Machine Learning Assignment - 1
Submitted by - Group 9

Problem 1 - Bayes classifier

Preprocessing - First, we loaded the IRIS dataset. It is given that the data is evenly distributed for each class. Since this is a classification problem, we grouped the data for each label and calculated means and covariance matrices for each group in the training set.

Implementing the classifier - After we have obtained necessary parameters, we assumed a Multivariate Gaussian distribution for each group. Then, for each row, we computed the maximum of class conditional probabilities using Multivariate Gaussian distribution's formula and calculated accuracies against the truth label for both training and test set.

Results -

```
Sayam:assign1 $ python3 Group9_Problem1.py
For training set -
        The accuracy of Bayes Classifier is 97.32 %

For test set -
        The accuracy of Bayes Classifier is 100.00 %
Sayam:assign1 $
```

We got pretty good results. The accuracy of Bayes classifier is 97.32 % and 100 % for the training and test set respectively.

Problem 2 - Naive Bayes classifier

Preprocessing - First, we loaded the IRIS dataset. It is given that the data is evenly distributed for each class. Since this is a classification problem, we grouped the data for each label and calculated means and standard deviations for each group in the training set.

Implementing the classifier - After we have obtained necessary parameters, we assumed a Univariate Gaussian distribution for each group. Then, for each row, we computed the maximum of class conditional probabilities using Univariate Gaussian distribution's formula and calculated accuracies against the truth label for both training and test set.

Results -

```
Sayam:assign1 $ python3 Group9_Problem2.py
For training set -
        The accuracy of Naive Bayes Classifier is 95.54 %

For test set -
        The accuracy of Naive Bayes Classifier is 100.00 %
Sayam:assign1 $
```

We got pretty good results. The accuracy of Bayes classifier is 95.54 % and 100 % for the training and test set respectively. Also, we found that the accuracy of Naive Bayes classifier is less than Bayes classifier. This is because covariance matrices capture more spread of the data in the case of Bayes classifier.

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