Repaso de algoritmos de machine learning

1. SVM
2. Decision Tree Classifier
3. Random Forest
4. K-NN

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

```
data = pd.read_csv('/content/drug200.csv')
data.head(5)
```

	Age	Sex	BP	Cholesterol	Na_to_K	Drug
0	23	F	HIGH	HIGH	25.355	drugY
1	47	M	LOW	HIGH	13.093	drugC
2	47	M	LOW	HIGH	10.114	drugC
3	28	F	NORMAL	HIGH	7.798	drugX
4	61	F	LOW	HIGH	18.043	drugY

```
data.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 200 entries, 0 to 199
Data columns (total 6 columns):
 #   Column       Non-Null Count  Dtype  
---  ------       --------------  -----  
 0   Age          200 non-null    int64  
 1   Sex          200 non-null    object 
 2   BP           200 non-null    object 
 3   Cholesterol  200 non-null    object 
 4   Na_to_K      200 non-null    float64
 5   Drug         200 non-null    object 
dtypes: float64(1), int64(1), object(4)
memory usage: 9.5+ KB
```

```
data.shape
```

```
(200, 6)
```

```
data.isnull().sum()
```

```
Age            0
Sex            0
BP             0
Cholesterol    0
Na_to_K        0
Drug           0
dtype: int64
```

Estadistica descriptiva

```
data.describe().T
```

	count	mean	std	min	25%	50%	75%	max
Age	200.0	44.315000	16.544315	15.000	31.0000	45.0000	58.00	74.000
Na_to_K	200.0	16.084485	7.223956	6.269	10.4455	13.9365	19.38	38.247

```
#cantidad drogas
data.Drug.value_counts()
```

```
drugY    91
drugX    54
```

```
     drugA     23
     drugC     16
     drugB     16
     Name: Drug, dtype: int64
```

```
#cantidad bp
data.BP.value_counts()
```

```
     HIGH      77
     LOW       64
     NORMAL    59
     Name: BP, dtype: int64
```

```
#cantidad colesterol
data.Cholesterol.value_counts()
```

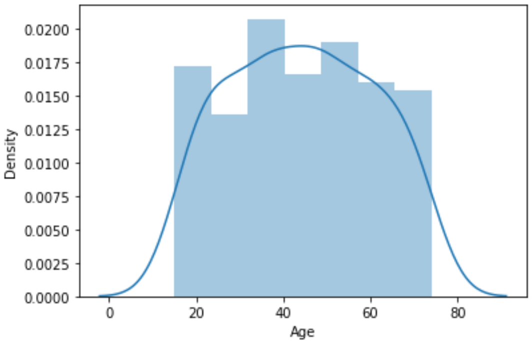
```
     HIGH      103
     NORMAL     97
     Name: Cholesterol, dtype: int64
```

```
#estudio de skewness
skew_age = data['Age'].skew(axis=0,skipna=True)
skew_na_to_k = data['Na_to_K'].skew(axis=0,skipna=True)


print(f'skewness age : {skew_age}')
print(f'skewness Na to K : {skew_na_to_k}')
```

```
     skewness age : 0.030308357030000607
     skewness Na to K : 1.039341186028881
```

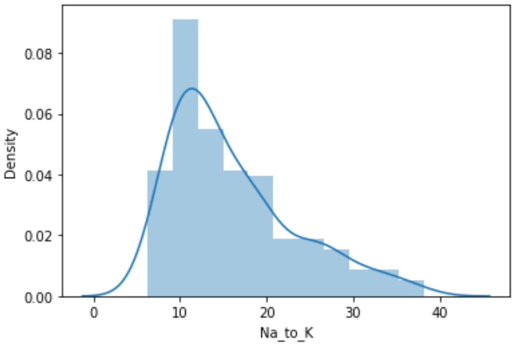
```
#graficando
sns.distplot(data.Age)
plt.show()
```

```
     /usr/local/lib/python3.8/dist-packages/seaborn/distributions.py:2619: Futur
       warnings.warn(msg, FutureWarning)
```

