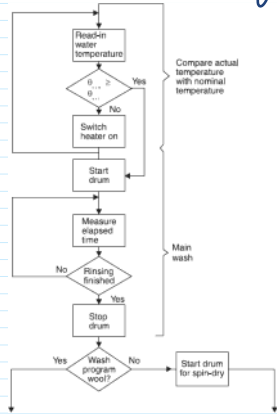


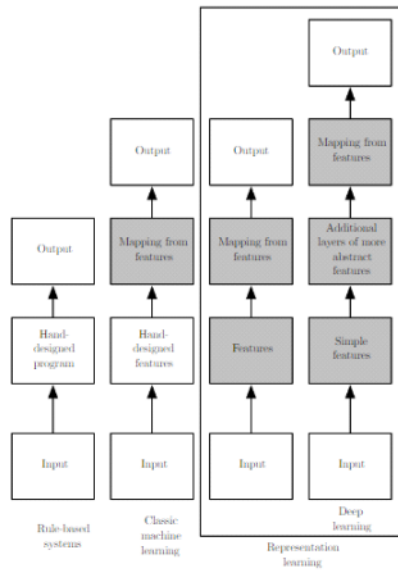
Artificial Intelligence :- (AI)

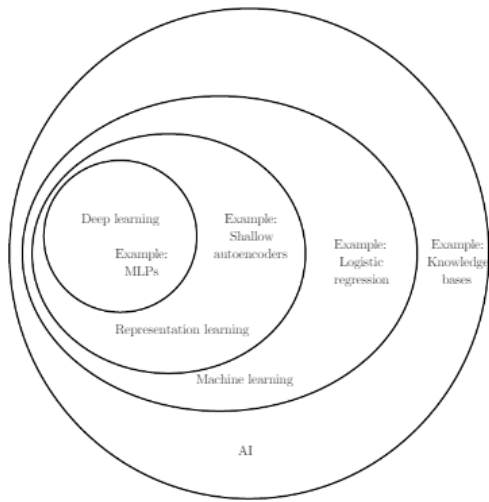
list of formal, mathematical rules.

Example : knowledge bases.
 (fuzzy logic)



AI v/s ML/DL :- =>



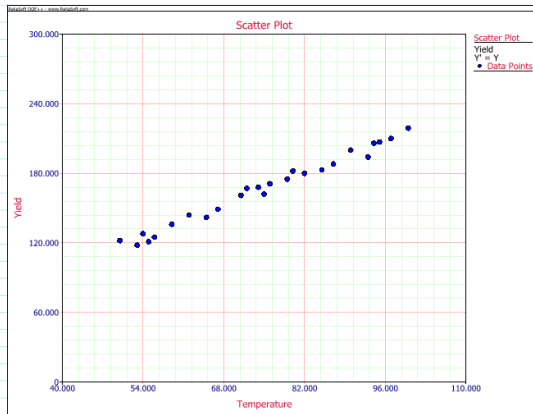


Linear Regression :-

Explains the relationship between two or more variables using a straight line.

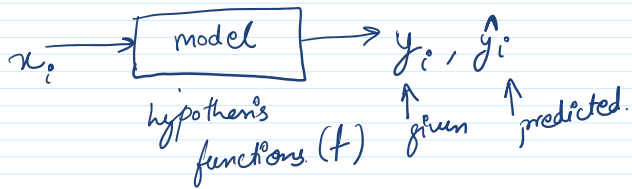
Example:-

| Observation Number | Temperature (x _i) | Yield (y _i) |
|--------------------|-------------------------------|-------------------------|
| 1 | 50 | 122 |
| 2 | 51 | 118 |
| 3 | 54 | 128 |
| 4 | 56 | 125 |
| 5 | 56 | 125 |
| 6 | 62 | 136 |
| 7 | 62 | 144 |
| 8 | 65 | 142 |
| 9 | 67 | 149 |
| 10 | 71 | 161 |
| 11 | 72 | 167 |
| 12 | 74 | 168 |
| 13 | 74 | 162 |
| 14 | 76 | 171 |
| 15 | 78 | 175 |
| 16 | 80 | 182 |
| 17 | 82 | 186 |
| 18 | 83 | 185 |
| 19 | 87 | 188 |
| 20 | 88 | 206 |
| 21 | 89 | 199 |
| 22 | 94 | 206 |
| 23 | 95 | 211 |
| 24 | 95 | 211 |
| 25 | 99 | 215 |



x_i = input variable
 y_i = output variable
 m = # of training examples

⇒ Training set = (x_i, y_i)



