Multinominal Naive Bayes

Índice

In [1]:
```
import numpy as np
import matplotlib.pyplot as plt
import scipy.stats as st

from sklearn.naive_bayes import MultinomialNB
from sklearn.metrics import confusion_matrix, classification_report, roc_curve
from sklearn.feature_extraction.text import TfidfVectorizer

import pickle
X_train_smt = pickle.load(open("saved_feats/X_train_smt", "rb"))
X_test = pickle.load(open("saved_feats/X_test", "rb"))
y_train_smt = pickle.load(open("saved_feats/y_train_smt", "rb"))
y_test = pickle.load(open("saved_feats/y_test", "rb"))
data_text = pickle.load(open("saved_feats/data_text", "rb"))

# FORMATO DE PLOTS
plt.style.use('bmh')
```

Entrenamiento del modelo

Para ver el estudio realizado de la elección de mejores hierparametros, consulta el siguiente notebook: Parameters_NBayes

In [2]:
```
clf_mnb = (MultinomialNB(alpha=1.0, fit_prior=True,
                         class_prior=[0.2, 0.5, 0.93]))
clf_mnb.fit(X_train_smt, y_train_smt)
pred_mnb = clf_mnb.predict(X_test)
pred_prob_mnb = clf_mnb.predict_proba(X_test)
```

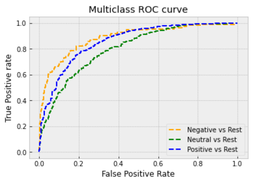
Visualización de resultados

In [3]:
```
print('Predicted classes:', clf_mnb.classes_)
print('Average accuracy :', np.mean(pred_mnb == y_test)*100)
print('Train accuracy :', (clf_mnb.score(
    X_train_smt, y_train_smt))*100)
print('Test accuracy :', (clf_mnb.score(
    X_test, y_test))*100)

print('\n CONFUSION MATRIX')
print(confusion_matrix(y_test, pred_mnb))
print('\n CLASSIFICATION REPORT')
print(classification_report(y_test, pred_mnb))
```

```
Predicted classes: ['Negative' 'Neutral' 'Positive']
Average accuracy : 90.63016718721293
Train accuracy : 87.72431473082233
Test accuracy : 90.63016718721293

 CONFUSION MATRIX
[[  34   28   49]
 [  20   88  142]
 [  23  248 4811]]

 CLASSIFICATION REPORT
              precision    recall  f1-score   support

    Negative       0.44      0.31      0.36       111
     Neutral       0.24      0.35      0.29       250
    Positive       0.96      0.95      0.95      5082

    accuracy                           0.91      5443
   macro avg       0.55      0.53      0.53      5443
weighted avg       0.92      0.91      0.91      5443
```

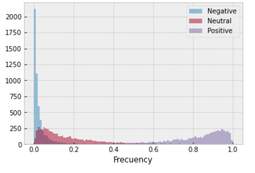
In [4]:
```
fpr = {}
tpr = {}
thresh = {}

fpr[0], tpr[0], thresh[0] = roc_curve(
    y_test, pred_prob_mnb[:, 0], pos_label='Negative')
fpr[1], tpr[1], thresh[1] = roc_curve(
    y_test, pred_prob_mnb[:, 1], pos_label='Neutral')
fpr[2], tpr[2], thresh[2] = roc_curve(
    y_test, pred_prob_mnb[:, 2], pos_label='Positive')

plt.plot(fpr[0], tpr[0], linestyle='--',
         color='orange', label='Negative vs Rest')
plt.plot(fpr[1], tpr[1], linestyle='--',
         color='green', label='Neutral vs Rest')
plt.plot(fpr[2], tpr[2], linestyle='--',
         color='blue', label='Positive vs Rest')
plt.title('Multiclass ROC curve')
plt.xlabel('False Positive Rate')
plt.ylabel('True Positive rate')
plt.legend(loc='best')
```

Out[4]:
```
<matplotlib.legend.Legend at 0x7f9e9f5e7d60>
```



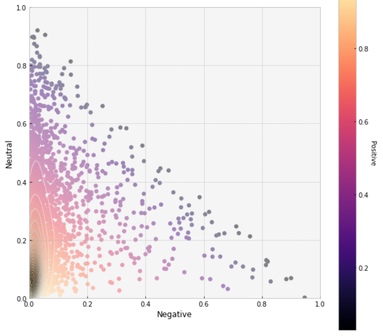
In [5]:
```
fig = plt.figure()
ax = fig.add_subplot()
ax.hist(pred_prob_mnb[:, 0], 100, alpha=0.5, label="Negative")
ax.hist(pred_prob_mnb[:, 1], 100, alpha=0.5, label="Neutral")
ax.hist(pred_prob_mnb[:, 2], 100, alpha=0.5, label="Positive")
ax.set_xlabel('Probability')
ax.set_xlabel('Frecuency')
ax.legend(prop={'size': 10})
```

Out[5]:
```
<matplotlib.legend.Legend at 0x7f9e9d539390>
```



In [6]:
```
x = pred_prob_mnb[:, 0]
y = pred_prob_mnb[:, 1]
z = pred_prob_mnb[:, 2]
cmap = plt.get_cmap('magma')

fig = plt.figure(figsize=(10, 10))
ax = fig.add_subplot()
ax.set_xlabel('Negative')
ax.set_ylabel('Neutral')
plt.scatter(x, y, c=z, cmap=cmap)
cbar = plt.colorbar()
cbar.set_label('Positive', rotation=270, fontsize=10, labelpad=10.0)
ax.set_aspect('equal', adjustable='box')

xx, yy = np.mgrid[0:1:100j, 0:1:100j]
positions = np.vstack([xx.ravel(), yy.ravel()])
values = np.vstack([x, y])
kernel = st.gaussian_kde(values)
f = np.reshape(kernel(positions).T, xx.shape)

plt.contourf(xx, yy, f, levels=20, cmap=plt.get_cmap('Greys'), alpha=0.5)
plt.show()
```

```
/tmp/ipykernel_27019/2290017891.py:11: MatplotlibDeprecationWarning: Auto-removal of grids by pcolor() and pco
lormesh() is deprecated since 3.5 and will be removed two minor releases later; please call grid(False) first.
  cbar = plt.colorbar()
```



Demo

In [7]:
```
# CountVectorizer followed by TfidfTransformer
tfidf = TfidfVectorizer(use_idf=True, norm='l2',
                        smooth_idf=True, sublinear_tf=False, max_features=5000)
tfidf.fit_transform(data_text)

# Input sentence
text = input("Enter sentence: ")
arr_text = np.array([text])
tfidf_arr_text = tfidf.transform(arr_text)

# Output
print(clf_mnb.predict(tfidf_arr_text))
```

```
Enter sentence: Product description is accurate
['Neutral']
```