Naïve Bayes Hypothesis

Dr. Muhammad Wasim

Example

f_1	f_2	f_3	f_4	y
0	1	1	0	1
0	0	1	1	1
1	0	1	0	1
0	0	1	1	1
0	0	0	0	1
1	0	0	1	0
1	1	0	1	0
1	0	0	0	0
1	1	0	1	0
1	0	1	1	0

$R_1(1,1) = 1/5$: fraction of all positive examples that have feature 1 on

$R_1(0,1) = 4/5$: fraction of all positive examples that have feature 1 off

Example (Cont.)

f_1	f_2	f_3	f_4	y
0	1	1	0	1
0	0	1	1	1
1	0	1	0	1
0	0	1	1	1
0	0	0	0	1
1	0	0	1	0
1	1	0	1	0
1	0	0	0	0
1	1	0	1	0
1	0	1	1	0

$R_1(1,1) = 1/5$: fraction of all positive examples that have feature 1 on

$R_1(0,1) = 4/5$: fraction of all positive examples that have feature 1 off

$R_1(1,0) = 5/5$: fraction of all negative examples that have feature 1 on

$R_1(0,0) = 0/5$: fraction of all negative examples that have feature 1 off

Example (cont.)

f_1	f_2	f_3	f_4	y
0	1	1	0	1
0	0	1	1	1
1	0	1	0	1
0	0	1	1	1
0	0	0	0	1
1	0	0	1	0
1	1	0	1	0
1	0	0	0	0
1	1	0	1	0
1	0	1	1	0

$R_1(1,1) = 1/5$ $R_1(0,1) = 4/5$
$R_1(1,0) = 5/5$ $R_1(0,0) = 0/5$

$R_2(1,1) = 1/5$ $R_2(0,1) = 4/5$
$R_2(1,0) = 2/5$ $R_2(0,0) = 3/5$

$R_3(1,1) = 4/5$ $R_3(0,1) = 1/5$
$R_3(1,0) = 1/5$ $R_3(0,0) = 4/5$

$R_4(1,1) = 2/5$ $R_4(0,1) = 3/5$
$R_4(1,0) = 4/5$ $R_4(0,0) = 1/5$

Prediction

- These R values actually represent the hypothesis and is used to classify the new input.

$R_1(1,1) = 1/5$	$R_1(0,1) = 4/5$
$R_1(1,0) = 5/5$	$R_1(0,0) = 0/5$
$R_2(1,1) = 1/5$	$R_2(0,1) = 4/5$
$R_2(1,0) = 2/5$	$R_2(0,0) = 3/5$
$R_3(1,1) = 4/5$	$R_3(0,1) = 1/5$
$R_3(1,0) = 1/5$	$R_3(0,0) = 4/5$
$R_4(1,1) = 2/5$	$R_4(0,1) = 3/5$
$R_4(1,0) = 4/5$	$R_4(0,0) = 1/5$

New x = <0,0,1,1>

$S(1) = R_1(0,1) \times R_2(0,1) \times R_3(1,1) \times R_4(1,1) = .205$

$S(0) = R_1(0,0) \times R_2(0,0) \times R_3(1,0) \times R_4(1,0) = 0$

S(1) > S(0), so predict class 1