

Multimedia II: Machine Learning & Computer Vision SS18

Assignment 03

Multimedia Computing Lab
Prof. Dr. Rainer Lienhart

Submitting your solution is not mandatory. Your solutions will be discussed in the exercise on May 17th, 2018.

Exercise 1 (Conjunctions of Boolean Attributes)

1. Consider a learning problem where each instance is described by a conjunction of n Boolean attributes a_1, \dots, a_n . Thus, a typical instance would be

$$x = (a_1 = T) \wedge (a_2 = F) \wedge \dots \wedge (a_n = T)$$

Now consider a hypothesis space H in which each hypothesis is a disjunction of constraints over these attributes. For example, a typical hypothesis would be

$$h = (a_1 = T) \vee (a_{23} = F) \vee \dots \vee (a_{42} = T)$$

Propose an algorithm that accepts a sequence of training examples and outputs a consistent hypothesis if one exists.

2. Provide traces of the algorithm you proposed in 1) for the following sequences of training examples ($n = 3$):

Instance	a_1	a_2	a_3	Classification
1	T	T	F	+
2	F	F	F	+
3	T	F	T	-

Instance	a_1	a_2	a_3	Classification
1	T	F	F	-
2	F	T	F	+
3	T	F	F	+

Exercise 2 (Version Spaces)

Complete the proof of the version space representation theorem (Theorem 2.1, p.32, Mitchell).