xgboost robust noise

September 7, 2018

0.1 Modelo de predición de cancer de mama (Wisconsin uci)

In [1]:
```
import pandas as pd
import numpy as np
from sklearn.cross_validation import train_test_split
from sklearn.preprocessing import StandardScaler
from sklearn.tree import DecisionTreeClassifier
from xgboost import XGBClassifier
from sklearn.pipeline import Pipeline
from random import random
import seaborn as sns
import matplotlib.pyplot as plt

import warnings
warnings.filterwarnings('ignore')

max_noise = 30
```

```
/home/rafa/anaconda3/lib/python3.6/site-packages/sklearn/cross_validation.py:41: DeprecationWarn
  "This module will be removed in 0.20.", DeprecationWarning)
```

In [2]:
```
# Importamos los datos desde el repositorio oficial
df = pd.read_csv('https://archive.ics.uci.edu/ml/machine-learning-databases/breast-cance
header=None)
```

In [3]:
```
# Vemos la estructura del dataframe
# Columna 0 --> ID
# Columna 1 --> Clase
# Columnas 2.. -> Datos
df[:2]
```

Out[3]:

	0	1	2	3	4	5	6	7	8	9	\
0	842302	M	17.99	10.38	122.8	1001.0	0.11840	0.27760	0.3001	0.14710	
1	842517	M	20.57	17.77	132.9	1326.0	0.08474	0.07864	0.0869	0.07017	

	...	22	23	24	25	26	27	28	29	\
0	...	25.38	17.33	184.6	2019.0	0.1622	0.6656	0.7119	0.2654	

```
1   ...     24.99  23.41  158.8  1956.0  0.1238  0.1866  0.2416  0.1860

       30       31
0  0.4601  0.11890
1  0.2750  0.08902

[2 rows x 32 columns]
```

In [4]:
```
# Separamos el dataset en (Conjunto de datos, Etiquetas)
X = df.loc[:, 2:].values
y = df.loc[:, 1].values
```

In [5]:
```
# Separamos el conjunto total en dos subconjuntos (Train 80% / Test 20%)
X_train, X_test, y_train, y_test = train_test_split(X, y, test_size=0.20)
```

In [6]:
```
weak_clf = DecisionTreeClassifier(criterion='entropy', max_depth=None, random_state=0)
```

In [7]:
```
# Creamos un flujo de trabajo (pipeline):
# Paso 1 -> Escalar los datos
# Paso 2 -> Analisis de componentes principales (Reduce la dimensionalidad)
# Paso 3 -> Construimos un modelo utilizando Regresión Logística


pipe_lr = Pipeline([('scl', StandardScaler()),
                    ('clf', XGBClassifier())])

# Ajustamos el modelo a los datos de entrenamiento
pipe_lr.fit(X_train, y_train)

#Calculamos la precisión del modelo utilizando los datos de test
print('Test Accuracy: %.3f' % pipe_lr.score(X_test, y_test))
```

```
Test Accuracy: 0.939
```

In [8]:
```
# Como cambia el accuracy al aumentar el ruido:
```

In [9]:
```
def accuracy_noise_level(N, X_train, y_train, X_test, y_test):

    change = lambda x: 'M' if x == 'B' else 'B'
    def change_rand(N):
        return lambda x: change(x) if random() < N/100 else x

    y_train = list(map(change_rand(N), y_train))

    pipe_lr = Pipeline([('scl', StandardScaler()),
                    ('clf', XGBClassifier())])

    # Ajustamos el modelo a los datos de entrenamiento
```

```
            pipe_lr.fit(X_train, y_train)

            #Calculamos la precisión del modelo utilizando los datos de test
            return pipe_lr.score(X_test, y_test)
```

In [10]:
```
def accuracy_noise_level_robust(N, X_train, y_train, X_test, y_test):

    change = lambda x: 'M' if x == 'B' else 'B'
    def change_rand(N):
        return lambda x: change(x) if random() < N/100 else x

    y_train = list(map(change_rand(N), y_train))

    pipe_lr = Pipeline([('scl', StandardScaler()),
                        ('clf', XGBClassifier(gamma=5))])

    # Ajustamos el modelo a los datos de entrenamiento
    pipe_lr.fit(X_train, y_train)

    #Calculamos la precisión del modelo utilizando los datos de test
    return pipe_lr.score(X_test, y_test)
```

In [11]:
```
accuracy_noise_level(0, X_train, y_train, X_test, y_test)
```

Out[11]:
```
0.9385964912280702
```

In [12]:
```
accuracy_noise_level(30, X_train, y_train, X_test, y_test)
```

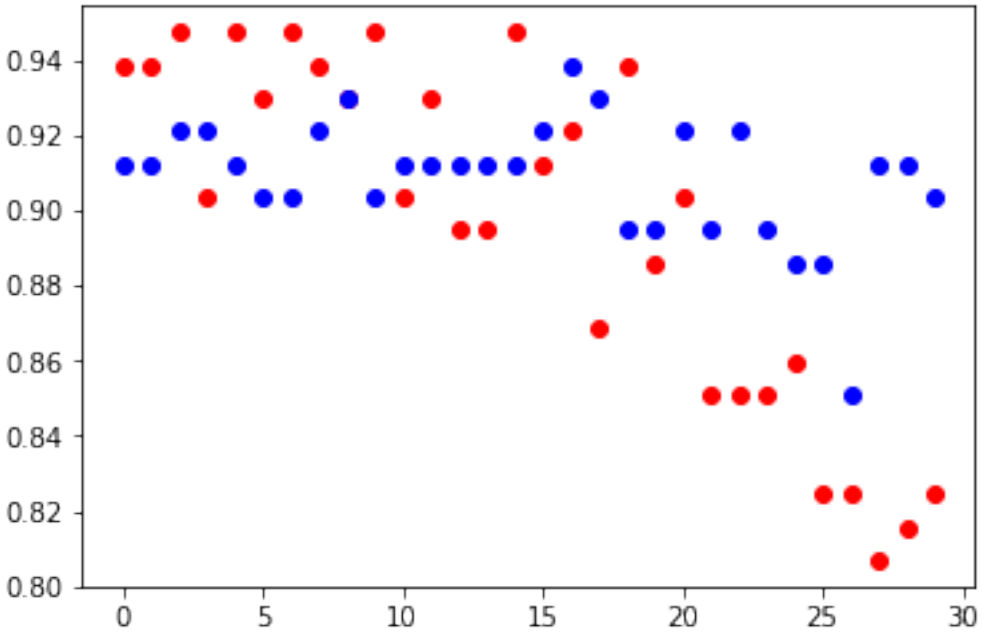
Out[12]:
```
0.7456140350877193
```

In [13]:
```
accuracies = [accuracy_noise_level(N, X_train, y_train, X_test, y_test) for N in range(
```

In [14]:
```
accuracies_robust = [accuracy_noise_level_robust(N, X_train, y_train, X_test, y_test) f
```

In [15]:
```
fig = plt.figure()
ax = plt.axes()

ax.plot(range(max_noise), accuracies, 'ro');
ax.plot(range(max_noise), accuracies_robust, 'bo');
```


0.94
0.92
0.90
0.88
0.86
0.84
0.82
0.80
0
5
10
15
20
25
30