Exercise 8

8.11.2022

#1 Multiattribute utility theory and decision trees

A company is thinking of launching a new smartwatch to the market. The company has two choices: either they can launch the watch right away or wait for another six months during which they can develop an additional feature for it.

The decision about whether to launch the smartwatch now or later is made with respect to two attributes: profit and market share. The outcomes on these attributes depend on whether the development process of the new feature is successful or not, and whether the company's product beats the competitor's on the market:

	Launch now		Development succeeds		Development fails	
	Win	Lose	Win	Lose	Win	Lose
Profit	20M€	10M€	50M€	5M€	10M€	-5M€
Market share	65%	35%	85%	15%	65%	15%

The probability of the company's product winning is 50% if the product is launched right away. If the company decides to develop the additional feature and succeeds in doing so, the probability of winning is 85%. If the development process fails, the probability of winning is 15%. The probability that development succeeds is 70%.

a) Let the attributes' measurement scales be [-5M€, 50M€] and [15%, 85%]. The attribute-specific utility function for profit is $u_1(x_1) = 1 - e^{\frac{-x_1}{50}}$ (x_1 measured in M€) and for market share $u_2(x_2) = 1 - e^{-2x_2}$ (x_2 measured as fractions). Determine the normalized attribute-specific utility functions.
b) Assume that the attributes are mutually preferentially independent and additive independent. The company manager states that increasing market share from 15% to 85% is equally preferred to increasing profit from 5M€ to 50M€. Determine the attribute weights.
c) Build the decision tree for the company's decision problem. What is your decision recommendation: should they launch the smartwatch now or later?