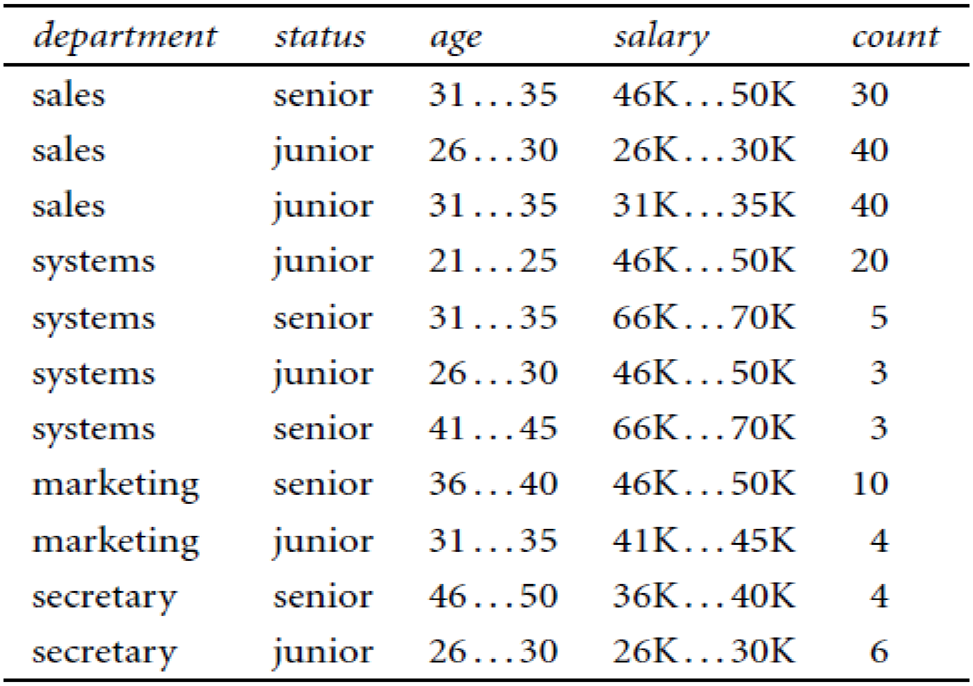
SVNIT,Surat
Computer Engineering Department
Data Warehousing and Mining
Tutorial-5

1. Given a decision tree, you have the option of (a) converting the decision tree to rules and then pruning the resulting rules, or (b) pruning the decision tree and then converting the pruned tree to rules.What advantage does (a) have over (b)?
2. The following table consists of training data from an employee database. The data have been generalized. For example, “31 : : : 35” for age represents the age range of 31 to 35. For a given row entry, count represents the number of data tuples having the values for department, status, age, and salary given in that row.



department	*status*	*age*	*salary*	*count*
sales	senior	31...35	46K...50K	30
sales	junior	26...30	26K...30K	40
sales	junior	31...35	31K...35K	40
systems	junior	21...25	46K...50K	20
systems	senior	31...35	66K...70K	5
systems	junior	26...30	46K...50K	3
systems	senior	41...45	66K...70K	3
marketing	senior	36...40	46K...50K	10
marketing	junior	31...35	41K...45K	4
secretary	senior	46...50	36K...40K	4
secretary	junior	26...30	26K...30K	6

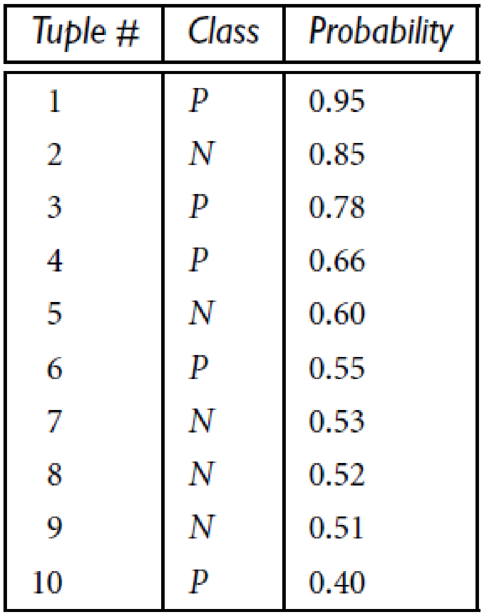
Let status be the class label attribute.

(a) How would you modify the basic decision tree algorithm to take into consideration the count of each generalized data tuple (i.e., of each row entry)?

(b) Use your algorithm to construct a decision tree from the given data.

(c) Given a data tuple having the values “systems,” “26 . . . 30,” and “46–50K” for the attributes department, age, and salary, respectively, what would a na¨ıve Bayesian classification of the status for the tuple be?

3. The data tuples of the table given below are sorted by decreasing probability value, as returned by a classifier. For each tuple, compute the values for the number of true positives .TP/, false positives .FP/, true negatives .TN/, and false negatives .FN/. Compute the true positive rate .TPR/ and false positive rate .FPR/. Plot the ROC curve for the data.



Tuple #	*Class*	*Probability*
1	*P*	0.95
2	*N*	0.85
3	*P*	0.78
4	*P*	0.66
5	*N*	0.60
6	*P*	0.55
7	*N*	0.53
8	*N*	0.52
9	*N*	0.51
10	*P*	0.40

4. Outline methods for addressing the class imbalance problem. Suppose a bank wants to develop a classifier that guards against fraudulent credit card transactions. Illustrate how you can induce a quality classifier based on a large set of non fraudulent examples and a very small set of fraudulent cases.

5. Experiment with any dataset of your choice using a decision tree model, logistic regression, naïve Bayes classifier, and a support vector model. Make a table of your results. Are the differences in model performance significant?