TOULOUSE LAUTREC

APRENDIZAJE AUTOMATICO CON PYTHON

k-Nearest Neighbor

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Curso 2290, Clases Lunes y Miercoles 20:00-22:30pm

Tercera Clase

Ejercicio k-Nearest Neighbor

In [1]:
```
from google.colab import drive
drive.mount('/content/drive')
```

```
Mounted at /content/drive
```

In [ ]:
```
```

In [2]:
```
import pandas as pd
import numpy as np
import matplotlib.pyplot as plt
from matplotlib.colors import ListedColormap
import matplotlib.patches as mpatches
import seaborn as sb

%matplotlib inline
plt.rcParams['figure.figsize'] = (16, 9)
plt.style.use('ggplot')

from sklearn.model_selection import train_test_split
from sklearn.preprocessing import MinMaxScaler
from sklearn.neighbors import KNeighborsClassifier
from sklearn.metrics import classification_report
from sklearn.metrics import confusion_matrix
```

Leemos nuestro archivo de entrada

In [4]:
```
dataframe = pd.read_csv(r"/content/drive/MyDrive/DATASET_TOULOUSE_C3/reviews_sentiment.c
dataframe.head(10)
```

Out[4]:

	Review Title	Review Text	wordcount	titleSentiment	textSentiment	Star Rating	sentimentValue
0	Sin conexión	Hola desde hace algo más de un mes me pone sin...	23	negative	negative	1	-0.486389
1	faltan cosas	Han mejorado la apariencia pero no	20	negative	negative	1	-0.586187
2	Es muy buena lo recomiendo	Andres e puto amoooo	4	NaN	negative	1	-0.602240
3	Version antigua	Me gustana mas la version anterior esta es mas...	17	NaN	negative	1	-0.616271
4	Esta bien	Sin ser la biblia.... Esta bien	6	negative	negative	1	-0.651784
5	Buena	Nada del otro mundo pero han mejorado mucho	8	positive	negative	1	-0.720443
6	De gran ayuda	Lo malo q necesita de ...,pero la app es muy buena	23	positive	negative	1	-0.726825
7	Muy buena	Estaba más acostumbrado al otro diseño, pero e...	16	positive	negative	1	-0.736769
8	Ta to guapa.	Va de escándalo	21	positive	negative	1	-0.765284
9	Se han corregido	Han corregido muchos fallos pero el diseño es ...	13	negative	negative	1	-0.797961

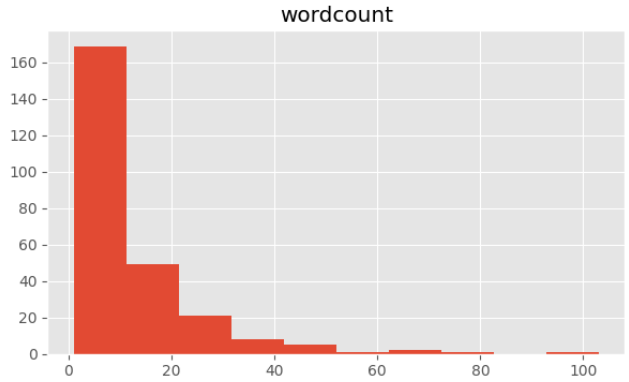
In [5]:
```
dataframe.describe()
```

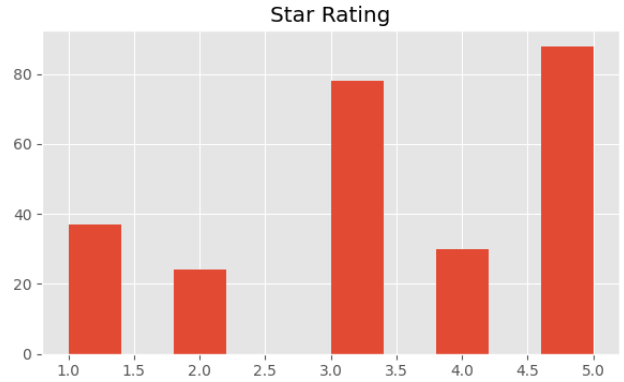
Out[5]:

