⊞ Siamese :—
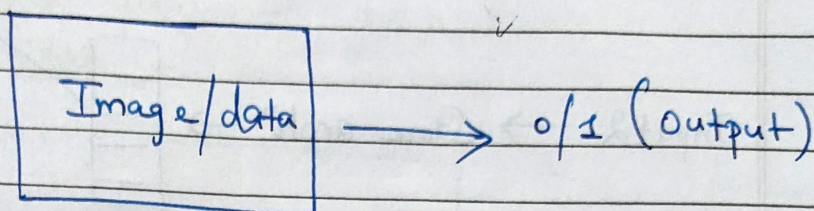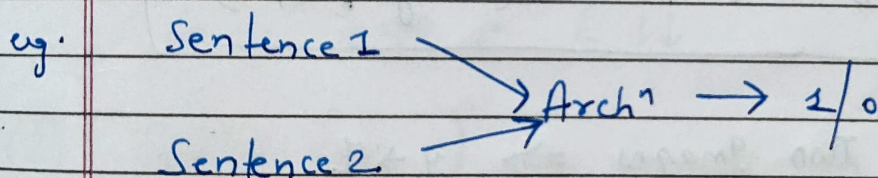
↳ Specially used in Facial Recognition System.

↳ **Till Now :**

$$\boxed{\text{Image/data}} \longrightarrow 0/1 \text{ (Output)}$$

↳ **Now :** (Comparison Architecture) :—

e.g.   Image 1
       Image 2 → Architecture → 1 (Similar)
                                 → 0 (Dissimilar)

e.g.   data 1
       data 2 → Architecture → 1
                                → 0

e.g.   Sentence 1
       Sentence 2 → Arch^n → 1/0
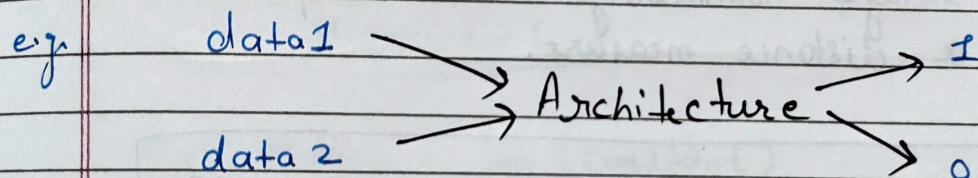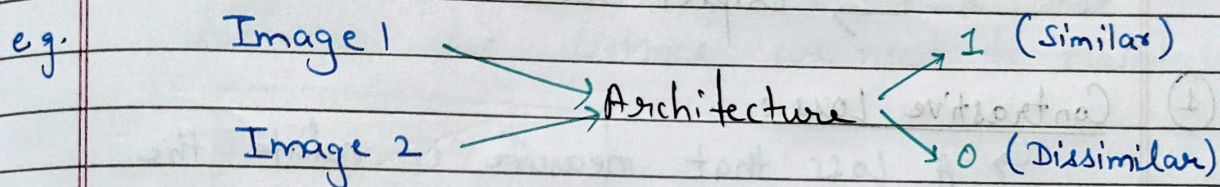
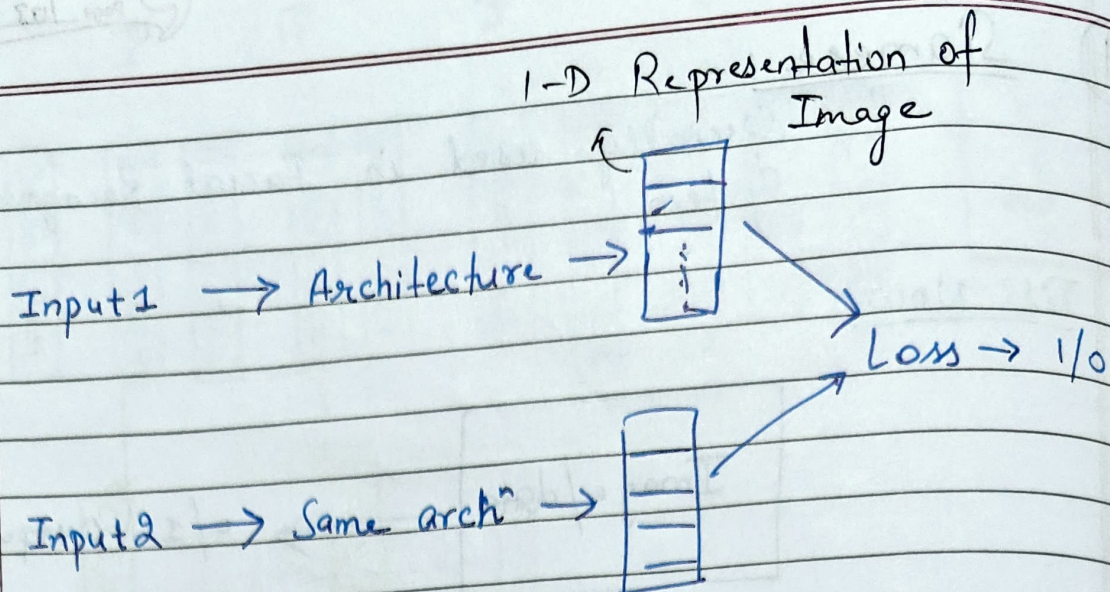↳ **Image Aspect** (Face Recognition) :

   ↳ Image 1 :   While creating Face lock
                 (Giving multiple angles' images)

   ↳ Image 2 :   Live image to unlock
                 phone.

1-D Representation of Image

Input1 $\longrightarrow$ Architecture $\rightarrow$

Input2 $\longrightarrow$ Same arch^n $\rightarrow$

Loss $\rightarrow$ 1/0

$\hookrightarrow$ **Loss:-**

$\longrightarrow$ Contrastive Loss

$\longrightarrow$ Triplet loss

① **Contrastive Loss :**

$\hookrightarrow$ A loss that measure or relate the image similarity with respect to a distance measure.

$$L = y D^2 + (1-y) \max(\text{margin} - D, 0)^2$$

$\hookrightarrow$ When Two Images $\Rightarrow$ $y \rightarrow 1$
are similar

Otherwise $\Rightarrow$ $y \rightarrow 0$

$\therefore$ When images are similar, $\boxed{L = D^2}$

$D \rightarrow$ Euclidean distance b/w the encoded vectors (Dissimilarity)

∴ When images are similar, we have to reduce D^2 to "0"

Reduce → D^2 → 0

↳ When images are dissimilar ⟹ $\boxed{y = 0}$

$$L = \max(\text{margin} - D, 0)^2$$

• "Margin" is a kind of benchmark that determines the distance we need to maintain.

Maximize → D
⇓
Minimize → L

e.g. Margin = 100 (constant)

So, $D \uparrow\uparrow$ ⟹ $L \downarrow\downarrow$

② <u>Triplet Loss</u> [By Google in 2015]

↳ specially used for facial recognition systems.

Triplet → Means → Three Elements

Three elements → a. Anchor Image
b. Positive Image
c. Negative Image.

* **Anchor Image :-**
↳ Reference Image.
e.g. Image while creating Face Lock.

* **Positive Image :**
↳ Logging in the system any time after that. (That person's image)

* **Negative Image :**
↳ Another person's image

$$d(A, P) - d(A, N) < 0$$

A → Anchor Image
P → Positive „
N → Negative „

$$L = \max\left(d(a,n) - d(a,p) , 0 \right)$$

Adding some
Margin →

$$L = \max\left(d(a,n) - d(o,p) + margin , 0 \right)$$