Linear algebra for AI & DS

Second theoretical quiz

Question1:

Given a 10- feature vector (s) for main symptoms of corona virus, such as: s_1 = fever; s_2 = dry cough.

s_3 = tiredness; s_4 = sore throat; s_5 = aches and pain.

s_6 = diarrhoea; s_7 = chest pain; s_8 = loss of taste or smell.

s_9 = skin rash; s_{10} = breathing difficulty.

The nonzero elements **nnz**($s_{1\text{-}3}$) are considered *common symptoms* and have a weight of 15%.

the **nnz**($s_{4\text{-}6}$, $s_{8\text{-}9}$) are considered *less common symptoms* " with a weight of 5%.

symptoms s_7 and s_{10} are *serious symptoms* with a weight of 80%.

If a person admitted to a hospital with symptoms

$\boldsymbol{p}$ = [1 0 1 1 0 0 0 1 0 1], given that hospital assesses all symptoms, the patients score will be:

Solution1:

1.20

Question2:

Which one of the following vectors (a) when applied to vector s = [0 0 0 0 1 0 1 1 0 1] gives the output of 4?

Solution:

a = [0 0 0 0 1 0 1 1 0 1]

Question3:

The root mean square of the vector x = [1 -2 3 2] is

Solution:

$$rms(x) = \frac{\|x\|}{\sqrt{n}} = \frac{\sqrt{1^2 + (-2)^2 + 3^2 + 2^2}}{\sqrt{4}} = \frac{3\sqrt{2}}{2}$$

$$= 2.121$$

Question4:

Given the histogram (h_i) of 2 sentences, where h_1 = [2.2, 4.8, 1.1, 2.1, 4.1] and h_2 = [4.8, 0.7, 0.1, 1.1, 0.6]

Solution:

6.15

Question5:

Compute the correlation coefficient between the vectors u = [1.8 2. -3.7 4.7] and
v = [0.6 2.1 1.9 1.4]

Solution:

-0.715

Question6:

What is the angle (in degrees) between the vectors u = [1, 4, 6] and v = [1, 2, 3]?

Solution:

7.60

Question7:

Find the Taylor approximation (f_hat) for the affine function f(x) = x1^2 + exp (x2 - x1) near the point z(0.85, 2.05).

Solution:

4.062