

Exercises and Labs 1 for Lecture “Authentication „ (M.Sc.)

Exercise 1.1 List a number of applications of classification, additional to those mentioned in the lecture.

Exercise 1.2 Consider the data of four adults, indicating their weight (actually, their mass) and their health status. Devise a simple classifier that can properly classify all four patterns. How is a fifth adult of weight 76 kg

Weight (kg)	Class label
50	Unhealthy
60	Healthy
70	Healthy
80	Unhealthy

classified using this classifier?

Exercise 1.3 Consider the following items bought in a supermarket and some of their characteristics:

Item no.	Cost (\$)	Volume (cm ³)	Color	Class label
1	20	6	Blue	Inexpensive
2	50	8	Blue	Inexpensive
3	90	10	Blue	Inexpensive
4	100	20	Red	Expensive
5	160	25	Red	Expensive
6	180	30	Red	Expensive

Which of the three features (cost, volume and color) is the best classifier?

Exercise 1.4 Consider the problem of classifying objects into circles and ellipses. How would you classify such objects?

Exercise 1.5 Discuss the invariance of shape features to translation, rotation, scaling, noise, and illumination. Illustrate your answer with specific examples of features.

Exercise 1.6 Explain the following terms (1) a pattern, (2) a class, (3) a classifier, (4) feature space, (5) a decision rule, and (6) a decision boundary.

Exercise 1.7 What is a training set? How is it chosen? What influences its desired size?

Exercise 1.8 There are two cookie jars: jar 1 contains two chocolate chip cookies and three plain cookies, and jar 2 contains one chocolate chip cookie and one plain cookie. Blindfolded Fred chooses a jar at random and then a cookie at random from that jar. What is the probability of him getting a chocolate chip cookie? (Hint: use a decision tree).