Human Pose Estimation Assignment

This assignment is for you to learn some basic concepts of machine learning and image processing, which will help you in the project. You might find some parts daunting, it's okay not to answer all questions; just try your best!
There are no rules for solving the assignment, although try to search things up and understand stuff. Try not to use chatGPT cuz GPT might help you in this assignment, but no one's gonna save your ass when shit gets real in the project XD

You can submit the link to the assignment submission instead of the SOP document; who likes to read SOPs hehe ;).

Lastly, have fun solving the assignment!

Section 1: Ez mode

Try to keep the answers to less than 50 words each, be precise and apt

Q0. Give us a basic introduction of yourself.
Q1. Why do you want to do this project?
        Let us know why we should select you over other participants.
Q2. What are your previous experiences with coding
        Any previous projects, even CS101, would work
Q3. On a scale of 1-10, how well can you handle stressful situations
        Cuz it's gonna get ugly real quick in here
Q4. What do you think is the most important thing in life?
        I wanna know if we think alike :)

Section 2: Learning mode

Google stuff and try to understand these novel concepts; they'll help you irrespective of you getting selected for the project

Q.0 How would you represent a ball in a 4x4, 8x8 and 16x16 pixel image? Use only white and black pixels.

Q.1 Image Degradation - Learn about Gaussian blurs and convolutions. Does a Gaussian blur kernel reduce the resolution of an image? Since applying a blur kernel is the same as matrix multiplication, the number of pixels stays the same, why do they say that the image is downsampled or reduced in "resolution" then?

Q2. To estimate the pose of a human, what all features should be mapped? Is it the same for all animals? Can you estimate the pose of an alien (something you have never seen before)?

Section 3: Grind mode

Here is where you'll have quite a hard time. Remember to chill out and have fun.

Q1. Learn what gradient descent is. Write a code with minimal usage of libraries to find a local minimum of the function

$$f(x) = x^5 - 4x^4 + 3x^2 + x + 1$$

Q2. Linear Regression - Learn what is Linear Regression. Apply linear regression on the following data points to find the line of best fit. What do you observe when applying regression with the last point, (1, 1) and without it? Why do you think this happens?

X-coords	Y-coords
50	122
53	118
54	128
55	121
56	125
59	136
62	144
65	142
67	149
71	161
72	167
74	168
75	162
76	171
79	175
1	1

Q3. Given the pose of a human, can you identify other features from their structure, like their age, gender, and ethnicity? What accuracy do state-of-the-art models show in identifying these features?
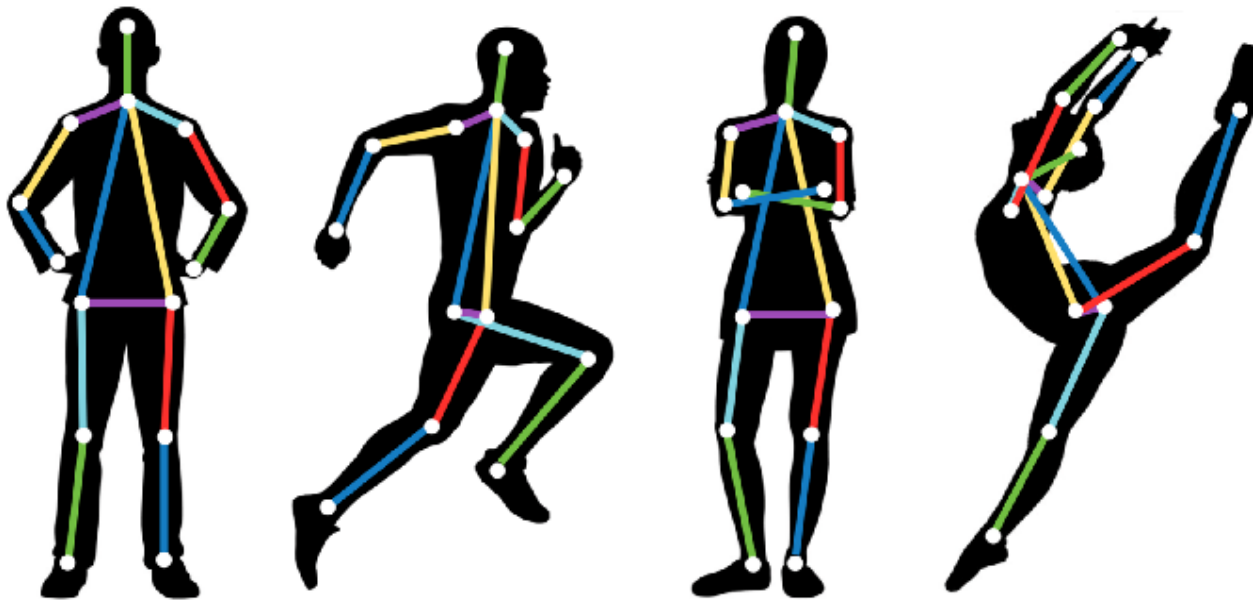
We hope you enjoyed solving the assignment! We wish you the best of luck for your journey into Machine Learning and to work on pose estimation with us!