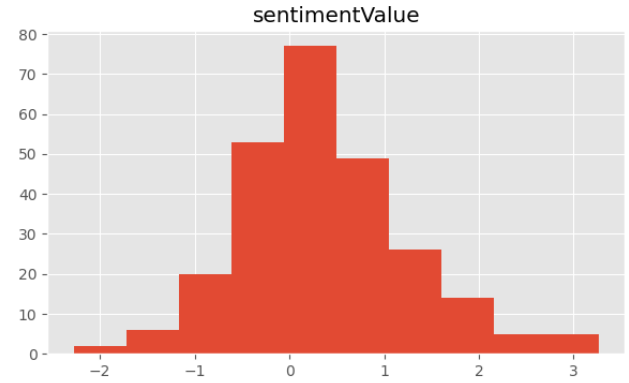
	wordcount	Star Rating	sentimentValue
count	257.000000	257.000000	257.000000
mean	11.501946	3.420233	0.383849
std	13.159812	1.409531	0.897987
min	1.000000	1.000000	-2.276469
25%	3.000000	3.000000	-0.108144
50%	7.000000	3.000000	0.264091
75%	16.000000	5.000000	0.808384
max	103.000000	5.000000	3.264579

Rápidas visualizaciones

In [6]:
```
dataframe.hist()
plt.show()
```







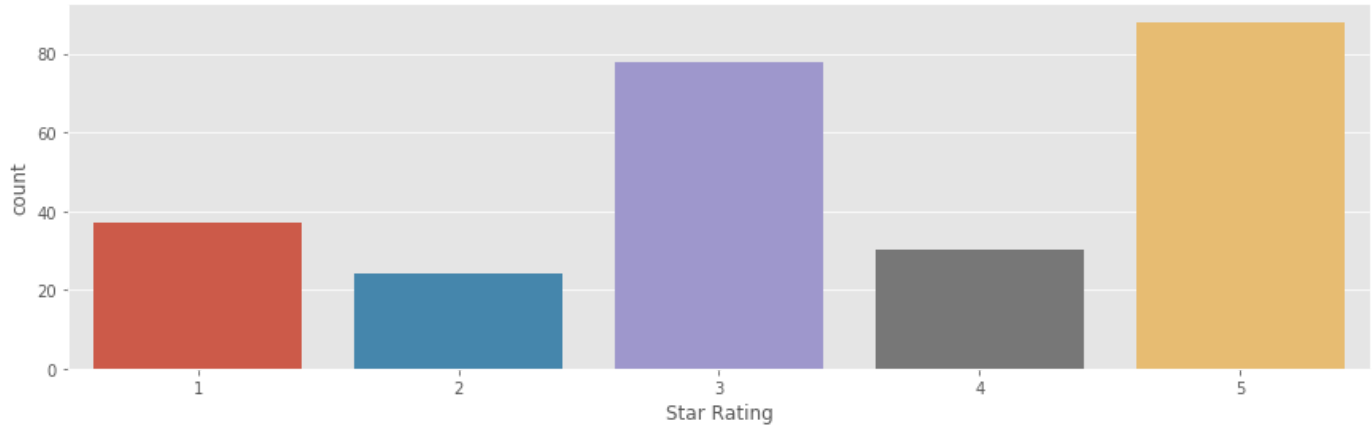
In [7]:
```
print(dataframe.groupby('Star Rating').size())
```

```
Star Rating
1     37
2     24
3     78
4     30
5     88
dtype: int64
```

In [9]:
```
#sb.factorplot('Star Rating',data=dataframe,kind="count", aspect=3)
```

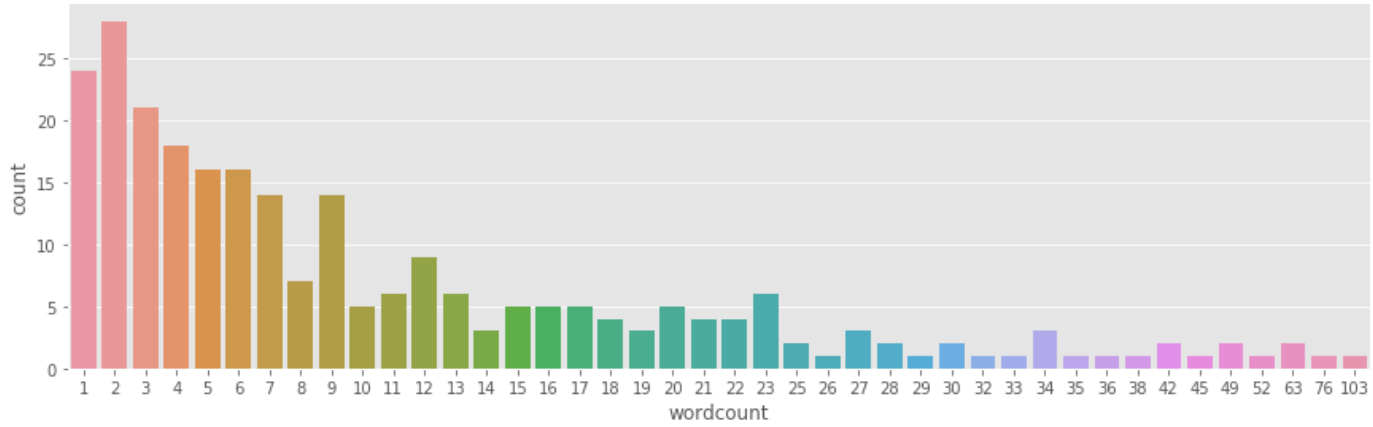
In [ ]:
```
sb.factorplot('Star Rating',data=dataframe,kind="count", aspect=3)
```

