

Unit 5 - Week 4-Inductive Learning based on Symbolic Representations and Weak Theories

Course outline

- How does an NPTEL online course work?
- Week 1-Introduction to the Machine Learning course
- Week 2-Characterization of Learning Problems
- Week 3-Forms of Representation
- Week 4-Inductive Learning based on Symbolic Representations and Weak Theories**
 - Inductive Learning based on Symbolic Representations and Weak Theories
 - Generalization as Search - Part 01
 - Generalization as Search - Part 02
 - Decision Tree Learning Algorithms - Part 01
 - Decision Tree Learning Algorithms - Part 02
 - Instance Based Learning - Part 01
 - Instance Based Learning - Part 02
 - Cluster Analysis
 - Lecture Notes
 - Quiz : Assignment 4**
 - Week 4 Feedback
- Week 5-Learning enabled by Prior Theories
- Week 6-Machine Learning based Artificial Neural Networks
- Week 7 - Tools and Resources and Interdisciplinary Inspiration
- Text Transcripts
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Assignment 4

The due date for submitting this assignment has passed. **Due on 2020-03-25, 23:59 IST.**
 As per our records you have not submitted this assignment.

1) The different data-driven search approaches to induction require different storage policies. What does the Version space approach algorithm has to store? **1 point**

- All positive examples + All negative examples + All hypotheses
- All positive examples + all hypotheses
- All negative examples + all hypotheses
- All hypotheses

No, the answer is incorrect.
 Score: 0
 Accepted Answers:
 All hypotheses

Consider the following for answering questions 2-4:
 How does the set of hypotheses look like after having handled the following three instances:

- Instance 1. { (Angry Black horse) (happy Brown Cow) } positive
- Instance 2. { (Angry Brown Cow) (happy Black horse) } positive
- Instance 3. { (Angry Brown horse) (happy Brown horse) } negative

2) Using Depth-First Search **1 point**

- CBH3 = {(Angry ? ?) (happy ? Cow) }
- CBH3 = {(Angry ? horse) (happy ? ?) }
- CBH3 = {(Black horse) (? Brown Cow) }

No, the answer is incorrect.
 Score: 0
 Accepted Answers:
 CBH3 = {(Black horse) (? Brown Cow)}

3) Using Breadth-First Search **1 point**

- S3 = {(Angry ? ?) (happy ? Cow) }
- S3 = {(Black horse) (? Brown Cow) }
- S3 = {(Angry ? ?) (happy ? ?) }

No, the answer is incorrect.
 Score: 0
 Accepted Answers:
 S3 = {(Black horse) (? Brown Cow)}

4) Using the Version space approach **1 point**

- S3 = {(Angry ? ?) (Small ? Cow) } G3 = {(Black ?) (? ? Cow) } {(? ? Cat) (? Brown ?) }
- S3 = {S3 = {(Angry ? ?) (Small ? ?) } G3 = {(Black ?) (? Brown ?) } {(? ? Cat) (? ? horse) }
- S3 = {(Black horse) (? Brown Cow) } G3 = {(Black ?) (? ? ?) } {(? ? Cat) (? ? ?) }

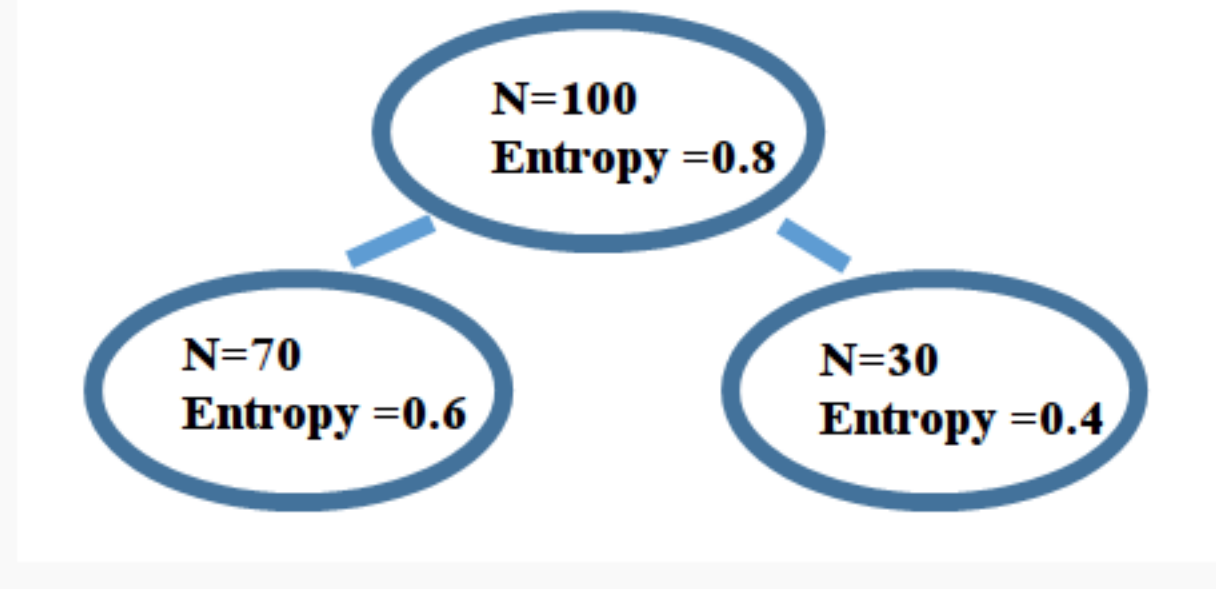
No, the answer is incorrect.
 Score: 0
 Accepted Answers:
 S3 = {(Black horse) (? Brown Cow) } G3 = {(Black ?) (? ? ?) } {(? ? Cat) (? ? ?) }

