Assignment 1

Machine Learning introduction, data management and background.

1. In the first lectures, we talked about how Machine Learning (ML) interest is growing. Find one newspaper article about a new ML development. Discuss the article, and describe which kind of techniques are they using. Is the development on supervised or unsupervised learning?
2. We did a short tutorial on how to load data using Python and Pandas. As an example, we used the Game of Thrones battle dataset. Go to https://www.kaggle.com/datasets and download a dataset that might interest you. Clean your data, and visualize it, as we did in class. Using the visualizations, draw at least one conclusion of your data. Present the plots you obtained as well as the Python commands that you used. How do you think we could use ML in this dataset?
   Tip: You might need to create a kaggle account.
3. In class, we learned how the eigenvectors of a matrix could describe space transformation. Using the same circle example as in class, generate at least four different matrices, and describe how the eigenvalues of each matrix modify the circle. Plot the results you obtain from the transformation.
4. A man approaches you with two coins; he tells you that each coin is fair (0.5 probability of heads/tails). This mysterious man tells you that if you get tails in both coins at the same time, he'll give you 5 USD, but if you get any other result, you'll have to give him 1 USD. Is this a game you want to play? Describe your reasoning and write up the equations you used to draw your conclusion. Tip: Although we did not see it in class, you can use the concept of expected value and a bit of game theory to solve this problem.
5. In the last example, throwing both coins are said to be independent events. Why? How could you "rig" the game such that they become dependent events of each other? You can describe any technology as complex or as simple as you want.
   Does the fact of making them dependent change the decision you reached in question four?