Q1 Exam regulations
0 Points

BBM406 Honor Code

I promise that, for the BBM406 Final Exam

- All my exam work will be done entirely by myself, with no help from others;
- I will not communicate with anybody except the proctors during the exam;
- I will not consult any people or sources other than my printed/handwritten course notes, slides and the reference books listed in the course webpage;
- I will not provide any information about the exam's contents to other students until the exam deadline; and
- I will turn on my camera on Zoom session during the whole exam period.

Understanding this, I pledge my honor that I will not violate this Honor Code during the exam. I certify that all solutions will be entirely my own, that I will not consult people or sources other than those permitted, and that I will not share information with others during the exam.

Do NOT sign nor take this exam if you do not agree with this.

Signature (Specify your name and surname as your signature)
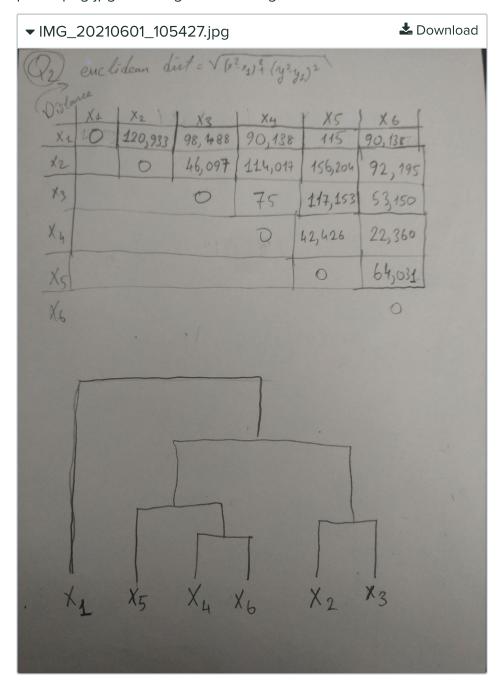
MTUSTA Mehmet Taha USTA

Q2 Clustering
28 Points

Question 1 – Part 2. *Clustering* [28 POINTS]

Consider the following set of samples where each sample is represented in terms of a 2-dimensional feature vector.

Sample	Feature-1	Feature-2
x_1	125	30
x_2	110	150
x_3	85	120
x_4	40	60
x_5	10	30
x_6	50	80

Assuming that the distances between clusters are estimated by using L1-norm, perform hierarchical agglomerative clustering with single-link. Please specify the clustering result in terms of a dendrogram (cluster tree).

Please attach your solution to Question 1 of Part 2 (Clustering) as a pdf or png/jpg file using the following link:

▾ IMG_20210601_105427.jpg   ⬇ Download

Q3 Decision Trees
28 Points

Question 2 – Part 2. *Decision Trees* [28 POINTS]

Consider the following set of samples which are used to learn a decision tree (without any pruning) to predict whether a lightsaber belongs to a Jedi Guardian or Jedi Consular.

Crystal	Color	Type	Jedi
Azure	Blue	Retrosaber	Guardian
Danite	Blue	Retrosaber	Guardian
Danite	Purple	Retrosaber	Guardian
Danite	Purple	Double-bladed	Guardian
Azure	Blue	Double-bladed	Guardian
Danite	Blue	Double-bladed	Consular
Danite	Green	Double-bladed	Consular
Azure	Magenta	Double-bladed	Consular
Azure	Blue	Protosaber	Consular
Azure	Purple	Protosaber	Consular
Danite	Purple	Protosaber	Consular

(a) [5 POINTS] What is the entropy *H(Jedi|Type=Retrosaber or Type=Double-bladed)*?

(b) [5 POINTS] Which attribute would be chosen for the root of the decision tree? *You need to provide all the necessary computations while answering this question.*

(c) [12 POINTS] Draw the full decision tree that is learned from the given dataset. *You need to provide all the necessary computations while answering this question.*

(d) [6 POINTS] Suppose that the following table shows a validation set.

Crystal	Color	Type	Jedi
Azure	Blue	Double-bladed	Consular
Danite	Blue	Double-bladed	Consular
Azure	Purple	Double-bladed	Guardian

Please specify both the training set error and validation set error for the tree you estimated in part (c)?

Please attach your solution to Question 2 of Part 2 (Decision Trees) as a pdf or png/jpg file using the following link:

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Final Exam - Part 2　　　　　　　　　　● GRADED

STUDENT

MEHMET TAHA USTA

TOTAL POINTS

28 / 56 pts

QUESTION 1

Exam regulations　　　　　　　　　　　　　　　　**0** / 0 pts

QUESTION 2

Clustering　　　　　　　　　　　　　　　　　　**28** / 28 pts

QUESTION 3

Decision Trees　　　　　　　　　　　　　　　　**0** / 28 pts