Tipo : Guía de Laboratorio
Capítulo : Machine Learning en Python
Duración : 60 minutos

I. OBJETIVO

Demostrar competencias básicas en machine learning usando el caso Titanic.

II. REQUISITOS

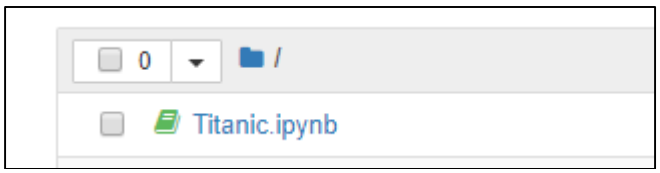
Los siguientes elementos de software son necesarios para la realización del laboratorio:

- Instalar Anaconda en Windows
- Navegador web

III. EJECUCIÓN DEL LABORATORIO

Ejercicio: Caso Titanic.

- Crear un entorno virtual
- conda create --name labtitanic python=3.5
- activatelabtitanic
  2.1.1 pipinstall
    a. jupyter
    b. matplotlib
    c. scikit-learn
    d. pandas
- Activar jupyter en la línea de comandos con jupyter notebook
- Abrir Titanic.ipynb en el browser
- Ejecutar el código y consultar



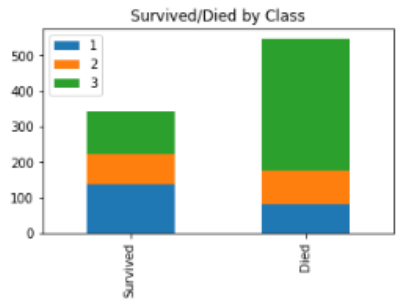
1. **Introducción**

```
In [20]: #https://www.kaggle.com/rochellesilva/simple-tutorial-for-beginners
         #https://ahmedbesbes.com/how-to-score-08134-in-titanic-kaggle-challenge.html
         import numpy as np
         import matplotlib.pyplot as plt
         import pandas as pd

         import warnings
         warnings.filterwarnings('ignore')

In [21]: dataset= pd.read_csv("train.csv")

In [22]: dataset.head()

Out[22]:
```

	PassengerId	Survived	Pclass	Name	Sex	Age	SibSp	Parch	Ticket	Fare	Cabin	Embarked
0	1	0	3	Braund, Mr. Owen Harris	male	22.0	1	0	A/5 21171	7.2500	NaN	S
1	2	1	1	Cumings, Mrs. John Bradley (Florence Briggs Th...	female	38.0	1	0	PC 17599	71.2833	C85	C
2	3	1	3	Heikkinen, Miss. Laina	female	26.0	0	0	STON/O2. 3101282	7.9250	NaN	S
3	4	1	1	Futrelle, Mrs. Jacques Heath (Lily May Peel)	female	35.0	1	0	113803	53.1000	C123	S
4	5	0	3	Allen, Mr. William Henry	male	35.0	0	0	373450	8.0500	NaN	S

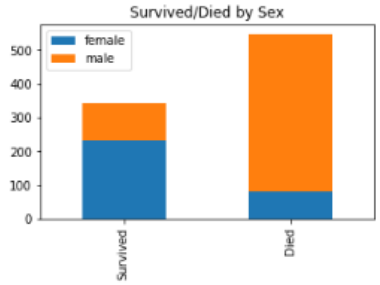
2. Exploración **clase de pasajeros**

```
In [23]: survived_class = dataset[dataset['Survived']==1]['Pclass'].value_counts()
         survived_class.head()

Out[23]: 1    136
         3    119
         2     87
         Name: Pclass, dtype: int64

In [24]: dead_class = dataset[dataset['Survived']==0]['Pclass'].value_counts()
         dead_class.head()

Out[24]: 3    372
         2     97
         1     80
         Name: Pclass, dtype: int64

In [25]: df_class = pd.DataFrame([survived_class,dead_class])
         df_class.index = ['Survived','Died']
         df_class.plot(kind='bar',stacked=True, figsize=(5,3), title="Survived/Died by Class")

Out[25]: <matplotlib.axes._subplots.AxesSubplot at 0x228ff5f65c0>
```



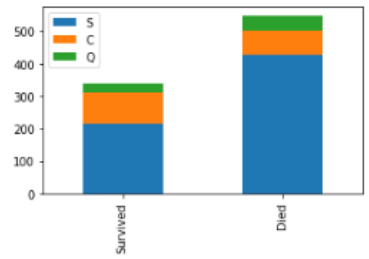
3. Exploración **sexo**

```
In [26]: Survived = dataset[dataset.Survived == 1]['Sex'].value_counts()
         Died = dataset[dataset.Survived == 0]['Sex'].value_counts()
         df_sex = pd.DataFrame([Survived , Died])
         df_sex.index = ['Survived','Died']
         df_sex.plot(kind='bar',stacked=True, figsize=(5,3), title="Survived/Died by Sex")

Out[26]: <matplotlib.axes._subplots.AxesSubplot at 0x228ff92e208>
```



4. Exploración **punto de embarque**

```
In [27]: survived_embark = dataset[dataset['Survived']==1]['Embarked'].value_counts()
         dead_embark = dataset[dataset['Survived']==0]['Embarked'].value_counts()
         df_embark = pd.DataFrame([survived_embark,dead_embark])
         df_embark.index = ['Survived','Died']
         df_embark.plot(kind='bar',stacked=True, figsize=(5,3))

Out[27]: <matplotlib.axes._subplots.AxesSubplot at 0x228ff984630>
```



5. Limpieza **datos de categoría**

```
In [28]: X = dataset.drop(['PassengerId','Cabin','Ticket','Fare', 'Parch', 'SibSp'], axis=1)
         y = X.Survived                        # vector of labels (dependent variable)
         X=X.drop(['Survived'], axis=1)        # remove the dependent variable from the dataframe X

         X.head(20)
```

Out[28]:

	Pclass	Name	Sex	Age	Embarked
0	3	Braund, Mr. Owen Harris	male	22.0	S
1	1	Cumings, Mrs. John Bradley (Florence Briggs Th...	female	38.0	C
2	3	Heikkinen, Miss. Laina	female	26.0	S
3	1	Futrelle, Mrs. Jacques Heath (Lily May Peel)	female	35.0	S
4	3	Allen, Mr. William Henry	male	35.0	S

```
In [29]: # encode "Sex"
         from sklearn.preprocessing import LabelEncoder
         labelEncoder_X = LabelEncoder()
         X.Sex=labelEncoder_X.fit_transform(X.Sex)
```

```
In [11]: X.head()
```

Out[11]:

	Pclass	Name	Sex	Age	Embarked
0	3	Braund, Mr. Owen Harris	1	22.0	S
1	1	Cumings, Mrs. John Bradley (Florence Briggs Th...	0	38.0	C
2	3	Heikkinen, Miss. Laina	0	26.0	S
3	1	Futrelle, Mrs. Jacques Heath (Lily May Peel)	0	35.0	S
4	3	Allen, Mr. William Henry	1	35.0	S

```
In [30]: # number of null values in embarked:
         print ('Number of null values in Embarked:', sum(X.Embarked.isnull()))
```

```
Number of null values in Embarked: 2
```

```
In [31]: row_index = X.Embarked.isnull()
         X.loc[row_index,'Embarked']='S'
```

```
In [32]: # encode "Embarked"
         from sklearn.preprocessing import LabelEncoder
         labelEncoder_X = LabelEncoder()
         X.Embarked=labelEncoder_X.fit_transform(X.Embarked)
```

```
In [33]: X.head()
```

Out[33]:

	Pclass	Name	Sex	Age	Embarked
0	3	Braund, Mr. Owen Harris	1	22.0	2
1	1	Cumings, Mrs. John Bradley (Florence Briggs Th...	0	38.0	0
2	3	Heikkinen, Miss. Laina	0	26.0	2
3	1	Futrelle, Mrs. Jacques Heath (Lily May Peel)	0	35.0	2
4	3	Allen, Mr. William Henry	1	35.0	2

```
In [34]: #Drop Name
         X=X.drop(['Name'], axis=1)
         X=X.drop(['Age'], axis=1)
         X.head()
```

Out[34]:

	Pclass	Sex	Embarked
0	3	1	2
1	1	0	0
2	3	0	2
3	1	0	2
4	3	1	2

6. **Predicciones**

```
In [35]: #-----------------------Logistic Regression-----------------------------------------------
         # Fitting Logistic Regression to the Training set
         from sklearn.linear_model import LogisticRegression
         classifier = LogisticRegression(penalty='l2',random_state = 0)

         # Applying k-Fold Cross Validation
         from sklearn.model_selection import cross_val_score
         accuracies = cross_val_score(estimator = classifier, X=X , y=y , cv = 10)
         print("Logistic Regression:\n Accuracy:", accuracies.mean(), "+/-", accuracies.std(),"\n")

         Logistic Regression:
          Accuracy: 0.7811176370446034 +/- 0.025395923106421765

In [36]: #---------------------------Random Forest-----------------------------------------

         # Fitting Random Forest Classification to the Training set
         from sklearn.ensemble import RandomForestClassifier
         classifier = RandomForestClassifier(n_estimators = 100, criterion = 'entropy', random_state = 0)

         # Applying k-Fold Cross Validation
         from sklearn.model_selection import cross_val_score
         accuracies = cross_val_score(estimator = classifier, X=X , y=y , cv = 10)
         print("Random Forest:\n Accuracy:", accuracies.mean(), "+/-", accuracies.std())

         Random Forest:
          Accuracy: 0.8114683350357508 +/- 0.029440244470430504
```

IV. EVALUACIÓN

1. ¿Cuáles son las fases esenciales del análisis de este caso?
    a. **Respuesta:** exploración, limpieza y modelos.
2. ¿Qué permite la exploración en este caso?
    a. **Respuesta:** entre otras cosas familiarizarse con el dataset, identificar el estado de los datos y reconocer las variables clave para el modelo.
3. ¿Por qué es importante la limpieza de datos en este caso?
    a. **Respuesta:** en este caso particular se ajusta la data para que funcione el modelo. Concretamente, ya que usamos modelos de clasificación se debe procurar transformar datos de texto a datos numéricos