5) What is the entropy for a decision tree data-set with 8 positive and 2 negative examples. **0 points**

- 0.740
- 0.840
- 0.43

No, the answer is incorrect.
 Score: 0
 Accepted Answers:
 0.43

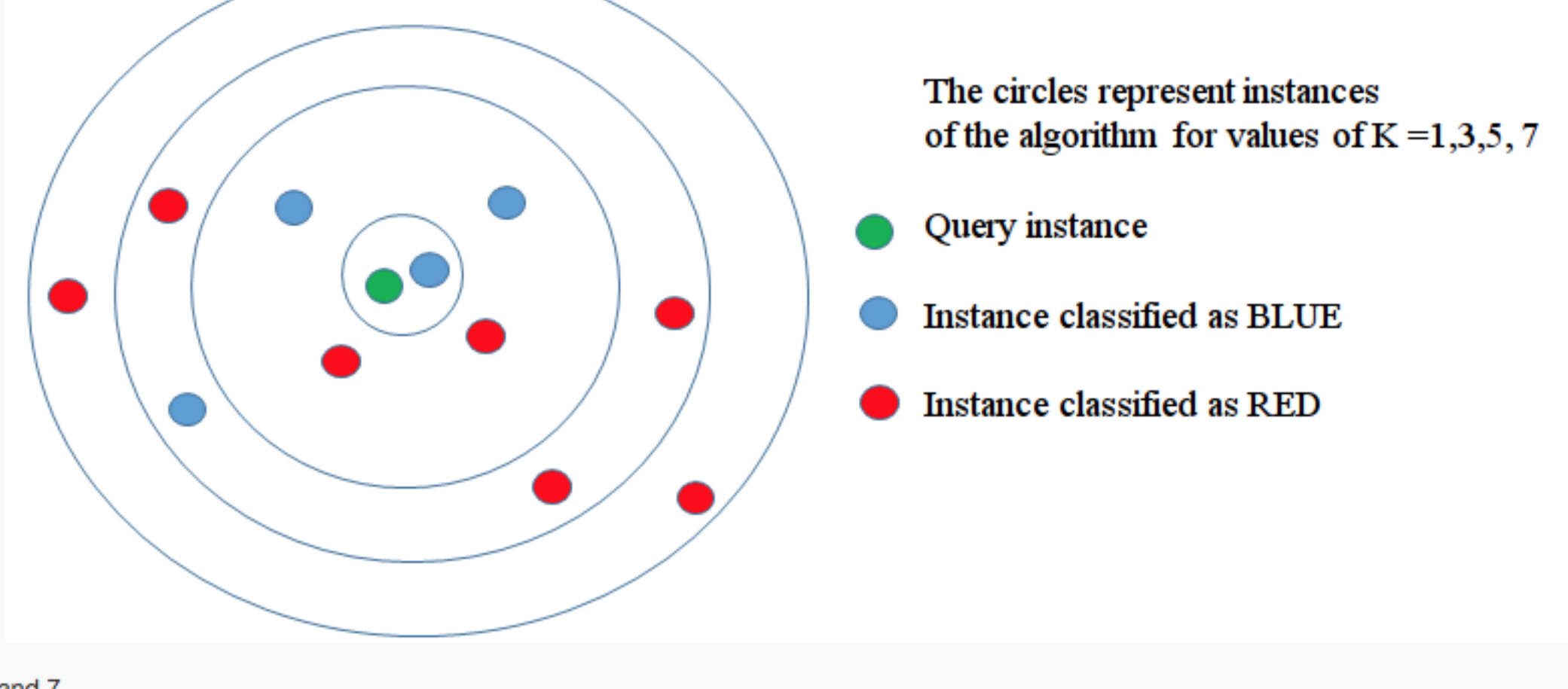
6) What is the value of the Information Gain in the following partitioning?: **2 points**



0.32
 0.42
 0.18
 0.26

No, the answer is incorrect.
 Score: 0
 Accepted Answers:
 0.26

7) For which values of k is the query instance classified as BLUE by the k-nearest neighbour algorithm? **1 point**



3 and 7
 1 and 3
 3 and 5
 1 and 7

No, the answer is incorrect.
 Score: 0
 Accepted Answers:
 1 and 3

8) For the two feature vectors (1,1,1,0,0,0,1) and (0,0,1,1,1, 1, 1). **1 point**

What is the Manhattan distance between the two vectors?

