Kinect Based Suspicious Posture Recognition for Real-Time Home Security Applications

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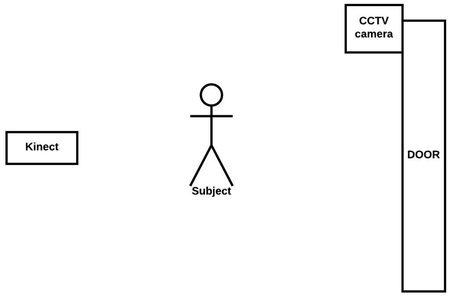
Premise



- A kinect IR camera captures the skeletal features which is used for detecting suspicious postures.
- The CCTV camera is used to take a picture of the supposed intruder and alert the home resident.

Why kinect?

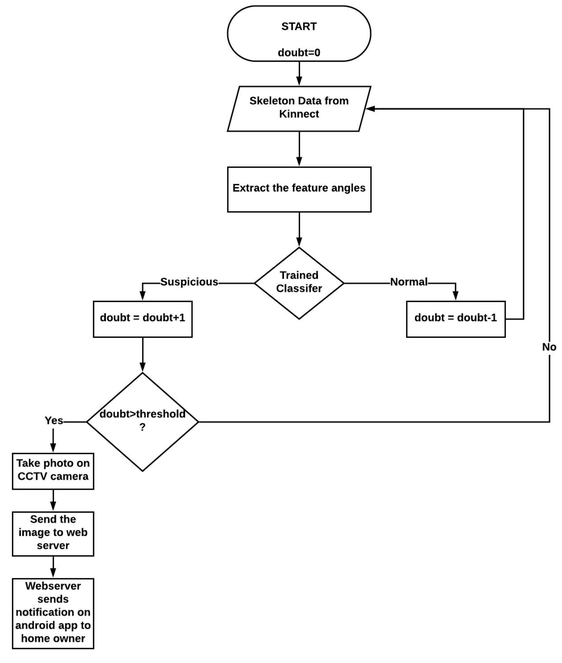
- The IR camera is independent of lighting conditions and works well in the dark (without light) also.
- The lower dimensions of the skeletal features enables us to use a simple classifier, which can be deployed on the edge device itself.
- Deploying the classifier on the edge-device cuts on the communication overhead and latency involved in communicating with the server.

Approach

Algorithm 2: Inference Time Computations

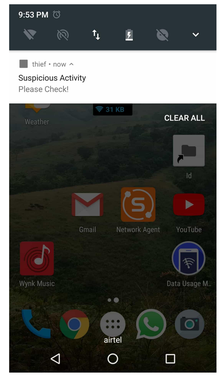
```
score = 0;
while joint coordinates are incoming from the Kinect do
    compute X using the joint coordinates;
    h_θ = σ(θ^(T) X^(i));
    if h_θ > confidence_threshold then
        score = score + 1;
        if score > num_frame_threshold then
            capture picture and send alarm to server;
            score = 0
        end
    else
        if score > 0 then
            score = score − 1;
        end
    end
    iter = iter+1;
end
```

Flowchart

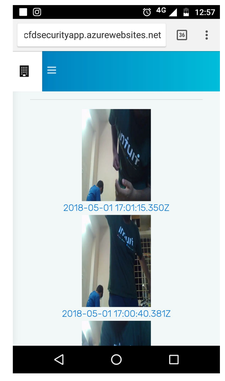


Results

SAMPLE DETECTIONS



NOTIFICATION ON THE APP



Suspicious activities notified to the user

TABLE II
CONFUSION MATRIX FOR SUSPICIOUS AND NORMAL POSTURES

	Suspicious (Actual)	Normal (Actual)
Suspicious (Predicted)	15	2
Normal (Predicted)	3	30

TABLE III
EVALUATION METRICS

Precision(%)	Recall(%)	Accuracy(%)
88.23	83.33	90