Out[ ]:
```
<seaborn.axisgrid.FacetGrid at 0x10cea75f8>
```



In [ ]:
```
sb.factorplot('wordcount',data=dataframe,kind="count", aspect=3)
```

Out[ ]:
```
<seaborn.axisgrid.FacetGrid at 0x10ced6390>
```



Preparamos el dataset

In [11]:
```
X = dataframe[['wordcount','sentimentValue']].values
y = dataframe['Star Rating'].values

X_train, X_test, y_train, y_test = train_test_split(X, y, random_state=0)
scaler = MinMaxScaler()
X_train = scaler.fit_transform(X_train)
X_test = scaler.transform(X_test)
```

Creamos el Modelo

In [12]:
```
n_neighbors = 7

knn = KNeighborsClassifier(n_neighbors)
knn.fit(X_train, y_train)
print('Accuracy of K-NN classifier on training set: {:.2f}'
     .format(knn.score(X_train, y_train)))
print('Accuracy of K-NN classifier on test set: {:.2f}'
     .format(knn.score(X_test, y_test)))
```

```
Accuracy of K-NN classifier on training set: 0.90
Accuracy of K-NN classifier on test set: 0.86
```

Resultados obtenidos

In [13]:
```
pred = knn.predict(X_test)
print(confusion_matrix(y_test, pred))
print(classification_report(y_test, pred))
```

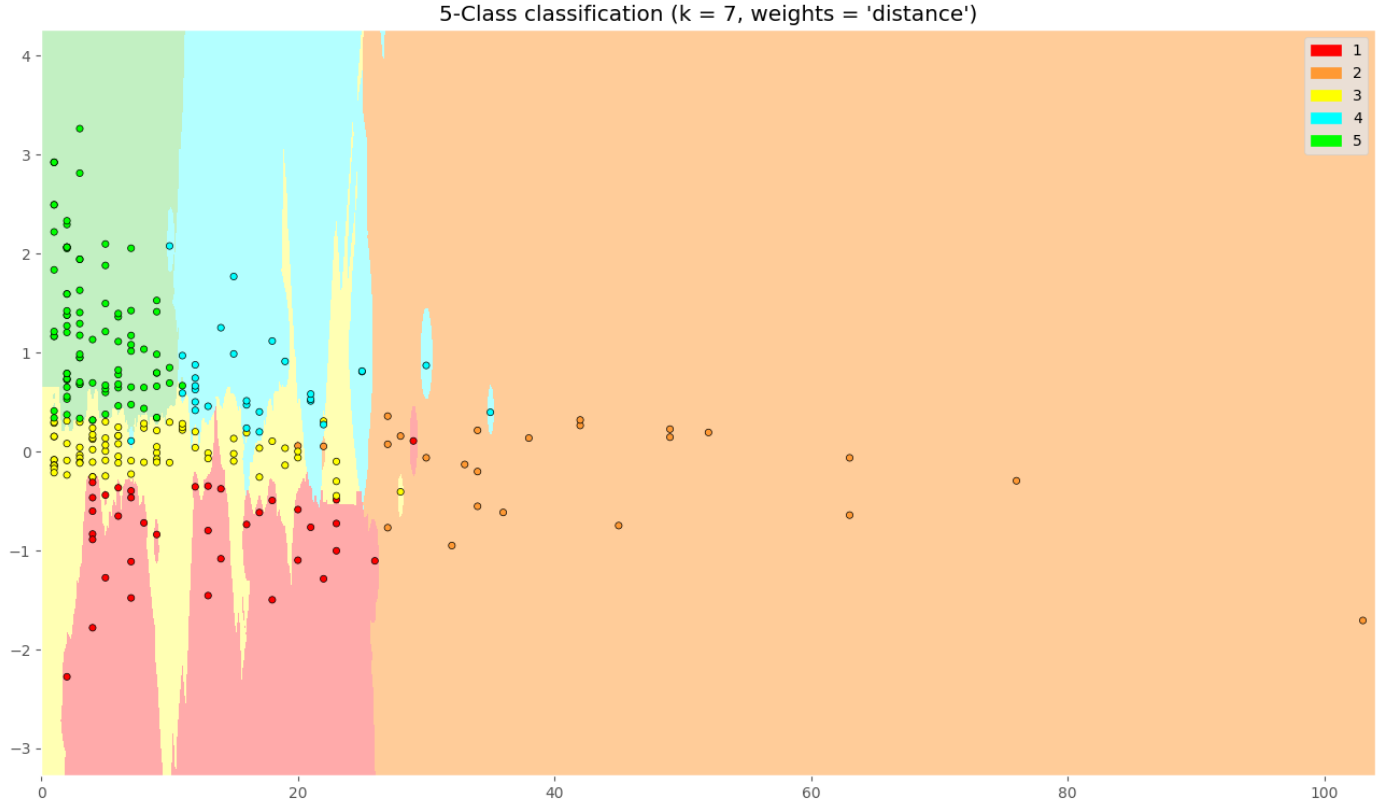
```
[[ 9  0  1  0  0]
 [ 0  1  0  0  0]
 [ 0  1 17  0  1]
 [ 0  0  2  8  0]
 [ 0  0  4  0 21]]
              precision    recall  f1-score   support

           1       1.00      0.90      0.95        10
           2       0.50      1.00      0.67         1
           3       0.71      0.89      0.79        19
           4       1.00      0.80      0.89        10
           5       0.95      0.84      0.89        25

    accuracy                           0.86        65
   macro avg       0.83      0.89      0.84        65
```

```
weighted avg       0.89      0.86      0.87        65
```

