

Pre-req of Lecture # 26

NumPy

- Numerical Python

import numpy as np

- Data Types and Shapes

⇒ ① Scalars (no dimension)

every item in array must have same type

s = np.array()

print(s)

s.shape

() ← output

⇒ ② Vector (single dimension, represented by single row or column of elements)

2D vector

all elements in vector are of same data type

x = np.zeros(3)

print(x) =>

np.ones()

we can access the element within vector using indices

Matrices

↳ supply list of list where each list represents a row. create 3x3 matrix

a = np.array([[1, 2, 3], [4, 8, 6], [7, 8, 9]])

1st element

2nd

3rd

⇒ a[2, 2]

= 9

• [[1 2 3]
[4 8 6]
[7 8 9]]

tensors \rightarrow just like vector and matrices, but they can have more dimensions.

Changing Shapes

`v = np.array([1, 2, 3, 4])`

`print(v.shape)`

$(4,)$

`reshape = v.reshape(2, 2)`

$\begin{bmatrix} 1 & 2 \\ 3 & 4 \end{bmatrix}$

Lecture 26: Training of Neural Networks

→ review of previous lecture

→ ... hyper-parameters — learning rate

- Cont^{tant} experience from

- can not learn from

- affect ^{data} on model's

accuracy

calculator performs

⇒ input layer → output

→ forward pass/propagation

1) model prediction
2) loss (dist)

- i) loss

(distance \Rightarrow loss function

objektive fmoz)

⇒ Backward pass / propagation

loss funⁿ → output layer → input layer

$\hat{y} \Rightarrow$ predicted label

$y \Rightarrow$ actual label

→ B) actually model learn here

so model have good
prediction

--- so re cycle. ---

جس سے forward اور backward پاس ہر $\frac{1}{2}$ epoch تک ایک بار ڈیٹا سے پاس ہو جائیں تو اس سے ایک epoch کہتے ہیں

How neural network learn,

⇒ each neural network that learn use a technique called = Gradient Descent

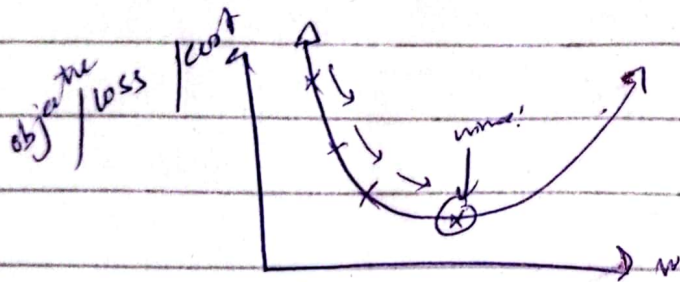
Gradient Descent

Think like slope/hill

gradient tell you direct

which is steepest

[This is a method used to find the best set of parameters that make prediction as accurate as possible]



• optimal loss

Beyond optimal loss will increase

[example of handling sub-optimal]

Learning rate \Rightarrow step size

Batch Size

• subset of training dataset used in each iteration of training process

• divide the entire dataset into smaller batches

Large batch size \Rightarrow speed up training
 \rightarrow but require more memory.

آپ اس سے زیادہ دیتا مادل اور ہائیڈرو جیو
دست رزٹ دیتا \leftarrow over-fitting

Practical
using tensorflow library

- importing library
- loading data
- normalizer
- model definition

example
input layer
dense layer
output

- model compilation

(optimizers, loss, metrics)

when values are not defined - default values are used.

like learning-rate

- Train the model
- Evaluate the model
- Data Visualizer

ANN (Simple Neural Network)

◦ Practice on different models

◦ choose hyper-parameter
accuracy \Rightarrow increase
loss \Rightarrow decrease

◦ Tweak & Practise

\therefore cifar10 (32x32)