**Assignment 4: Data Lab, Decision Tree**

* Due by 14th October, 2022 by 5pm IST.
* To be submitted to the following email address: office.of.gr@gmail.com
* The subject of the email should be: Assignment Number [4]: Data Lab, 2022
* Please clearly mention your name and roll number.
* Submit your work as a single pdf file. Additional material,

code, etc can/should also be submitted, but there should be atleast 1 pdf, which has the

entire assignment.

* Wherever there is code, in the assignments, the code should be

well documented and easy to understand / follow.

The objective of the assignments is three fold. One is to be able to develop expertise in writing and communicating about technical topics. This will be done by using the IEEE conference style format for all assignments. The other is to explain, in your own way, the mathematical ideas that are embedded within the technical topic of interest. For example, in this case it is decision tree. The third is to use the topic, in this case of decision tree, to understand a problem from the real world. So in a sense the objective is to write what one may call a mathematical essay on decision tree.

Title could be: Assignment 4: a mathematical essay on decision tree.

Abstract: Give a brief overview of your assignment.

Author: Name, Department, Institution, Email

**Section 1: Introduction**

In this section, the 1st paragraph should be on a broad overview of the topic. The 2nd paragraph should be an overview of the technical aspects (i.e. in this case it is a decision tree). The 3rd paragraph should be about the problem that you are aiming to solve/understand using decision tree. Finally, the 4th paragraph should give an overview of the paper.

**Section 2: Decision Tree**

This section should outline the key principles underlying decision tree.

**Section 3: Data**

The *Car Evaluation Database* was derived from a simple hierarchical decision model. The prediction task is to classify a car based on its safety. The data is provided in the car\_evaluation.csv file.

| **Variable** | **Definition** | **Key** |
| --- | --- | --- |
| buying | buying price | vhigh, high, med, low |
| maint | Price of the maintenance | vhigh, high, med, low |
| doors | Number of doors | 2, 3, 4, 5, more |
| persons | Capacity in terms of persons to carry | 2, 4, more |
| lug\_boot | The size of luggage boot | small, med, big |
| safety | Estimated safety of the car | low, med, high |
| Target | Target variable to predict | unacc, acc, good, vgood |

**Section 4: The problem**

(a) Outline the problem, and plot/visualise the data.

(b) Make progress on the problem, by applying the techniques of decision tree to the problem at hand.

(c) Discuss any insights and observations.

**Section 5: Conclusions**

Write about 1 paragraph on the key insights that were obtained from your study and also outline any further avenues of possible investigation.

**References**

Please put in all the references that you have used during the assignment. The format should be the same as the IEEE conference format.