```
Wait for it... Don't panic (Porter's Stemmer is taking time...)


########### Naive Bayes Classifier For  Topic Class  (
TfidfVectorizer ) ###########
Accuracy = 0.918
             precision    recall  f1-score   support

      books      0.935     0.923     0.929       233
     camera      0.862     0.942     0.900       258
        dvd      0.920     0.901     0.910       242
     health      0.971     0.840     0.901       243
      music      0.947     0.962     0.954       260
   software      0.892     0.936     0.913       264

avg / total      0.920     0.918     0.918      1500

Cross Validation:
 [ 0.92156863  0.8627451   0.88157895  0.89333333  0.88590604
  0.81208054
  0.79194631  0.9261745   0.87162162  0.85810811]

Training Time:  0.9059863090515137
Testing Time:  0.21500587463378906

Posterior probabilities:
['books' 'camera' 'dvd' 'health' 'music' 'software']
[[ 0.13436057  0.16002862  0.18012285  0.16281557  0.20419561
  0.15847679]
 [ 0.14603753  0.1668942   0.16714003  0.1786779   0.16468939
  0.17656095]
 [ 0.18923179  0.12677206  0.15327364  0.14724923  0.20259871
  0.18087457]
 ...,
 [ 0.17964378  0.09616698  0.18804243  0.15252927  0.20675205
  0.17686549]
 [ 0.14603753  0.1668942   0.16714003  0.1786779   0.16468939
  0.17656095]
 [ 0.18923179  0.12677206  0.15327364  0.14724923  0.20259871
  0.18087457]]

Prior Probability(Probability of Class):
```

```
['books' 'camera' 'dvd' 'health' 'music' 'software']
[[ 0.17815513  0.20414054  0.17465106  0.13243391  0.13403504
  0.17658431]]


 Do you want to See the Output of other classifiers(Decsision
Tree/K-NN) too?:
[Y/N]:y

########### Naive Bayes Classifier For  Topic Class  (
CountVectorizer ) ###########
Accuracy = 0.905333333333
             precision    recall  f1-score   support

      books      0.925     0.906     0.915       233
     camera      0.850     0.942     0.893       258
        dvd      0.873     0.884     0.879       242
     health      0.971     0.823     0.891       243
      music      0.949     0.931     0.940       260
   software      0.886     0.939     0.912       264

avg / total      0.908     0.905     0.905      1500

Cross Validation:
 [ 0.92810458  0.8627451   0.88815789  0.87333333  0.87248322
  0.82550336
  0.81208054  0.9261745   0.86486486  0.85135135]

Training Time:  0.7929949760437012
Testing Time:  0.20000982284545898

Posterior probabilities:
['books' 'camera' 'dvd' 'health' 'music' 'software']
[[ 0.02024726  0.16567455  0.08286366  0.08495294  0.59166211
  0.05459948]
 [ 0.02940642  0.21341593  0.20308522  0.2188043   0.22269635
  0.11259178]
 [ 0.1532972   0.01409775  0.04641906  0.08311896  0.54006923
  0.1629978 ]
 ...,
 [ 0.2239203   0.00627581  0.19372584  0.20813377  0.15026208
  0.21768221]
```

```
  [ 0.02940642  0.21341593  0.20308522  0.2188043   0.22269635
   0.11259178]
  [ 0.1532972   0.01409775  0.04641906  0.08311896  0.54006923
   0.1629978 ]]

 Prior Probability(Probability of Class):
 ['books' 'camera' 'dvd' 'health' 'music' 'software']
 [[ 0.28690966  0.38032056  0.06653816  0.02166855  0.0217401
    0.22282298]]

 ########### Decision Trees Classifier For Topic Class (
 TfidfVectorizer ) ###########
 Accuracy = 0.788
              precision    recall  f1-score   support

       books      0.793     0.824     0.808       233
      camera      0.861     0.744     0.798       258
         dvd      0.827     0.810     0.818       242
      health      0.645     0.749     0.693       243
       music      0.892     0.858     0.875       260
    software      0.741     0.746     0.743       264

 avg / total      0.794     0.788     0.790      1500

 Cross Validation:
  [ 0.78431373  0.81045752  0.75657895  0.77333333  0.67114094
   0.73825503
   0.79865772  0.76510067  0.71621622  0.77702703]

