

**Intro to AI & CV**  
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**Homework 1**

You are to design a very basic system to recognize human activities using machine learning, while keeping in mind that your system does not have to yield great results. Think of 2 options, one using one or more cameras and another using one or more wearable sensors, and answer the following questions:

1. What data would you need to feed your system and what hardware/sensors would you need to collect that data? You might have to conduct some online research to find good answers.
  - a. Answer for the camera-based system
  - b. Answer for the wearable system
2. Give some details about the user study you would design to collect your needed data, assuming that there are no publicly available datasets you can use?
  - a. Answer for the camera-based system
  - b. Answer for the wearable system
3. What kind of pre-processing would you apply to your collected data?
  - a. Answer for the camera-based system
  - b. Answer for the wearable system
4. You are to extract a feature vector that would represent each sample in your data. What are 5 features that you would choose to be in your feature vector?
  - a. Answer for the camera-based system
  - b. Answer for the wearable system
5. Assuming you have 100 samples for each of 10 activities you would like to recognize, what would be a simple mathematical way to build one archetype/model for each of the 10 activities given the feature vector you decided on?
6. Based on your archetype/model of each activity, how would you label/classify future data? Choose a simple mathematical way to do that.
  - a. Answer for the camera-based system
  - b. Answer for the wearable system