Deep Learning-I

by

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MODULE-2

Mathematical background for Deep learning:

- Data Manipulation
- Data Preprocessing
- Linear Algebra
- Calculus
- Probability

Calculus

- In deep learning, we train models, updating them successively so that they get better and better as they seem or eand more data.
- Usually,getting better means minimizing a loss function,a score that answers the question“how bad is our model?”
- The task of fitting models into two key concerns:

i)optimization: theprocessoffitting our models to observed data.

ii)Generalization: The mathematical principles and practitioners wisdom that guide as to how to produce models whose validity extends beyond the exact set of data examples used to train them.

Derivatives and Differentiation

- In deep learning, we typically choose loss functions that are differentiable with respect to our model's parameters.
- Were we increase or decrease that parameter by an infinitesimally small amount.
- To illustrate derivatives,let us experiment with an example. Define $u = f(x) = 3x^2 + 1$.

```
import numpy as np
import pandas as pd
import sympy as sp   #Python library for symbolic mathematics
x = sp.symbols('x')
print(sp.diff(3*x**2+1,x))
```

- o/p
- 6x

Derivatives and Differentiation...

```
import numpy as np
import pandas as pd
import sympy as sp
x = sp.symbols('x')
print(sp.diff(3*x**2+1,x))
from scipy.misc import derivative
def f(x):
  return 3*x**2+1
print (derivative(f,2.0))
```

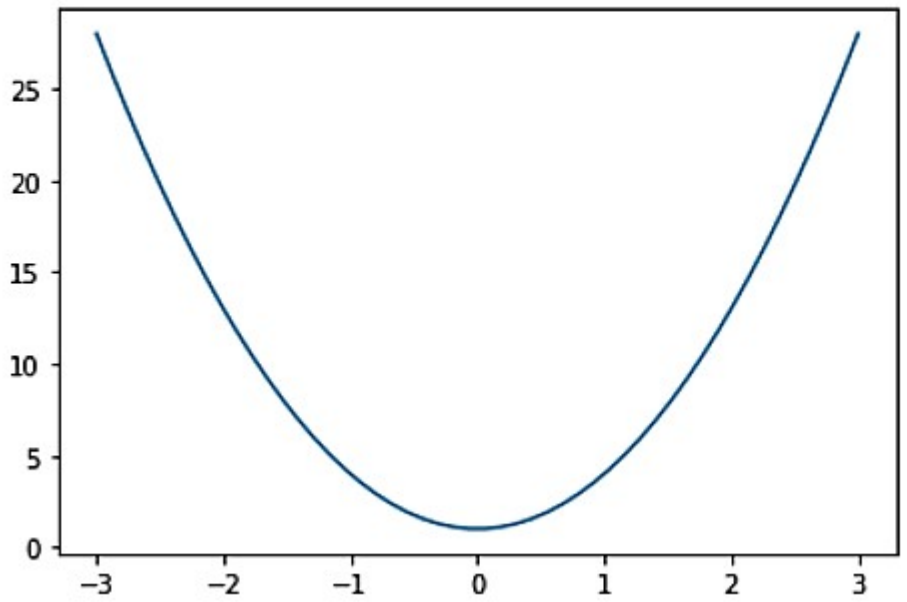
- o/p
- 12

Derivatives and Differentiation...

```
import sympy as sp
x = sp.symbols('x')
print(sp.diff(3*x**2+1,x))
from scipy.misc import derivative
def f(x):
  return 3*x**2+1
print (derivative(f,2.0))
import matplotlib.pyplot as plt
import numpy as np
y=np.linspace(-3,3)
y
plt.plot(y,f(y))
```

Python-Result

```
6*x
12.0
[<matplotlib.lines.Line2D at 0x7f9b816341d0>]
```



Home work

- Find the derivative of y = f(x) = x2 − 6 x+1 and Plot the function y .
- Find the derivative of y = f(x) = 2x − 1 x and Plot the function
- Plot the function y = f(x) = x3 − 1 x and its tangent line when x = 1. 2.


Thank You!