

Exercise Sheet 8

Exercise 29 Coding Theory: Shannon-Fano and Huffman Code

Determine

- a) a Shannon-Fano coding scheme/question tree and
- b) a Huffman coding scheme/question tree

for the symbols s_1 to s_6 , which occur with the probabilities

$$P(s_1) = 0.05, P(s_2) = 0.10, P(s_3) = 0.12, P(s_4) = 0.20, P(s_5) = 0.25, P(s_6) = 0.28,$$

respectively! Compute the average code length and the code efficiency!
(code efficiency: ratio of Shannon entropy to average code length)

Exercise 30 Decision Trees: Attribute Selection Measures

Compute the information gain and the χ^2 measure for the following two contingency tables, which refer to two descriptive attributes A , B and one class attribute C !

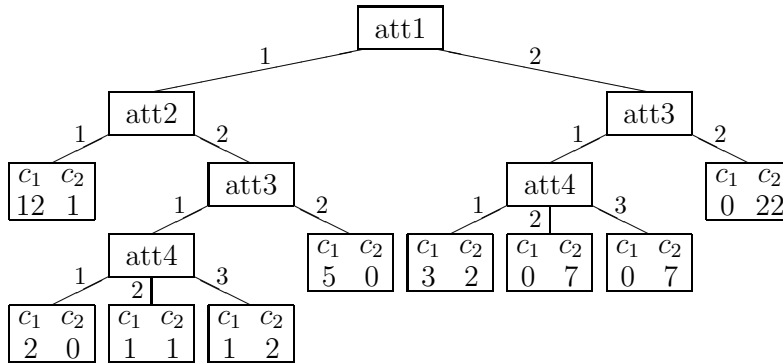
		A		
		a_1	a_2	a_3
C	c_1	9	4	3
	c_2	3	9	4
	c_3	4	3	9

		B		
		b_1	b_2	b_3
C	c_1	9	4	3
	c_2	6	6	4
	c_3	1	6	9

How may one describe the selection behavior of the two measures intuitively?
(Hint: Mind the first row and the last column of the two tables.)

Exercise 31 Decision Trees: Pruning

Prune the following decision tree using the approach of pessimistic pruning!
(parameter: 0.5 additional errors)



Additional Exercise Lagrange Theory

Determine the minimum of the function $f(x, y) = xy^2 + x + 2y$ under the constraints $xy = 1$ and $x > 0$ with the help of the method of Lagrange multipliers!