- 5
- 3
- 2
- 4

No, the answer is incorrect.
 Score: 0
 Accepted Answers:
 5

9) Consider the following two vectors: **3 points**

$$X = [3, 3, 0, 3, 0, 0, 0]$$

$$Y = [3, 0, 3, 3, 0, 0, 0]$$

What is the cosine similarity between X and Y?

- 0.49
- 0.67
- 0.76
- 0.38

No, the answer is incorrect.
 Score: 0
 Accepted Answers:
 0.67

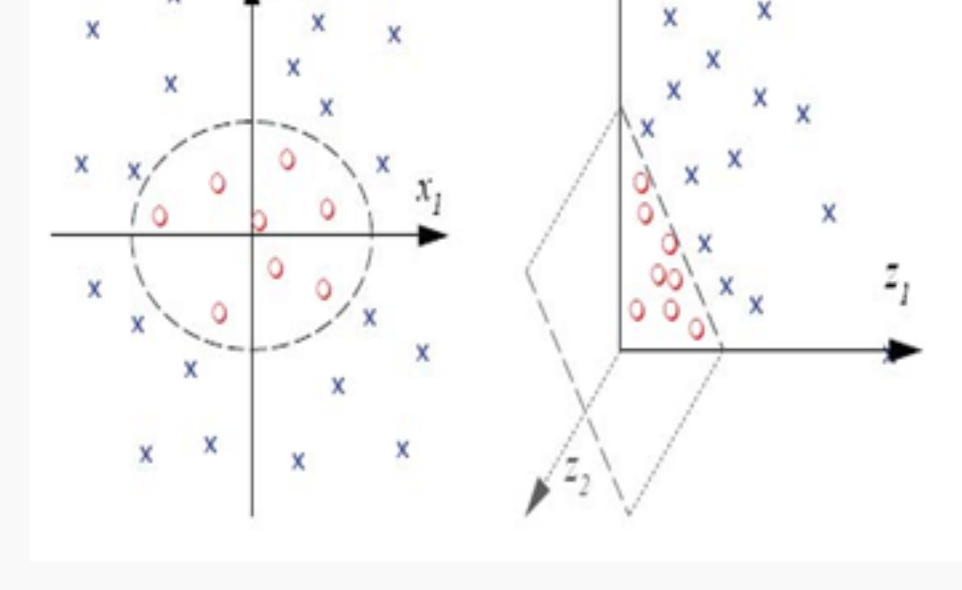
10) Consider a two-dimensional non linearly separable input space and the following feature mapping onto a linearly separable three dimensional space: **4 points**

$$X: F : (x_1, x_2) \rightarrow (x_1^2, x_2^2, \sqrt{2}x_1x_2)$$

$$Z: F : (z_1, z_2) \rightarrow (z_1^2, z_2^2, \sqrt{2}z_1z_2)$$

$K(X,Z)$ = the Kernel or Similarity function in the three dimensional space = the inner product of X and Z in that space : $\langle X, Z \rangle$

Calculate $K(X,Z)$ = the inner product of X and Z above for the two two dimensional vectors of (1,2) and (2,1) in the input space.



4
 12
 16
 8

No, the answer is incorrect.
 Score: 0
 Accepted Answers:
 16

11) DBSCAN is a specific clustering technique. **1 point**

To which category of clustering techniques does it belong?

- Partitioning-based clustering
- Hierarchical-based Clustering
- Density-based clustering
- Grid-based clustering
- Model-based clustering

No, the answer is incorrect.
 Score: 0
 Accepted Answers:
 Density-based clustering

12) What is the proximity matrix between the two clusters AB and CD given the distance matrix : **2 points**

	A	B	C	D	E	F
A	0	1	5	3	7	9
B	1	0	3	5	9	7
C	5	3	0	1	2	4
D	3	5	1	0	4	2
E	7	9	2	4	0	1
F	9	7	4	2	1	0

- | | | |
|----|----|----|
| AB | CD | EF |
| 0 | 2 | 8 |
| 3 | 0 | 4 |
| 6 | 4 | 0 |
- | | | |
|----|----|----|
| AB | CD | EF |
| 0 | 3 | 6 |
| 3 | 0 | 4 |
| 6 | 4 | 0 |
- | | | |
|----|----|----|
| AB | CD | EF |
| 0 | 4 | 8 |
| 4 | 0 | 3 |
| 8 | 3 | 0 |

No, the answer is incorrect.
 Score: 0
 Accepted Answers:

AB	CD	EF
0	4	8
4	0	3
8	3	0