Homework 1

DS 625: Computing for Data Compression, Image and Signal Processing: Spring 2022

Due: February 14 (Tuesday), 11:59pm

100 points

As mentioned in the course description, DS625 is a project based class. We will have a sequence of 2 homeworks that will correspond to different stages of your overall course project.

Submission Instructions

You homework 1 submission should include a report and the corresponding code for any results included in the report(a zip file containing report + code).

Report (pdf file)

The report needs to have the following sections

1. **Problem Overview [1 page]** : Include a brief explanation of the problem, its importance, and how are you planning to solve this problem.
2. **Background and Literature [1 Page]**: Cite as many research papers as possible (recent preferred) that have handled a problem similar to your case. The similarity can be in terms of
   (a) Solving the same (or very similar) problem but entirely approach (for example instead of using data they might be just using physics to model the same system)
   (b) Solving the same (or very similar) problem with data, but they might be using a different set of attributes.
   (c) Solving the same (or very similar) problem with data and even using the same attributes. Here, you can have novelty in terms of the algorithm you are proposing to be used. Explain how (in your opinion) your proposed approach is expected to outperform what has been proposed before for this case.

   Also cite a few research papers which are helping you to understand your proposed approach better. Developing on your explanation of the literature you cited, include a list of the contributions your project is expected to make.
3. **Data Source [1 Page]**: Describe and cite the source of your data. Can be a website, data portal, or some other related source. If its a simulation dataset, provide a brief description of how you generated this data. Here also describe the attributes and target variable for your dataset.

4. **Proposed approach [1 Page]**: In this section give a brief explanation of the machine learning algorithm(s) you are going to try for your problem. Also include your motivation behind choosing this approach.

5. **Preliminary results [1 Page]**: Include any preliminary results which you might have already obtained for your project.

6. **Roadmap [1 Page]**: Provide a detailed description of your plan for completing this project (Assuming a final submission date of 27th April 2022). Please include a project plan of what do you plan to achieve during:

   (a) Feb 15 - Mar 21 (HW 2 due)

   (b) Mar 22 - April 28 (Final Project due)

7. **References**: Make sure whatever references you mention in this section are cited somewhere in this report. For now you can approximately follow a general format:

   Author names, Paper name, Journal/Conference name, Volume/issue number (if any), Year, Pages

   For example

   [1]: Shekhar, Prashant, and Patra, Abani. 'Hierarchical approximations for data reduction and learning at multiple scales.' *Foundations of Data Science*, 2.2, (2020), 123-154.

Code (.py/.ipynb file)

If you have included any of your preliminary results in the report, submit your python code as well. The submission can be in the form of jupyter notebooks or python scripts. **Please note that code submission is not compulsory for Homework 1**.