Project Topics:

You are expected to first of all choose a project topic that you are really interested in. Please pick something that you can get excited and passionate about. Meanwhile, you should also consider the difficulty of each project. Once you chose the topic from the following pool of five topics, it can be very helpful for you to look up existing research on relevant topics by searching related keywords on Google and Google Scholar (http://scholar.google.com).

Topics:

Topic 1 (Difficulty 1.0): Building your COVID-19 Symptoms checker [Life Sciences]

Suggested proposals: In this project, you will be expected to use basic machine learning algorithms like Logistic Regression for classification or K nearest neighbor for clustering to predict whether someone has coronavirus or not.
Data: https://www.kaggle.com/iamhungundji/covid19-symptoms-checker

Topic 2 (Difficulty 1.1): Building your NBA game prediction [Sports]

Suggested proposals: In this project, you will be expected to use base machine learning algorithms like Logistic Regression and decision trees for classification, or other unsupervised learning algorithms to reach some conclusions, e.g., which pair of players tends to win the game.
Data: http://cs229.stanford.edu/proj2019aut/data/assignment_308875_raw/26496823.pdf

Topic 3 (Difficulty 1.2): Building your stock price predictor [Finance]

Suggested proposals: In this project, you will be expected to use either genetic algorithms or regression machine learning algorithms like Ridge Regression, Recurrent Neural Network, and reinforcement learning algorithms to predict the price of a stock in the future.
Data: https://www.kaggle.com/arashnic/time-series-forecasting-with-yahoo-stock-price

Topic 4 (Difficulty 1.2): Building your household animal classification model [Ecology]

Suggested proposals: In this project, you will be expected to use Convolutional Neural Network to predict the label of each image as either a dog or a cat.
Data: https://www.kaggle.com/c/dogs-vs-cats/data

Topic 5 (Difficulty 1.5): Controlling your agents with Reinforcement Learning [Robotics]

Suggested proposals: In this project, you will be expected to use fuzzy logic systems or reinforcement learning algorithms to control the agent to finish the tasks.
Environment: https://gym.openai.com/envs/#classic_control
https://github.com/openai/gym/tree/master/gym/envs/classic_control

Evaluation:

The project will be evaluated based on:
- 60%: The technical correctness and quality of your work. (Does your technical material make sense? Are the submitted codes written completely by the students themselves? Are your proposed algorithms existing or with minor improvements? Do the students have insights?)
- 20%: Presentation of the work (Are the students familiar with the implementation details? Do the students well demonstrate the significance and even novelty of their work?)
- 20%: Final report. (Do the students clearly describe the problem and the techniques for solving the problem? How much is each student's contribution?)

Moreover, we will times the original score of each project with the difficulty coefficient. For example, if a project with difficulty 1.2 scores 90 points, its final score would be 90*1.2 = 108.

Presentation Guidelines:

- Background: What problem are you tackling? What is the setting you are considering?
- Method: Which algorithm (e.g., genetic algorithm, Logistic regression, Convolutional neural network, reinforcement learning) is used and why?
- Experiments: Describe the experiments that you have run, including the prediction accuracy or some analyses that you have done.

Report Guidelines:

- The final report can be at most 3 pages long (including reference works and figures).
- Background
- Method
- Experiments
- Contributions: describe what each team member contributed to the project and how much.

You are also required to submit your codes packaged into a .zip file.

Academic dishonesty:

We will be checking you code against other submissions in the class for logical redundancy. If you copy others' codes and submit with only minor changes, we will know. We trust you all to submit your own original work, instead of copying others'. Please do not try to fool us; otherwise, we will apply the strongest disciplinary actions.

Getting help:

If you find yourself have difficulties and problems, contact the teaching assistant for help. Piazza forums, emails, and the offline Tutorial session are there for your support. Please do not hesitate to use them. We expect the project to be rewarding and inspirational for you, but not demoralizing.