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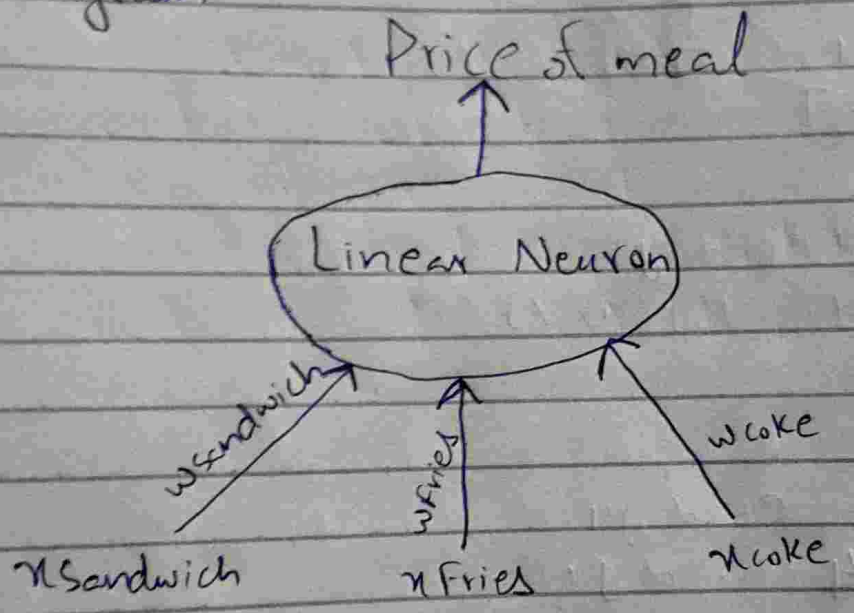
Question 1

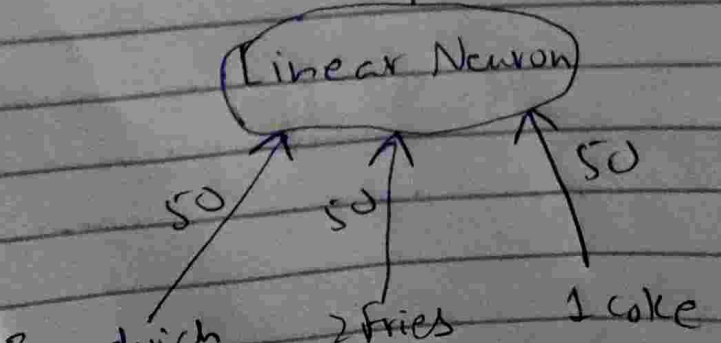
price = $x_{sandwich} w_{sandwich} + x_{Fries} w_{Fries} + x_{coke} w_{coke}$

$w = (w_{sandwich}, w_{Fries}, w_{coke})$

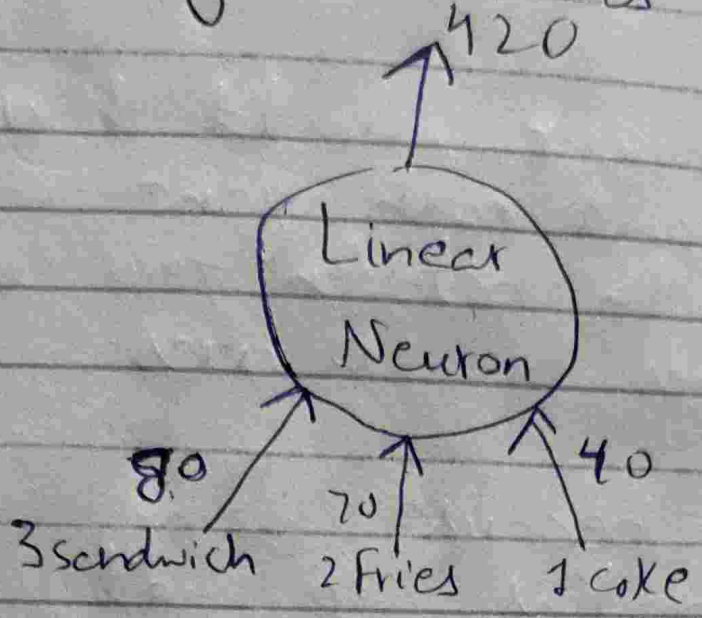
Diagram



Inputs : 3 sandwich 2 Fries 1 coke
weights : 50 50 50
original Price : ~~820~~ 420
300



Adjusting the Prices



These adjusted weights better fit the cashier's brain.

Price of a portion = $x_{portion}$ $w_{portion}$

x is a constant

For proportionality $y = kx$ wher k is a constant

Here, price of portion = y, $x_{portion} = k$ and $w_{portion} = x$

Hence, price of portion and each meal price ($w_{portion}$) are proportional

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Question 2

a) Each chromosome would have 20 genes and each gene would represent path between two cities so 20 genes for 20 cities.

b) 190 genes because using all possible combinations we get $20 \times 19 = 380$ but we have to consider that the links are bidirectional and hence would be 190 genes.