Gráfica de la Clasificación Obtenida

In [14]:

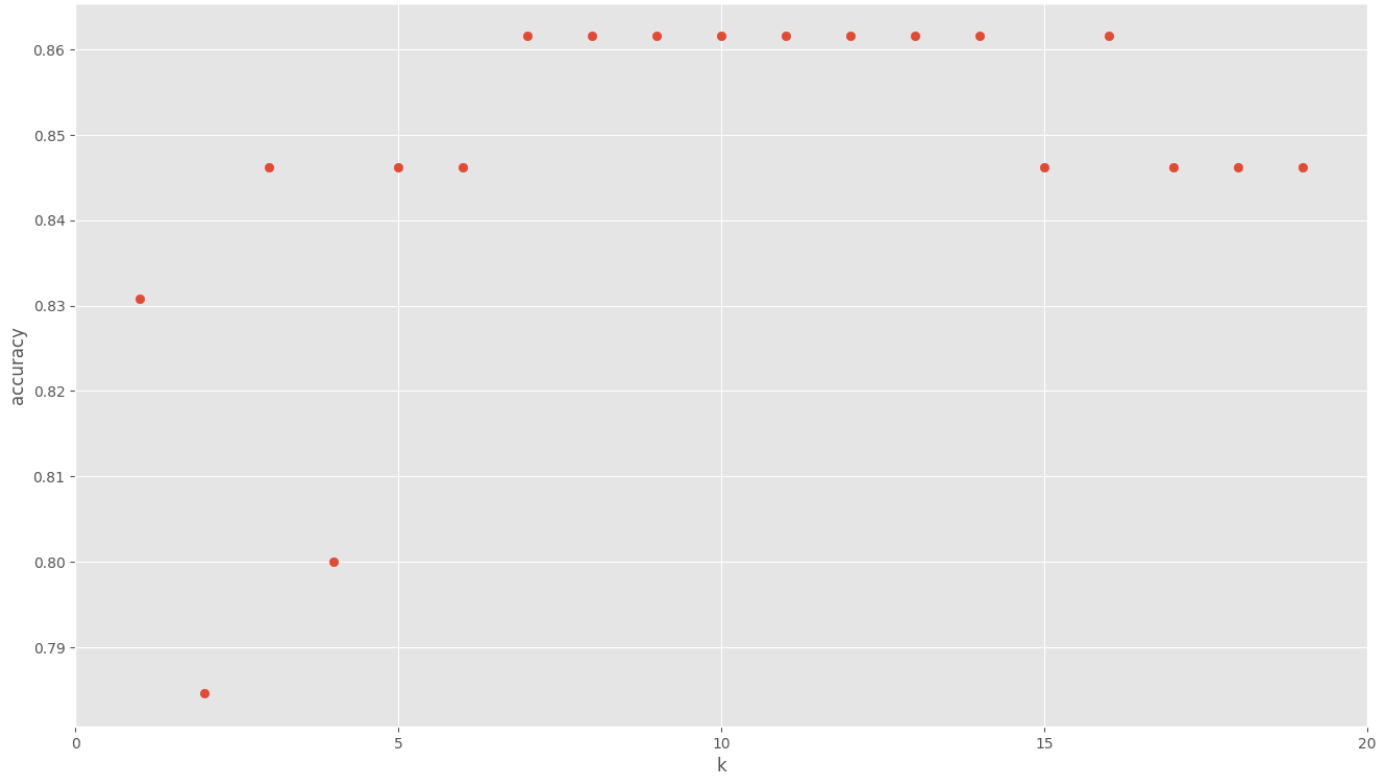
```
h = .02  # step size in the mesh

# Create color maps
cmap_light = ListedColormap(['#FFAAAA', '#ffcc99', '#ffffb3','#b3ffff','#c2f0c2'])
cmap_bold = ListedColormap(['#FF0000', '#ff9933','#FFFF00','#00ffff','#00FF00'])

# we create an instance of Neighbours Classifier and fit the data.
clf = KNeighborsClassifier(n_neighbors, weights='distance')
clf.fit(X, y)

# Plot the decision boundary. For that, we will assign a color to each
# point in the mesh [x_min, x_max]x[y_min, y_max].
x_min, x_max = X[:, 0].min() - 1, X[:, 0].max() + 1
y_min, y_max = X[:, 1].min() - 1, X[:, 1].max() + 1
xx, yy = np.meshgrid(np.arange(x_min, x_max, h),
                     np.arange(y_min, y_max, h))
Z = clf.predict(np.c_[xx.ravel(), yy.ravel()])

# Put the result into a color plot
Z = Z.reshape(xx.shape)
plt.figure()
plt.pcolormesh(xx, yy, Z, cmap=cmap_light)

# Plot also the training points
plt.scatter(X[:, 0], X[:, 1], c=y, cmap=cmap_bold,
                edgecolor='k', s=20)
plt.xlim(xx.min(), xx.max())
plt.ylim(yy.min(), yy.max())

patch0 = mpatches.Patch(color='#FF0000', label='1')
patch1 = mpatches.Patch(color='#ff9933', label='2')
