# Classification of work-out pose using deep learning

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## Abstract

Pose estimation is a supervised machine learning task for estimating the human different types of body poses or classifying and identifying the joints of the human body from images, video clips, or real-time video. To get an incredible output for this purpose a deep learning model can be the best fit. In this paper I describe a deep learning model to identify all bone joints of a human body then I use some training sets to train our model to classify the workout pose of a human body.

## Problem Statement

Regular physical activity has been shown to reduce morbidity and mortality by decreasing heart disease, diabetes, high blood pressure, colon cancer, feelings of depression/anxiety, and weight, while building and maintaining healthy bones, muscles, and joints.[1] It's documented that regular physical activity is essential for healthy aging [2][3]. The American College of Sports Medicine (ACSM) and the American Heart Association (AHA) define protocols, guidelines and recommendations regarding the exact type and intensity of elderly exercise regimens [2][3][4][5].

Online workout platform-assisted solutions for elderly people. Pose estimation is one of the most interesting machine learning areas since it is used in different fields including activity recognition, animation, gaming, augmented reality, etc. An online workout platform for older people /patient where the deep learning model classifies their pose and give the accuracy of their pose might be an effective way for their exercise.

## Research hypothesis

The aim of this project is to investigate effective engagement strategies to predicts human joint locations by using a convolutional neural network model. In addition, we will use this pose estimation in healthcare area more precisely for online workout platform. Where we use a device's (computer/laptop) webcam that captures real-time video stream of single person than classify of his/her workout pose.

## Materials and methods

First, for estimating the pose we need to capture a set of coordinates for each joint and then connect those with edge. The model first identifies the body part localization as input and outputs a low-resolution per-pixel heatmap. This heatmap shows the probability of a joint occurring at each spatial location in the image.[6]
There are three different types of approaches to model the human body: Skeleton-based, Contour based, and Volume-based model. Initially, I will try to use first two type of approaches and will compare between them. Model will:

1. Detect the pose of a single person (**3ft ~ 6ft)**
2. Detect the pose of the person who is closest to the image center and ignore the other people who are in the image frame.
3.The model predicts **17 human key points** of the full body.

To train the model for classifying the different types of exercise, I will consist of n different types of poses which will be suitable for old age people, like chair yoga, Pilates, sun salutation, etc. Then use the classifier most preferably SVM and KNN and calculate the accuracy.

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