KneeBend Rep counter using Mediapipe

1. As suggested, I have used Mediapipe pose detection model for the detection of key points of the leg. The pose detection model extracts landmarks which contains 4 values – x, y, z and visibility. Here, x and y determines the coordinates of the points. I have used those points from three landmarks which are hip, knee and ankle & used those to calculate the angle.
2. Prior to the calculation of the angle, I have to decide which leg is farther and which is neared to the camera. This is where, the third coordinate ‘z’ is useful. If the value of ‘z’ is smaller, then we can assume that point is nearer to the camera. So, based on that value, I have decided whether I should consider left or right leg.
3. After considering the leg, calculation of the angle takes place. I have used a simple function to the task. Now, if the angle is lesser than 140 (as suggested), the timer will start.
4. And whenever the angle becomes greater than or equal to 140, the timer stops.
5. Now, we check whether the time is greater than 8 seconds or not.
   1. If yes, increase the rep count and reset the timer.
   2. If no, display feedback – “Keep your knee bent”
6. I have cv2 text writer to display the rep count and the feedback. Feedback is shown for 3 seconds.
7. To handle, frame fluctuations -
   1. Whenever there is a frame fluctuation, the angle difference between frame which appeared sudden and the actual current frame is large. So, I have taken that difference into account and determined whether I should reset the timer or not.
   2. The value ‘40’ is taken arbitrarily.

Note: I have provided output video url in a text document as the google form isn’t accepting the output video with large size (even the compressed version).

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