mlearn 310 HW2

(1) Naive Bayes

Senior	High	HighSchool	Yes	?

P(Age=Senior) = 3/11

P(Income=High) = 4/11

P(Edu=Highschool) = 4/11

P(Prior=Yes) = 5/11

BuyPC=

P(Yes) = 5/11

P(BuyPC=NO) = 6/11

Frequency Tables

		BUY PC?		
		Yes	NO	
Income	Low	1/4	3/4	4/11
	Medium	1/3	2/3	3/11
	High	3/4	1/4	4/11

		BUY PC?		
		YES	NO	
Education	College	4/7	3/7	7/11
	HighSchool	1/4	3/4	4/11

		BUY PC?		
		Yes	NO	
Prior Purchase	YES	4/5	1/5	5/11
	NO	1/6	5/6	6/11

		BUY PC?		
		YES	NO	
Age	Young Adult	3/4	1/4	4/11
	Middle Age	1/4	3/4	4/11
	Senior	1/3	2/3	3/11

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(1.2) NaiveBayes

Y = Senior, High, HighSchool(, Yes)

$$P(Y/BuyPC=Yes) = P(Age=senior/Buy=Yes) * P(Income=High/Buy=Yes) * P(Edu=HighSchool/Buy=Yes) * P(Prior=Yes/Buy=Yes)$$

$$= 1/3 * 3/4 * 1/4 * 4/5$$

$$P(BuyPC=YES/Y) = P(Y/Buy=Yes)\ P(Buy=Yes)$$

$$= \frac{1}{3} * 2/4 * 1/4 * 4/5 * 5/11$$

$$= 1/44$$

$$P(BuyPC=NO/Y) = P(Y/Buy=NO)\ P(Buy=NO)$$

$$= 2/3 * 1/4 * 3/4 * 1/5 * 6/11$$

$$= \frac{2 * 6^3}{4 \times 4 \times 5} = \frac{3}{20}$$

P(BuyPC=NO|Y) > P(BuyPC=YES|Y)