Pattern & Anomaly Detection Lab

Experiment 10

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AIML B3

Submitted To:

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SOCS

UPES

CODE:

```python
import numpy as np

x1 = np. random. random( (100, 1))
y= 4 + 3*x1 + np. random. randn(100, 1)

x0 = np. ones ( (100, 1))
X = np. concatenate( (x0, x1), axis = 1)


#%%
temp1 = np.linalg.inv(np.dot (X.T, X))
temp2 = np.dot(temp1,X.T)
w = np. dot(temp2, y)
print("-------------------------------")
print("Least squares method(Direct) Single Input")
print("-------------------------------")
print("W0",w[0])
print("W1",w[1])


#%%
import numpy as np
x1 = np.random. random( (100, 3))
X=np.c_[np.ones((100,1)),x1]
a=[[4,5,8],
   [8,5,7],
   [7,6,3],
   [1,3,8]]
W=np.array(a)
y1=np.dot(X,W)
temp1 = np.linalg.inv(np.dot (X.T, X))
temp2 = np.dot(temp1,X.T)
w = np. dot(temp2, y1)
print("-------------------------------")
print("Least squares method(Direct) Multiple Input")
print("-------------------------------")
print("W1's are:\n" ,w)

```

```python
#%%
X_ = np.random. random( (100, 3))
y1= 4 + 3*X_ + np. random. randn(100, 1)
y2= 5 + 2*X_ + np. random. randn(100, 1)
y3= 3 + 6*X_ + np. random. randn(100, 1)
y4= 7 + 9*X_ + np. random. randn(100, 1)
Xwb=np.c_[np.ones((100,1)),X_]
W_=Xwb.T.dot(Xwb)
tp1 = np.linalg.inv(np.dot (Xwb.T, Xwb))
tp2 = np.dot(tp1,Xwb.T)
W1 = np. dot(tp2, y1)
W2 = np. dot(tp2, y2)
W3 = np. dot(tp2, y3)
W4 = np. dot(tp2, y4)


print("------------Modified-----------------")
print("Least squares method(Direct) Multiple Input")
print("-----------------------------")
print("W1:\n",W1)
print("W2:\n",W2)
print("W3:\n",W3)
print("W4:\n",W4)
#%%
print(np.concatenate((W1,W2,W3,W4)))
```

OUTPUT:

```
IPython 7.26.0 -- An enhanced Interactive Python.

In [1]: runcell(0, 'B:/3rd year/5th sem/P&AD/exp10.py')

In [2]: runcell(1, 'B:/3rd year/5th sem/P&AD/exp10.py')
--------------------------------
Least squares method(Direct) Single Input
--------------------------------
W0 [3.6047836]
W1 [3.50268276]

In [3]: runcell(2, 'B:/3rd year/5th sem/P&AD/exp10.py')
--------------------------------
Least squares method(Direct) Multiple Input
--------------------------------
W1's are:
 [[4. 5. 8.]
 [8. 5. 7.]
 [7. 6. 3.]
 [1. 3. 8.]]
```

```
In [4]: runcell(3, 'B:/3rd year/5th sem/P&AD/exp10.py')
-----------Modified------------------
Least squares method(Direct) Multiple Input
------------------------------
W1:
 [[ 3.87767253  3.87767253  3.87767253]
 [ 3.05152315  0.05152315  0.05152315]
 [ 0.3952086   3.3952086   0.3952086 ]
 [-0.24948184 -0.24948184  2.75051816]]
W2:
 [[ 5.67017869  5.67017869  5.67017869]
 [ 1.25767771 -0.74232229 -0.74232229]
 [-0.28164296  1.71835704 -0.28164296]
 [-0.2510575  -0.2510575   1.7489425 ]]
W3:
 [[ 3.00627306  3.00627306  3.00627306]
 [ 6.48435087  0.48435087  0.48435087]
 [-0.09223401  5.90776599 -0.09223401]
 [-0.3093984  -0.3093984   5.6906016 ]]
W4:
 [[ 6.98119803  6.98119803  6.98119803]
 [ 9.46229368  0.46229368  0.46229368]
 [-0.05479141  8.94520859 -0.05479141]
 [-0.61903883 -0.61903883  8.38096117]]

In [5]: runcell(4, 'B:/3rd year/5th sem/P&AD/exp10.py')
[[ 3.87767253  3.87767253  3.87767253]
 [ 3.05152315  0.05152315  0.05152315]
 [ 0.3952086   3.3952086   0.3952086 ]
 [-0.24948184 -0.24948184  2.75051816]
 [ 5.67017869  5.67017869  5.67017869]
 [ 1.25767771 -0.74232229 -0.74232229]
 [-0.28164296  1.71835704 -0.28164296]
 [-0.2510575  -0.2510575   1.7489425 ]
 [ 3.00627306  3.00627306  3.00627306]
 [ 6.48435087  0.48435087  0.48435087]
 [-0.09223401  5.90776599 -0.09223401]
 [-0.3093984  -0.3093984   5.6906016 ]
 [ 6.98119803  6.98119803  6.98119803]
 [ 9.46229368  0.46229368  0.46229368]
 [-0.05479141  8.94520859 -0.05479141]
 [-0.61903883 -0.61903883  8.38096117]]
```