred.size)

def accuracy(y\_pred,y\_true):

acc=y\_pred.argmax(axis=1)==y\_true.argmax(axis=1)

return acc.mean()

for itr in range(iterations):

z1=np.dot(x\_train,w1)

a1=sigmoid(z1)

z2=np.dot(a1,w2)

a2=sigmoid(z2)

mse=mean\_squared\_error(a2,y\_train)

acc=accuracy(a2,y\_train)

results=results.\_append({"mse":mse,"accuracy":acc},ignore\_index=True)

e1=a2-y\_train

dw1=e1\*a2\*(1-a2)

e2=np.dot(dw1,w2.T)

dw2=e2\*a1\*(1-a1)

w2\_update=np.dot(a1.T,dw1)/n

w1\_update=np.dot(x\_train.T,dw2)/n

w2=w2-learning\_rate\*w2\_update

w1=w1-learning\_rate\*w1\_update

results.mse.plot(title="Mean Squared Error")

plt.show()

results.accuracy.plot(title="Accuracy")

plt.show()

# Testing

z1=np.dot(x\_test,w1)

a1=sigmoid(z1)

z2=np.dot(a1,w2)

a2=sigmoid(z2)

acc=accuracy(a2,y\_test)

print("Accuracy:{}".format(acc))

Screenshot:





