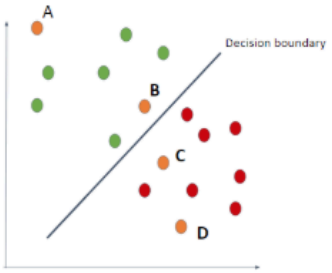
Q1. Confidence of Prediction

Solved

Using hints except Complete Solution is Penalty free now

Use Hint



The above diagram represents the scatterplot of data points that are of positive (green) or negative (red) class.
There are four query points (orange) that are to be classified by the decision boundary (straight line) into one of the classes.
Which of the query points will have the highest and lowest confidence of prediction respectively?
Note: The probability that a data point belongs to the correct class is directly proportional to the distance of a point from the decision boundary

A,B

Q2. Plane distance

Find the distance of the point (−6,0,0) from the plane 2x−3y+6z=2?

2

Q3. Decision function

Solved

Using hints except Complete Solution is Penalty free now

Use Hint

Suppose you want to implement a decision function to classify the data points into two classes => {0, 1}.
If the data point lies towards the normal then we can classify it as class 1, otherwise class 0.
Which option correctly implements the given condition?
Note: **x** represents the data point, **w** and w0 represent the weights of the plane.

a.

```
import numpy as np
def classifyDataPoint(w, w0, x):
  if np.dot(w, x) + w0 < 0:
    return 1
  else:
    return 0
```

b.

```
import numpy as np
def classifyDataPoint(w, w0, x):
  if np.dot(w, w0) + x > 0:
    return 1
  else:
    return 0
```

c.

```
import numpy as np
def classifyDataPoint(w, w0, x):
  if np.dot(w, x) + w0 > 0:
    return 1
  else:
    return 0
```

d.

```
import numpy as np
def classifyDataPoint(w, w0, x):
  if np.dot(w, w0) + x < 0:
    return 1
  else:
    return 0
```

C

Q4. Determine the Accuracy Solved

Using hints except Complete Solution is Penalty free now Use Hint

Accuracy is one of the metrics used for classification problems. It is defined as :
Accuracy = (number of correctly classified points)/(total number of points).
Given an equation of the separating plane as $\mathbf{3x_1 + 4x_2 + 1 = 0}$,determine the accuracy of this plane on the given below dataset.

x1	x2	label
1	4	positive
-2	-1	negative
3	-1	negative

Our model is designed in such a way that any point lying towards the normal will be classified as positive otherwise negative.

0.67

Q5. Projection

Given vectors $V1$ and $V2$ of same dimensionality, then the length of the projection of $V1$ on $V2$ is :

- $\frac{v\_1.v\_2}{|v\_2|}$ Answer
- $v\_1.v\_2$
- $\frac{v\_1.v\_2}{|v\_1|}$
- $\sqrt{|v\_1|^2+|v\_2|^2}$

Q6. Straight line or not </> Solved

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You are given a list of (X, Y) coordinates, check whether the coordinates lie on a straight line or not. If they lie on a straight line return the slope and intercept else return -1.

Input Format

```
coordinates (list of tuples)
```

Output Format

```
if straight line exists :
(M, B)
tuple of M and B, consisting of float values rounded upto one decimal place

else:
-1
```

Example 1 Input

```
[(1.0, 5.0), (-3.0, -3.0), (2.5, 8.0)]
```

Example 1 Output

```
(2.0, 3.0)
```

Example 2 Input

```
[(5.0, 5.0), (-2.0, -3.0), (0.0, 0.0), (14.0, 6.7), (-3.0, -6.3)]
```

Example 2 Output

```
-1
```

Python 3 (Python-3.8)

```python
def straight_line_or_not(coordinates):

    """
        Input is the list of tuples containg the coordiantes.
        Fucntion computes the slope and intercept if the points lies in a straight line.
        If lie straight line return the tuple (slope,intercept) having float values till one deciaml point.
        else, return -1
    """
    ls= coordinates
    i=0
    m=[]
    while i<len(ls)-1:
        slope=(ls[i+1][1]-ls[i][1])/(ls[i+1][0]-ls[i][0])
        m.append(slope)
        i=i+1
    if len(set(m))==1:
        c= ls[0][1]-m[0]*ls[0][0]
        return (round(m[0],1),round(c,1))
    else:
        return -1
```

Q1. Equation of a plane Solved

Using hints except Complete Solution is Penalty free now Use Hint

Given that we have a plane $ax + by + c = 0$ and a data point (x_1, y_1). Now when we insert this data point into the equation of a plane, we get $ax_1 + by_1 + c > 0$.
What can be said about this data point?

The datapoint (x1,y1) lies towards the normal of the plane

Q2. Two Planes Solved

Using hints except Complete Solution is Penalty free now Use Hint

Given two equations of plane $\pi 1 : 2x + 3y + 6 = 0$ and $\pi 2 : 4x + 6y + 12 = 0$. How many common/intersecting points these planes have?

Infinite

Q3. Colliding robots Solved

Using hints except Complete Solution is Penalty free now Use Hint

Three robots have been programmed to move along the paths **x-y-2=0**, **x+y-4=0**, and **x+3y=6** in an infinite space.
Do you think that these robots will ever collide?

yes, they can at (3, 1)