Report

Following algorithms have been implemented in this assignment (Please look into results excel file for the algorithm results):

1) **Independent Bayesian Networks**: In the following algorithm, all features are assumed to be independent. Laplace smoothing is done to prevent zero probabilities.
2) **Tree Bayesian Network using Chow Liu**: Chow liu algorithm is used in this to construct Bayesian tree for the datasets. Pair wise mutual info for features is calculated. Then DFS traversal is done to set the parents. Laplace smoothing is done to prevent zero probabilities.
3) **Mixture of Tree Bayesian Network**: K mixture of Tree Bayesian network is created in this model for a particular dataset. Expectation Maximization algorithm is used for convergence in each case. The K which gives best results is chosen. The results are done by averaging of 10 iterations.
4) **Tree Bayesian Network using bagging:** K-sets of bootstrap sample is generated and a random r mutual info values of nodes in the network to 0. Then predictions are made and averaged. The K,R values which give the best results are taken.

   Reasonable method for setting the probability

   The probability of each mixture can be set according to the number of training examples assigned each bucket or the bags created by the k value. The sum of weights of all the training examples for each mixture is calculated and normalized over all the mixtures. The results of the given weighting method be more of less same as this method

On comparing the overall results of the algorithms (Check out the results file):

The performance of The Mixture of Trees Bayesian network was the best of all for each of the datasets. The performance of Tree Bayesian Network using Chow Liu and Using Bagging were more or less similar. The independent Bayesian Network was the worst performing of all as expected due it its independent assumption.