NEW YORK INSTITUTE OF TECHNOLOGY
College of Engineering and Computing Sciences
DTSC 620 (Fall 2022)
Classification with Bayes' Classification Rule

Table 1 gives the joint distribution between two binary-valued features and three classes {U_1, U_2, U_3}.

f_1	f_2	U	P (f_1, f_2, U)
1	0	U_1	0.1
0	0	U_1	0.1
0	1	U_1	0.1
1	1	U_1	0.1
1	0	U_2	0.1
0	0	U_2	0.05
0	1	U_2	0.05
1	1	U_2	0. 05
1	0	U_3	0.1
0	0	U_3	0.2
0	1	U_3	0.05
1	1	U_3	0.0

Table 1.

(a) Given a test feature vector <f'$_1$ =0, f'$_2$ = 0>, use Bayes classification rule and the information provided in **Table 1**, to find the class to which this vector belongs**.**

<f1 = 0, f2 = 0> => U3

P(f1 = 0, f2 = 0, U = U1) = 0.1
P(f1 = 0, f2 = 0, U = U2) = 0.05
P(f1 = 0, f2 = 0, U = U3) = 0.2

(b) Given the test feature f'$_1$ = 0, use Bayes classification rule and the information provided in **Table 1**, to find the class to which this vector belongs**.**

f '1 = 0 => U3

P(f '1 = 0, U = U1) => 0.1+ 0.1 => 0.2
P(f '1 = 0, U = U2) => 0.05+ 0.05 => 0.1
P(f '1 = 0, U = U3) => 0.2+ 0.05 => 0.25