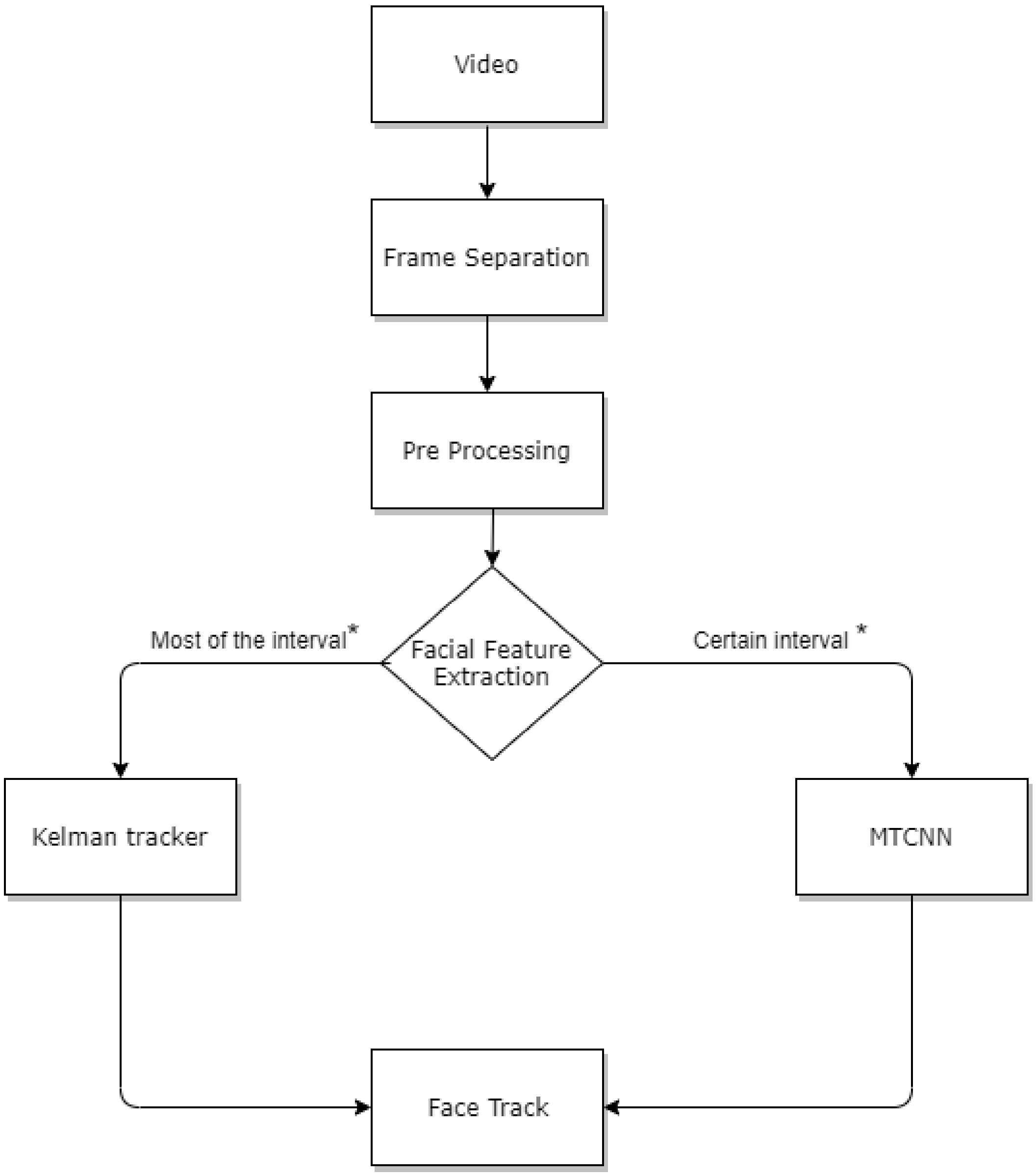
4. a) Flowchart for the Face tracker:



*Here **MTCNN** (Multi-Task cascaded Convolutional Neural Neywork) is used for many times rather than Kelman because of computationally expensive.

Fig: Flowchart of Face Tracking Algorithm

b) Pseudocode for the kalman tracker:

```
1: Initial Estimates for
X ˆ k−1 and Pk−1
2: Time Update
        •Project the state X ˆ − k = AX ˆ k−1 + BWk
        • Project the error covariance P − k = APk−1A T + Q
3: Measurement Update
        • Compute Kalman gain Kk = P − k HT HP − k HT +R
        • Update estimate with measurement Zk X ˆ k = X ˆ − k +Kk (zk − HX ˆ − k )
        • Update error covariance Pk = (1 −KkH)P − k
```

The state equation is Xk = AXk−1 + Bwk (9)

The measurement model is Zk = HXk + vk (10)

5. We cannot say that Euclidian distance is enough for feature matching. Some cases, it is enough and some cases it is not enough. It varies from problem to problem. “**Cosine Similarity**” is better for some problems.
6. We ca n improve Euclidean distance-based matching without another algorithm. We can use the formula- $\|pq\| = \sqrt{(p_x - q_x)^2 + (p_y - q_y)^2}$ which is upgraded formula of Euclidean distance formula.