

## Agenttipohjaisen tietojenkäsittelyn perusteet

## Laskuharjoitus 8

## Tehtävät

1. Apply the CURRENT-BEST-LEARNING algorithm to the set of examples given in the restaurant example:

Example	Attributes										Goal
	Alt	Bar	Fri	Hun	Pat	Price	Rain	Res	Type	Est	WillWait
$X_1$	Yes	No	No	Yes	Some	\$\$\$	No	Yes	French	0–10	Yes
$X_2$	Yes	No	No	Yes	Full	\$	No	No	Thai	30–60	No
$X_3$	No	Yes	No	No	Some	\$	No	No	Burger	0–10	Yes
$X_4$	Yes	No	Yes	Yes	Full	\$	No	No	Thai	10–30	Yes
$X_5$	Yes	No	Yes	No	Full	\$\$\$	No	Yes	French	>60	No
$X_6$	No	Yes	No	Yes	Some	\$\$	Yes	Yes	Italian	0–10	Yes
$X_7$	No	Yes	No	No	None	\$	Yes	No	Burger	0–10	No
$X_8$	No	No	No	Yes	Some	\$\$	Yes	Yes	Thai	0–10	Yes
$X_9$	No	Yes	Yes	No	Full	\$	Yes	No	Burger	>60	No
$X_{10}$	Yes	Yes	Yes	Yes	Full	\$\$\$	No	Yes	Italian	10–30	No
$X_{11}$	No	No	No	No	None	\$	No	No	Thai	0–10	No
$X_{12}$	Yes	Yes	Yes	Yes	Full	\$	No	No	Burger	30–60	Yes

Use the following first hypotheses:

- $\forall x (WillWait(x) \leftrightarrow Hungry(x))$
- $\forall x (WillWait(x) \leftrightarrow WaitEstimate(x, 30-60))$

2. Our favorite *Surprise* candy comes in two flavors, cherry and lime, but they are wrapped in an indistinguishable way. The candy is sold in large (indistinguishable) bags containing various mixtures of the two flavors:

- a 100% cherry
- b 75% cherry and 25% lime
- c 50% cherry and 50% lime
- d 25% cherry and 75% lime
- e 100% lime

Suppose that we open a new bag of candy and unwrap 4 pieces out of which three turn out to be cherry-flavored. The mixtures above can be interpreted as hypotheses  $h_1-h_5$  about the contents of the bag.

- (a) Which one is the most likely (ML) hypothesis?
- (b) Suppose that the prior distribution of the bags is  $\langle 0.1, 0.1, 0.1, 0.6, 0.1 \rangle$ . Find out the maximum a posteriori (MAP) hypothesis.
- (c) Estimate the probability that the fifth piece of candy is lime-flavored.