patch2 = mpatches.Patch(color='#FFFF00', label='3')
patch3 = mpatches.Patch(color='#00ffff', label='4')
patch4 = mpatches.Patch(color='#00FF00', label='5')
plt.legend(handles=[patch0, patch1, patch2, patch3,patch4])


plt.title("5-Class classification (k = %i, weights = '%s')"
              % (n_neighbors, 'distance'))

plt.show()
```



Cómo obtener el mejor valor de k

In [15]:
```
k_range = range(1, 20)
scores = []
for k in k_range:
    knn = KNeighborsClassifier(n_neighbors = k)
    knn.fit(X_train, y_train)
    scores.append(knn.score(X_test, y_test))
plt.figure()
plt.xlabel('k')
plt.ylabel('accuracy')
plt.scatter(k_range, scores)
plt.xticks([0,5,10,15,20])
```

Out[15]:
```
([<matplotlib.axis.XTick at 0x7b80331bdff0>,
  <matplotlib.axis.XTick at 0x7b80331bdc90>,
  <matplotlib.axis.XTick at 0x7b80331bcaf0>,
  <matplotlib.axis.XTick at 0x7b802f1209a0>,
  <matplotlib.axis.XTick at 0x7b802f121450>],
 [Text(0, 0, '0'),
  Text(5, 0, '5'),
  Text(10, 0, '10'),
  Text(15, 0, '15'),
  Text(20, 0, '20')])
```



Predicciones

In [16]:
```
print(clf.predict([[5, 1.0]]))
```

```
[5]
```

In [17]:
```
print(clf.predict_proba([[20, 0.0]]))
```

```
[[0.00381998 0.02520212 0.97097789 0.         0.        ]]
```