Setup

```
import pandas as pd
import numpy as np
import matplotlib.pyplot as plt
import sklearn
import seaborn as sns

from sklearn.model_selection import train_test_split
from sklearn.metrics import mean_squared_error, accuracy_score, confusion_matrix, precision_score, recall_score, ConfusionMatrixDisplay
from math import sqrt

import keras
from keras.models import Sequential
from keras.layers import Dense
from keras.utils import to_categorical
```

Set Data

```
rawData = 'https://raw.githubusercontent.com/Rwyld/Data-Science-Models/main/RedesNeuronales/diabetes%20CSV.csv'

data = pd.read_csv(rawData)
data.head(3)
```

	Pregnancies	Glucose	BloodPressure	SkinThickness	Insulin	BMI	DiabetesPedig
0	6	148	72	35	0	33.6	
1	1	85	66	29	0	26.6	
2	8	183	64	0	0	23.3	

Analisis Exploratorio

```
data.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 768 entries, 0 to 767
Data columns (total 9 columns):
 #   Column                    Non-Null Count  Dtype  
---  ------                    --------------  -----  
 0   Pregnancies               768 non-null    int64  
 1   Glucose                   768 non-null    int64  
 2   BloodPressure             768 non-null    int64  
 3   SkinThickness             768 non-null    int64  
 4   Insulin                   768 non-null    int64  
 5   BMI                       768 non-null    float64
 6   DiabetesPedigreeFunction  768 non-null    float64
 7   Age                       768 non-null    int64  
 8   Outcome                   768 non-null    int64  
dtypes: float64(2), int64(7)
memory usage: 54.1 KB
```

```
data.describe()
```

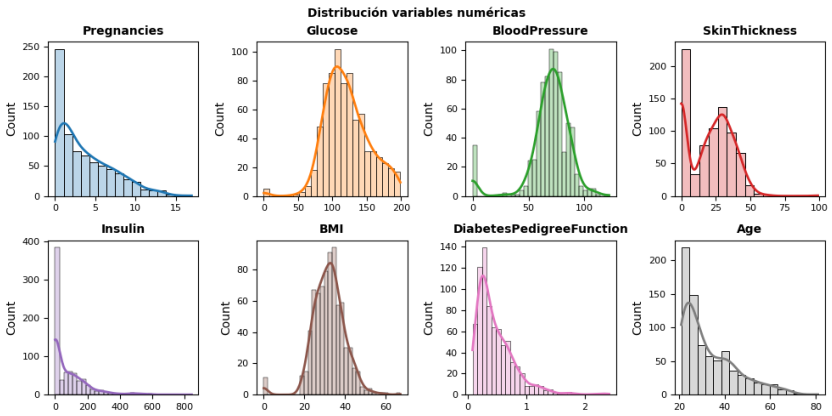
	Pregnancies	Glucose	BloodPressure	SkinThickness	Insulin	BM
count	768.000000	768.000000	768.000000	768.000000	768.000000	768.00000
mean	3.845052	120.894531	69.105469	20.536458	79.799479	31.99257
std	3.369578	31.972618	19.355807	15.952218	115.244002	7.88416
min	0.000000	0.000000	0.000000	0.000000	0.000000	0.00000
25%	1.000000	99.000000	62.000000	0.000000	0.000000	27.30000
50%	3.000000	117.000000	72.000000	23.000000	30.500000	32.00000
75%	6.000000	140.250000	80.000000	32.000000	127.250000	36.60000
max	17.000000	199.000000	122.000000	99.000000	846.000000	67.10000

```
fig, axes = plt.subplots(nrows=2, ncols=4, figsize=(10,5))
axes = axes.flat
#data = data.select_dtypes(include=['float64', 'int']).columns

graphData = data.drop('Outcome', axis=1)

for i, colum in enumerate(graphData):
    sns.histplot(
        data    = graphData,
        x       = colum,
        stat    = "count",
        kde     = True,
        color   = (list(plt.rcParams['axes.prop_cycle'])*2)[i]["color"],
        line_kws= {'linewidth': 2},
        alpha   = 0.3,
        ax      = axes[i]
    )
    axes[i].set_title(colum, fontsize = 10, fontweight = "bold")
    axes[i].tick_params(labelsize = 8)
    axes[i].set_xlabel("")


fig.tight_layout()
plt.subplots_adjust(top = 0.9)
fig.suptitle('Distribución variables numéricas', fontsize = 10, fontweight = "bold");
```



Resumen: La data cargada no presenta datos faltantes o nulos. En cuanto a los datos visualizados en histogramas, no se observan posibles datos anomalos y las variables podemos observar una distribucion normal en Glucosa, BMI y BlooPressure.

Modelando Keras

Split test/train data

```
X = data.drop('Outcome', axis = 1).values
y = data['Outcome'].values

X_train, X_test, y_train, y_test = train_test_split(X, y, test_size=0.1, random_state=2023)

y_train = to_categorical(y_train)
y_test = to_categorical(y_test)
```

Definiendo la red

```
model = Sequential()
model.add(Dense(100, activation='relu', input_dim=8))
model.add(Dense(50, activation='relu'))
model.add(Dense(2, activation='sigmoid'))
```

Compilando

```
model.compile(optimizer='adam',
              loss='categorical_crossentropy',
              metrics=['accuracy'])
```

Ajustando

```
model.fit(X_train, y_train,epochs=150, batch_size=10, verbose = False)
```

```
<keras.callbacks.History at 0x7f3cf9db0f10>
```

Predicciones y conclusion

```
predTraining = model.predict(X_train)
scores = model.evaluate(X_train, y_train, verbose=0)
print('Accuracy con la data train: {}% \n El error de la data de entrenamiento es: {}'.format(scores[1], 1 - scores[1]))

predTesting= model.predict(X_test)
scores2 = model.evaluate(X_test, y_test, verbose=0)
print('Accuracy con la data test: {}% \n El error de la data de testeo es: {}'.format(scores2[1], 1 - scores2[1]))
```

```
22/22 [==============================] - 0s 1ms/step
Accuracy con la data train: 0.8972503542900085%
 El error de la data de entrenamiento es: 0.10274964570999146
3/3 [==============================] - 0s 3ms/step
Accuracy con la data test: 0.8181818127632141%
 El error de la data de testeo es: 0.1818181872367859
```

Conclusión: La red obtuvo un 89% de precision en los datos de entrenamiento y un 81% en los datos de testeo, a pesar de ser una precision buena, el modelo puede mejorar su precision si se configura con otros hiperparametros y con una mayor cantidad de datos.