Advanced Robotics -- Week 9 Workshop

Task 1: Learning Linear Dynamic Systems

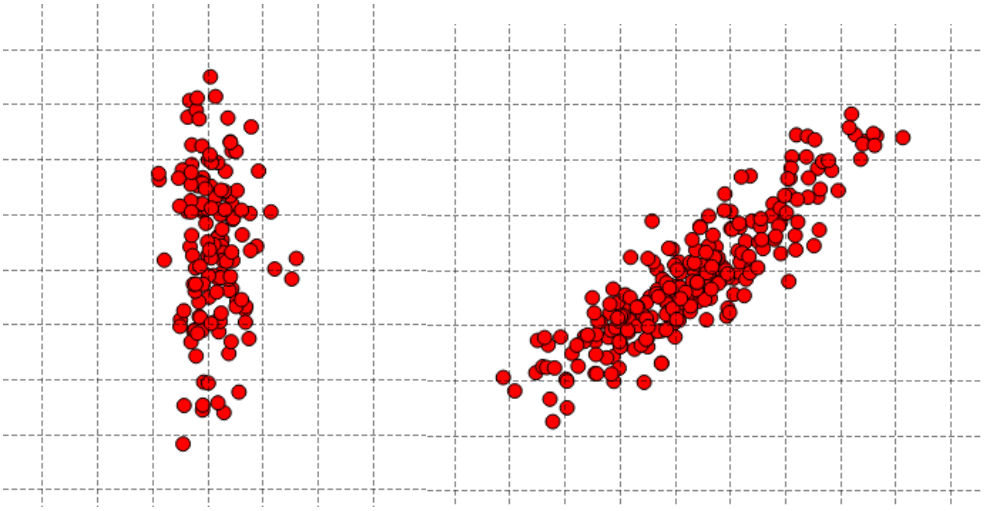
For this task will be developed the code for training stable dynamic systems using Python. The objective is to implement the methods that are currently not implemented

Steps:

1. Download the *Learning_Linear_DS* folder from Blackboard. This contains the code (main.py) and some demonstrations of motions(csv files)
2. Familiarize yourself with the code and read the inline documentation carefully to understand what operations should be performed in each of the unimplemented methods
3. Implement the *motion_model* method. This should return the predicted velocities from the linear dynamical system ($v = Ax$)
4. Implement the *lyapunov_constrains* method. This method is used in constrained optimization, in order to check if the desired constrains are satisfied.
5. Implement the *objective_fun* method. This method calculates the error between the velocities predicted from the linear dynamical system and the demonstrated. Output of this function is minimized by the optimization method
6. Train models for all the demonstrated trajectories (Angle.csv, CShape.csv, Line.csv, Sshape.csv, WShape.csv)
7. Which of the demonstrated trajectories are not modelled accurately by the linear dynamical system? Why?

Task 2: Gaussian Distributions and Likelihood

1. For each of the following datasets, draw approximately the mean, and the lines for one and three standard deviations.



2. Sort the following three gaussian models in order of increasing likelihood