Use Classifiers to decide if a statement is a sentiment or other or an advice

- What if we let the classifier decide if a statement has value or not from a sample of statements.

In[875]:=
```
<< dataReady.mx
```

In[876]:=
```
Length[dataReady]
```

Out[876]=
```
1616
```

In[937]:=
```
Export["dataReadyOut.csv", dataReady, "CSV"]
```

Out[937]=
```
dataReadyOut.csv
```

Prepare Dataset for Classification

I've extracted ingredients from all the reviews and I saved them in EnchiladaIng.

Then, I decided to create a classifier. hence, I labeled sentences having ingredients 1, and others 0. My reasoning, if the reviewers talked about an ingredients, they most likely did something with it. You will notice that the frequencies between the non-informative sentences and the informative sentences are close to each other.

In[877]:=
```
EnchiladaIng = {"chicken", "onion", "oil", "tortilla", "cheese",
   "butter", "mexican", "monterey", "jack", "flour", "chicken broth",
   "sour cream", "bean", "black bean", "green chilly", "green", "chilly",
   "broth", "cumin", "pepper", "tomato", "jalapeno", "chile", "corn",
   "garlic", "rotel", "soup", "salsa", "rice", "salt", "breast", "meat",
   "roux", "cilantro", "beef", "yogurt", "roast", "juic", "queso", "turkei",
   "oliv", "tomatillo", "oregano", "fajita", "wheat", "wheat tortilla",
   "bouillon", "lettic", "american", "shrimp", "mushroom", "jalapeños",
   "hamburg", "chive", "colbi", "avocado", "cornstartch", "zesti", "zatarain'",
   "tenderloin", "tea", "taquito", "steak", "sprout", "soybean", "serrano",
   "seiten", "salsa", "salad", "ricotta", "ranchero", "qusaddilla",
   "potato", "poblano", "pinto", "pesto", "pepperjack", "mezzetta", "herb",
   "guacomol", "ginger", "chipolt", "chipotle-lim", "chees", "goos",
   "paprika", "green chili", "green onion", "green pepper", "black oliv",
   "green pepper", "spanish rice", "taco season", "rotel tomato", "refri bean"};
```

In[878]:=
```
dataForClustering =
  Map[If[Length[Intersection[#, EnchiladaIng]] > 0, Rule[#, 1], Rule[#, 0]] &,
   dataReady];
```

```
Counts[dataForClustering[[All, 2]]]
```
⟨|0 → 794, 1 → 822|⟩

Now, I divided my dataset into training set, testing set, and validation set

```
trainingData = dataForClustering[[1 ;; 800]];
testingData = dataForClustering[[801 ;; 1200]];
validationData = dataForClustering[[1201 ;; 1616]];
```

Save the dataset

```
DumpSave["dataForClustering.mx", dataForClustering]
Export["DataForClustering.xls", dataForClustering, "XLS"]
```

Classifier

Mathematica decided on the best model. In here the best model is the Hidden Markov model. In R, you can use the package caret (which also has the model implemented)

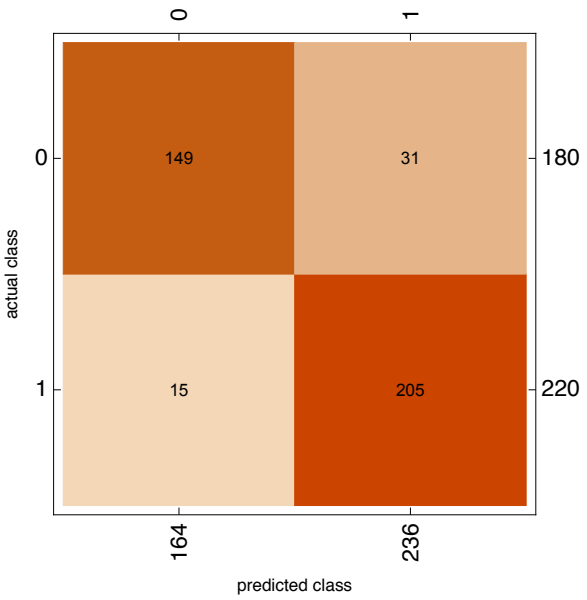
In[892]:=
```
c = Classify[trainingData]
```

Out[892]= ClassifierFunction[Method: Markov, Number of classes: 2]