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Question 3

We will use weak artificial intelligence due to reasons justified below

- The ability to use common sense is only found in artificial intelligence networks as the other frameworks simply process the data whether it is logical or not
- Livetime data sensed can also only be calculated by artificial intelligence
- Machine Learning and Data Mining need large data and stats and AI need small or no data
- Again, AI can formulate and change hypothesis without human interference
- AI has knowledge base which can justify the decisions it makes and other frameworks can not

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Question 4

a) Conceptual Dependency

b) Because it can deal with different tenses

c)

Haider $\overset{f}{\Longleftrightarrow}$ ATRANS $\leftarrow$ Car

She $\overset{P}{\Longleftrightarrow}$ PTRANS $\leftarrow$ Car

He $\overset{P}{\Longleftrightarrow}$ MTRANS $\leftarrow$ Objects

$f\{$ Haider
$\{$ x

$I\{$ Price
$\{$ Discount

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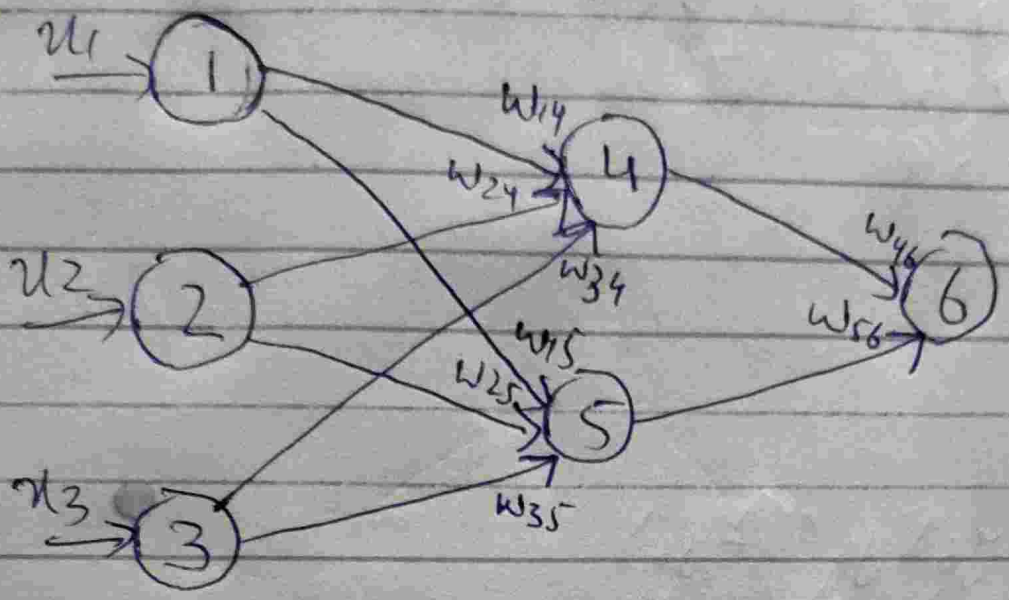
Question 5



$x_1 = 1 \qquad x_2 = 0 \qquad x_3 = 1$

$$a_4 = x_1 w_{14} + x_2 w_{24} + x_3 w_{34}$$
$$= (1)(0.3) + 0(0.3) + (1)(-0.4)$$
$$= -0.1$$

$$y_4 = \frac{1}{1 + e^{-a*1}}$$
$$= \frac{1}{1 + e^{0.01}} = 0.498 \simeq 0.50$$

$$a_5 = x_1 w_{15} + x_2 w_{25} + x_3 w_{35}$$
$$= (1)(-0.4) + 0(0.1) + (1)(0.4)$$
$$= 0$$

$$y_5 = \frac{1}{1 + e^{0 \times 0.1}} = 0.34$$

$a_6 = y_4 w_{46} + y_5 w_{56}$
$= 0.5(-0.4) + (0.34)(-0.5)$
$= -0.2 - 0.17$
$= -0.39$
$y_6 = 0$

t is 1

$e_6 = (t_6 - y_6) y_6 (1 - y_6)$
$= (1 - 0)(0)(1 - 0)$
$= 0$

$e_5 = (1 - y_5)(y_5)(1 - y_5)$
$= (1 - 0.34)(0.34)(1 - 0.34)$
$= 0.15$

$e_4 = (1 - y_4)(y_4)(1 - y_4)$
$= (1 - 0.5)(0.5)(1 - 0.5)$
$= 0.125$

~~e_3 [illegible]~~

$w_{14} = w_{14} + e_4 \alpha y_1$
$= 0.3 + (0.125)(0.7)(1)$
$= 0.3875$

$w_{15} = w_{15} + e_5 \alpha y_1$
$= -0.4 + (0.15)(0.7)(1)$
$= -0.295$

$w_{24} = w_{24} + e_4 \alpha y_2$

$w_{24} = 0.3$

$w_{25} = 0.1$

$w_{34} = w_{34} + e_4 \alpha y_3$
$= -0.4 + (0.125)(0.7)(1)$
$= -0.31$

$w_{35} = w_{35} + e_5 \alpha y_3$
$= 0.4 + (0.15)(0.7)(1)$
$= 0.5$

$w_{46} = w_{46} + e_6 \alpha y_4$
$= -0.4 + (0) \alpha y_4$
$w_{46} = -0.4$

$w_{56} = -0.5$

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Question 6

A perceptron is a neural network which has just a singular hidden layer

It has an input layer and each input neuron is connected to a the hidden layer and then each hidden neuron to output neuron.

Theoretically, input layer passes the inputs to hidden layer and hidden layer takes weighted input of every input and calculates output. Then in output layer, if output is ~~accur~~ not accurate weights are updated and are added with error x input x learning rate and these epochs are repeated until the weight values give correct output for every input.