

CSE848: Evolutionary Computation
Michigan State University
Assignment HA2: Home Assignment 2

Since we need the framework from now on, install Jupyter Lab or Notebooks on your computer. This will enable you to code in an environment that allows you to learn along the way and experiment with different settings. Also, some assignments require you to submit code in Jupyter notebook form. If you are not familiar with the framework, starting now will allow you to get accustomed to it. You can freely download it from <https://jupyter.org/>

In order to answer the questions below, you can already use a notebook: Copy the tasks below into markdown cells and answer them in the markdown cells. Use a different cell for different sub-tasks. Upload the notebook to the course D2L site – > Assessments – > Assignments – > Assignment 2.

1. There is much current research in producing autonomous vehicles that can be used on real roads. For each of the following capabilities that such a system should exhibit, state whether they are an optimisation, modelling, or simulation problem. Explain your reasoning.
 - (a) Steering in the middle of the road.
 - (b) Avoiding a child that runs into the road.
 - (c) Recognizing a traffic sign in a video feed as the vehicle drives along.
 - (d) Planning shortest, or quickest, route between two places.
 - (e) Learning to recognize traffic signs.

2. List the three kinds of learning that can be discerned in Machine Learning. Give an example of each and explain, why it falls into that category of learning.

3. The use of datasets in Machine Learning
 - (a) Explain the difference between the three uses of datasets common in Machine Learning:
 - (i) Training, (ii) validation, and (iii) testing.
 - (b) Suppose your entire dataset has 10,000 samples. Roughly, how would you distribute your samples among them between training, validation and testing?
 - (c) Another method to use datasets in ML is by n-fold cross-validation. Make yourself familiar with this method and explain it briefly. What is the advantage of n-fold cross-validation compared to the previous method?