⇒ Testing Samples = (x_j)



$$\hat{y} = f(x) = wx + b$$

$$\hat{y}_i = f(x_i) = wx_i + b$$

$$(x_i, y_i, \hat{y}_i)$$

\uparrow \uparrow
 given predicted

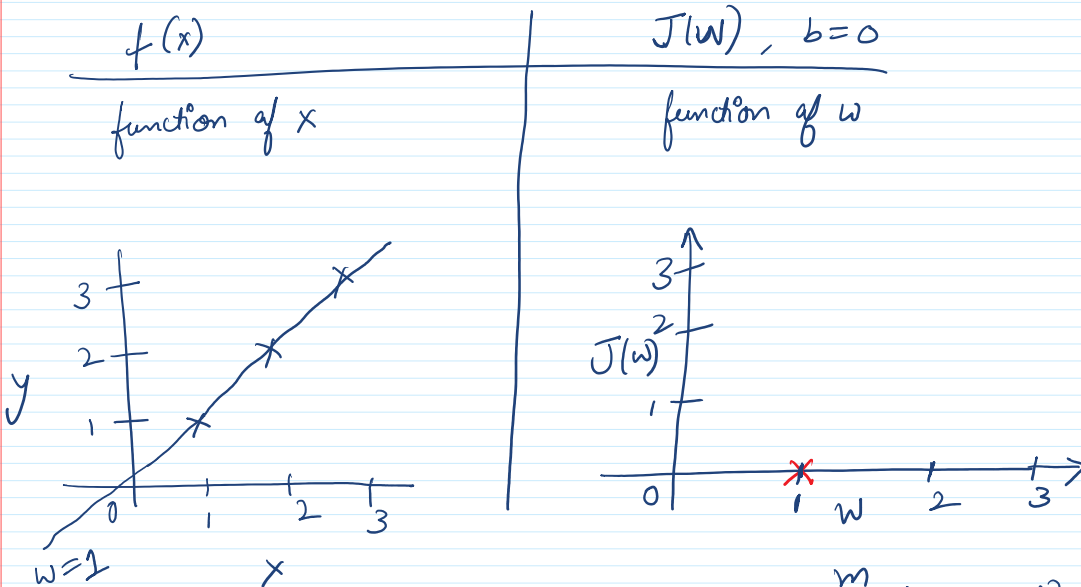
Cost function:-

Squared error cost function.

$$J(w, b) = \frac{1}{2m} \sum_{i=1}^m \underbrace{(\hat{y}_i - y_i)^2}_{\text{error}}$$

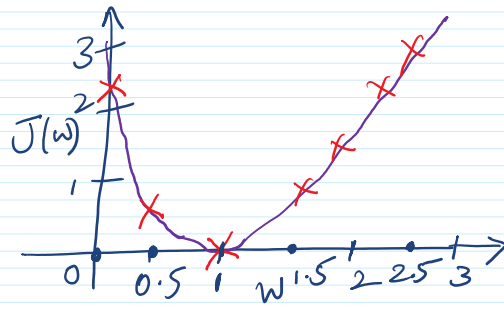
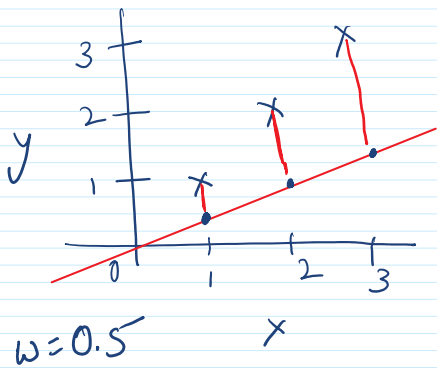
Goal:- Find best w, b such that cost $J(w, b)$ is minimum.

$$\min_{w, b} J(w, b)$$



$$\begin{aligned}
 J(w) &= \frac{1}{2m} \sum_{i=0}^m (\hat{y}_i - y_i)^2 \\
 J(1) &= \frac{1}{2m} (0^2 + 0^2 + 0^2) \\
 &= 0
 \end{aligned}$$

| $f(x)$ function of x | $J(w)$, $b=0$ function of w |
|---------------------------|-----------------------------------|
|---------------------------|-----------------------------------|



$$J(w) = \frac{1}{2m} \sum_{i=0}^m (\hat{y}_i - y_i)^2$$

$$J(0.5) = \frac{1}{2m} [(0.5 - 1)^2 + (1 - 2)^2 + (1.5 - 3)^2]$$

$$= \frac{1}{2 \times 3} [3 \cdot 5]$$

$$= 0.58$$

$$J(0) = 2.3$$