 Training Time:  3.914006471633911
 Testing Time:  0.20799684524536133

 ########### Decision Trees Classifier For Topic Class (
 CountVectorizer ) ###########
 Accuracy = 0.796
              precision    recall  f1-score   support

       books      0.788     0.845     0.816       233
      camera      0.832     0.767     0.798       258
         dvd      0.842     0.839     0.841       242
      health      0.614     0.700     0.654       243
       music      0.891     0.881     0.886       260
```

```
    software       0.831     0.746     0.786       264

avg / total       0.802     0.796     0.798      1500

Cross Validation:
 [ 0.79738562  0.77777778  0.75        0.8         0.73154362
  0.73154362
  0.77181208  0.83221477  0.75675676  0.72297297]

Training Time:  3.5489885807037354
Testing Time:  0.20300793647766113

########### K-Nearest Neighbor Classifier For Topic Class (
TfidfVectorizer ) ###########
Accuracy = 0.826
             precision    recall  f1-score   support

      books       0.887     0.773     0.826       233
     camera       0.807     0.891     0.847       258
        dvd       0.812     0.785     0.798       242
     health       0.835     0.790     0.812       243
      music       0.749     0.885     0.811       260
   software       0.900     0.822     0.859       264

avg / total       0.831     0.826     0.826      1500

Cross Validation:
 [ 0.85620915  0.81045752  0.79605263  0.79333333  0.82550336
  0.73154362
  0.77852349  0.85234899  0.75        0.77702703]

Training Time:  0.7880139350891113
Testing Time:  1.0149867534637451

########### K-Nearest Neighbor Classifier For Topic Class (
CountVectorizer ) ###########
Accuracy = 0.590666666667
             precision    recall  f1-score   support

      books       0.663     0.708     0.685       233
     camera       0.516     0.694     0.592       258
        dvd       0.701     0.562     0.624       242
```

```
      health       0.433     0.535     0.479       243
       music       0.653     0.658     0.655       260
    software       0.709     0.398     0.510       264

avg / total       0.613     0.591     0.590      1500

Cross Validation:
 [ 0.54248366  0.47712418  0.44736842  0.52        0.46979866
  0.41610738
  0.45637584  0.51006711  0.5         0.46621622]

Training Time:  0.7600135803222656
Testing Time:  0.954986572265625

##### Output of K-NN classifier for different values of K (1-20
) #####


K= 2    Accuracy= 0.735      F1-score= 0.734
K= 3    Accuracy= 0.769      F1-score= 0.767
K= 4    Accuracy= 0.795      F1-score= 0.793
K= 5    Accuracy= 0.802      F1-score= 0.799
K= 6    Accuracy= 0.807      F1-score= 0.805
K= 7    Accuracy= 0.813      F1-score= 0.812
K= 8    Accuracy= 0.82      F1-score= 0.819
K= 9    Accuracy= 0.821      F1-score= 0.82
K= 10    Accuracy= 0.823      F1-score= 0.823
K= 11    Accuracy= 0.827      F1-score= 0.827
K= 12    Accuracy= 0.823      F1-score= 0.822
K= 13    Accuracy= 0.824      F1-score= 0.823
K= 14    Accuracy= 0.826      F1-score= 0.826
K= 15    Accuracy= 0.826      F1-score= 0.826
K= 16    Accuracy= 0.837      F1-score= 0.837
K= 17    Accuracy= 0.833      F1-score= 0.833
K= 18    Accuracy= 0.83      F1-score= 0.829
K= 19    Accuracy= 0.832      F1-score= 0.832
K= 20    Accuracy= 0.829      F1-score= 0.828
K= 21    Accuracy= 0.833      F1-score= 0.832
K= 22    Accuracy= 0.833      F1-score= 0.833
K= 23    Accuracy= 0.835      F1-score= 0.835
K= 24    Accuracy= 0.839      F1-score= 0.838
K= 25    Accuracy= 0.836      F1-score= 0.835
```

```
K= 26    Accuracy= 0.84      F1-score= 0.84
K= 27    Accuracy= 0.841      F1-score= 0.841
K= 28    Accuracy= 0.841      F1-score= 0.84
K= 29    Accuracy= 0.84      F1-score= 0.839
K= 30    Accuracy= 0.84      F1-score= 0.839

Process finished with exit code 0
```