

# BITS F464 Machine Learning

Major Project

March 24, 2020

For your major project of ML course this semester, you'll be required to solve the same cart-pole problem that was given to you in the Resources document, but with a slight twist. As real-world problems generally go, the tasks will have noise in them due to human-error or imperfectness of the observation tool or even a changing environment. You will be working in **teams of upto 3 people**.

## 1 Task

You need to build a Reinforcement learning model that'll balance the pole on a cart which is running on a flat-terrain with noisy set of parameters like *action* and *sensors*. Moreover the values for gravity and friction randomly vary at each step for the same episode. You are required to solve the following sub-tasks (for the given parameters in the code attached):

1. Solve the cart-pole problem with random variation in gravity and friction.
2. Solve the cart-pole problem with the previous setting's noise and noisy controls. This means that the cart's force in the desired direction may be less/more than expected
3. Solve the cart-pole problem with both the previous modifications and noisy sensors/sensor observations of the pole angle at any moment.

## 2 Evaluation

This project counts for 20% (20 marks) towards your final grade. You will be evaluated based on how many trials/runs your agent took to start achieving an average episode score of greater than 480 over the last 100 runs and on code quality. *The lesser number of trials/runs your agent takes, the better is your model.* The marks are divided as follows:

- A report describing your work and individual contributions: 5 Marks
- Successful compilation, execution of the code and code quality : 5 Marks
- Tasks (*Relatively Graded*) : 10 Marks

**NOTE: All models should be your own. No stealing from GitHub. Any kind of plagiarism is strictly prohibited. If these rules are broken, a no marks will be awarded to the entire team.**

## 3 Resources

Here is a [link](#) to the document shared with you earlier.

## 4 Setting Up

- Create a fresh conda environment.

```
conda create -n mlproject python=3.6
```

- Activate the conda environment (do this each time you open a new terminal).

```
conda activate mlproject
```

- Install required packages, Refer to OpenAI Gym's [documentation](#) to install it.

- Locate the OpenAI gym's location of installation.

```
(mlproject) -> % python
Python 3.6.10 |Anaconda, Inc.| (default, Jan 7 2020, 21:14:29)
[GCC 7.3.0] on linux
Type "help", "copyright", "credits" or "license" for more information.
>>> import gym
>>> gym.__file__
'/home/sharan/anaconda3/envs/mlproject/lib/python3.6/site-packages/gym/__init__.py'
```

- Replace the cartpole.py with the files given to solve the corresponding tasks. For example, in

```
/home/sharan/anaconda3/envs/mlproject/lib/python3.6/site-packages/gym/envs/classic_control
```

replace cartpole.py.