

Tutorium 10 - Klassifikation & Naïve Bayes

Übungen

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Übung 1

Verwendet dieses Naïve-Bayes-Modell, um die Dokumente als *SPAM* oder *HAM* zu klassifizieren!

	$P(SPAM)$	$P(HAM)$
a priori	0.750	0.250
w	$P(w SPAM)$	$P(w HAM)$
all	0.064	0.066
available	0.070	0.059
beware	0.047	0.089
employees	0.043	0.099
filter	0.054	0.078
get	0.078	0.054
new	0.064	0.066
now	0.086	0.049
of	0.064	0.066
our	0.067	0.063
pill	0.095	0.044
smart	0.070	0.059
spam	0.045	0.094
to	0.064	0.066
weightloss	0.090	0.047

- 1 new weightloss pill now available
- 2 get our new smart spam filter
- 3 to all employees: beware of spam

Übung 1 - Musterlösung

- 1 new weightloss pill now available

$$P(\text{SPAM}|d1) = 0.000002471$$

$$P(\text{HAM}|d1) = 0.000000099$$

- 2 get our new smart spam filter

$$P(\text{SPAM}|d2) = 0.000000043$$

$$P(\text{HAM}|d2) = 0.000000024$$

- 3 to all employess: beware of spam

$$P(\text{SPAM}|d3) = 0.000000018$$

$$P(\text{HAM}|d3) = 0.00000006$$

Übung 2

Verwendet diese Dokumente, um die Parameter eines Naïve-Bayes-Modells zu schätzen!

Verwendet dabei Addiere-Eins-Glättung (Laplace-Glättung mit $\alpha = 1$)!

SPAM	buy gold very much gold now
HAM	Breaking news: Gold bars stolen from local bank
SPAM	stop breaking a sweat, your new life starts now

Übung 2 - Musterlösung

- $P(SPAM) = 0.67$
- $P(HAM) = 0.33$

w	$P(w SPAM)$	$P(w HAM)$
a	$\frac{2}{35} = 0.057$	$\frac{1}{28} = 0.036$
bank	$\frac{1}{35} = 0.029$	$\frac{2}{28} = 0.071$
bars	$\frac{1}{35} = 0.029$	$\frac{2}{28} = 0.071$
breaking	$\frac{2}{35} = 0.057$	$\frac{2}{28} = 0.071$
buy	$\frac{2}{35} = 0.057$	$\frac{2}{28} = 0.071$
from	$\frac{1}{35} = 0.029$	$\frac{2}{28} = 0.071$
gold	$\frac{3}{35} = 0.086$	$\frac{2}{28} = 0.071$
life	$\frac{2}{35} = 0.057$	$\frac{1}{28} = 0.036$
local	$\frac{1}{35} = 0.029$	$\frac{2}{28} = 0.071$
much	$\frac{2}{35} = 0.057$	$\frac{1}{28} = 0.036$
new	$\frac{2}{35} = 0.057$	$\frac{1}{28} = 0.036$
news	$\frac{1}{35} = 0.029$	$\frac{2}{28} = 0.071$
now	$\frac{3}{35} = 0.086$	$\frac{1}{28} = 0.036$
starts	$\frac{2}{35} = 0.057$	$\frac{1}{28} = 0.036$
stolen	$\frac{1}{35} = 0.029$	$\frac{2}{28} = 0.071$
stop	$\frac{2}{35} = 0.057$	$\frac{1}{28} = 0.036$
sweat	$\frac{2}{35} = 0.057$	$\frac{2}{28} = 0.071$
very	$\frac{2}{35} = 0.057$	$\frac{2}{28} = 0.071$
your	$\frac{2}{35} = 0.057$	$\frac{1}{28} = 0.036$
UNKNOWN	$\frac{1}{35} = 0.029$	$\frac{1}{28} = 0.036$

Übung 3

Berechnet die Werte *Accuracy*, *Precision*, *Recall* & *F1-Score* für beide Klassen!

-		Echte Klasse:	
		SPAM	HAM
Vorhergesagte Klasse:	SPAM	76	10
	HAM	15	40

Übung 3 - Musterlösung

- $Acc = \frac{76+40}{76+10+15+40} = 0.823$
- $Prec(SPAM) = \frac{76}{76+10} = 0.884$
- $Rec(SPAM) = \frac{76}{76+15} = 0.835$
- $F1(SPAM) = \frac{2*0.884*0.835}{0.884+0.835} = 0.859$
- $Prec(HAM) = \frac{40}{15+40} = 0.727$
- $Rec(HAM) = \frac{40}{10+40} = 0.800$
- $F1(HAM) = \frac{2*0.727*0.800}{0.727+0.800} = 0.762$