Performance with Testing Dataset

In[891]:=
```
ClassifierMeasurements[c, testingData, "ConfusionMatrixPlot"]
```

Out[891]=

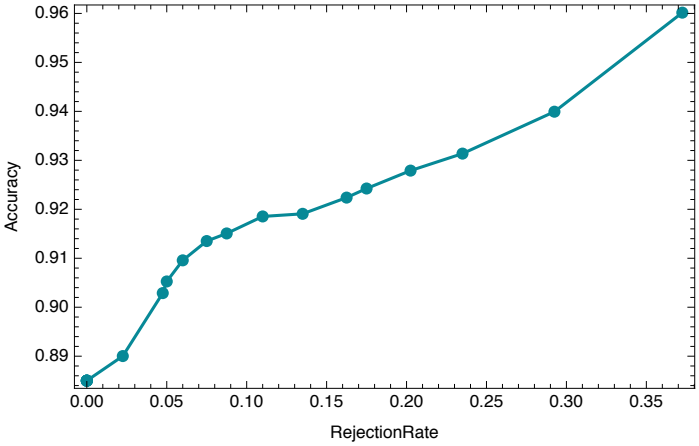


In[896]:=
```
ClassifierMeasurements[c, testingData, {"Precision", "Recall", "Accuracy"}]
```

Out[896]=
```
{⟨|0 → 0.827778, 1 → 0.931818|⟩, ⟨|0 → 0.908537, 1 → 0.868644|⟩, 0.885}
```

In[897]:=
```
ClassifierMeasurements[c, testingData, "AccuracyRejectionPlot"]
```

Out[897]=



Performance with Validation Dataset

One can see that the performance was not a flux.

In[929]:=
```
ClassifierMeasurements[c, validationData, "Accuracy"]
```

Out[929]=
```
0.911058
```

In[927]:=
```
ClassifierMeasurements[c, validationData, {"Precision", "Recall"}]
```

Out[927]=
```
{⟨|0 → 0.866667, 1 → 0.950226|⟩, ⟨|0 → 0.938889, 1 → 0.889831|⟩}
```

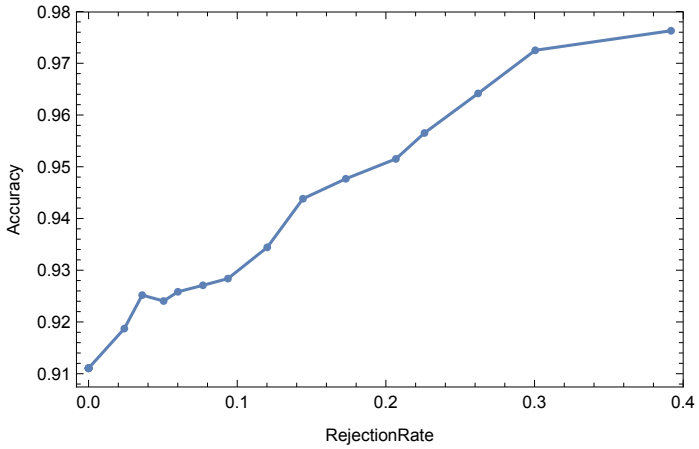
In[923]:=
```
Insert[Grid[{{"Performance", "Sentiment", "Not Sentiment"},
    {"Precision", 0.87, 0.95}, {"Recall", 0.94, 0.89}}],
 {Background → {None, {GrayLevel[0.7], {White}}}, Dividers → {Black, {2 → Black}},
  Frame → True, Spacings → {2, {2, {0.7}, 2}}}, 2]
```

Out[923]=

Performance	Sentiment	Not Sentiment
Precision	0.87	0.95
Recall	0.94	0.89

```
ClassifierMeasurements[c, validationData, "AccuracyRejectionPlot"]
```

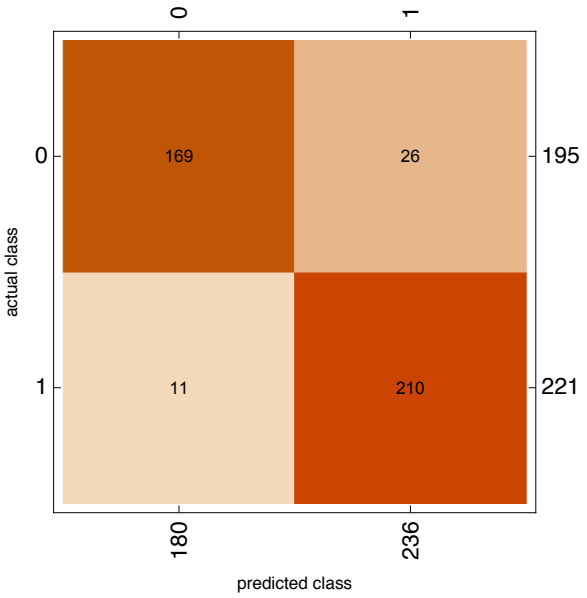
Out[948]=



In[901]:=

```
ClassifierMeasurements[c, validationData, "ConfusionMatrixPlot"]
```

Out[901]=




```
DumpSave["c.mx", c]
```

```
{ClassifierFunction[ Method: Markov
                     Number of classes: 2 ]}
```