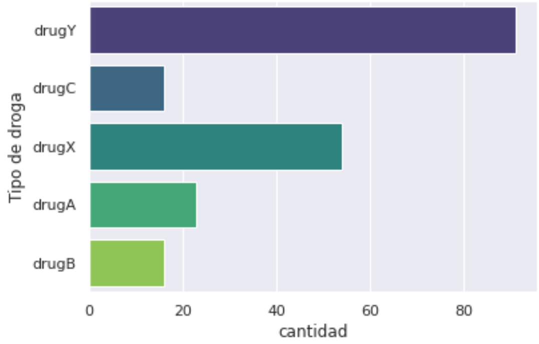


```
sns.distplot(data.Na_to_K)
plt.show()
```

```
     /usr/local/lib/python3.8/dist-packages/seaborn/distributions.py:2619: FutureWarn
       warnings.warn(msg, FutureWarning)
```



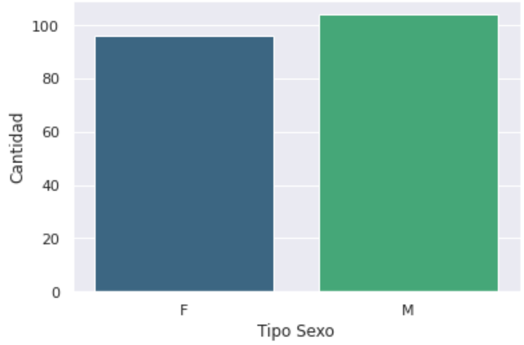
```
#distribucion por tipo de droga
sns.set_theme(style='darkgrid')
sns.set_theme(style='darkgrid')
sns.countplot(y='Drug',data=data,palette='viridis')
plt.xlabel('cantidad')
plt.ylabel('Tipo de droga')
plt.show()
```



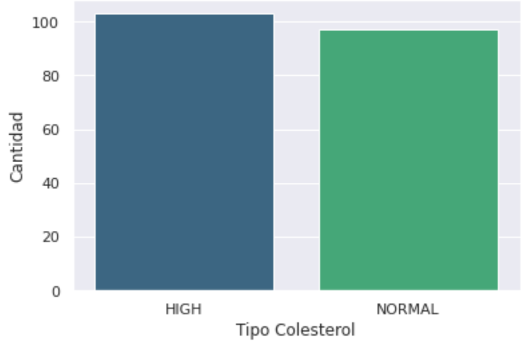
```
91/200
```

```
0.455
```

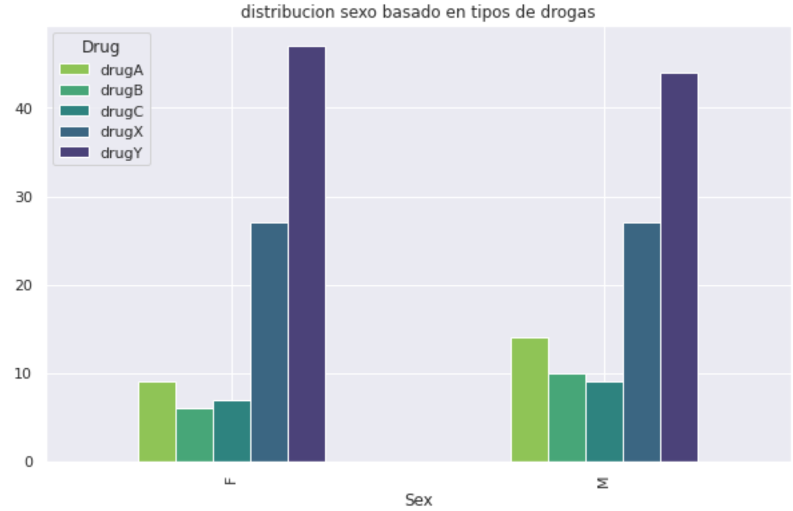
```
#Sexo
sns.set_theme(style='darkgrid')
sns.countplot(x='Sex',data=data,palette='viridis')
plt.xlabel('Tipo Sexo')
plt.ylabel('Cantidad')
plt.show()
```



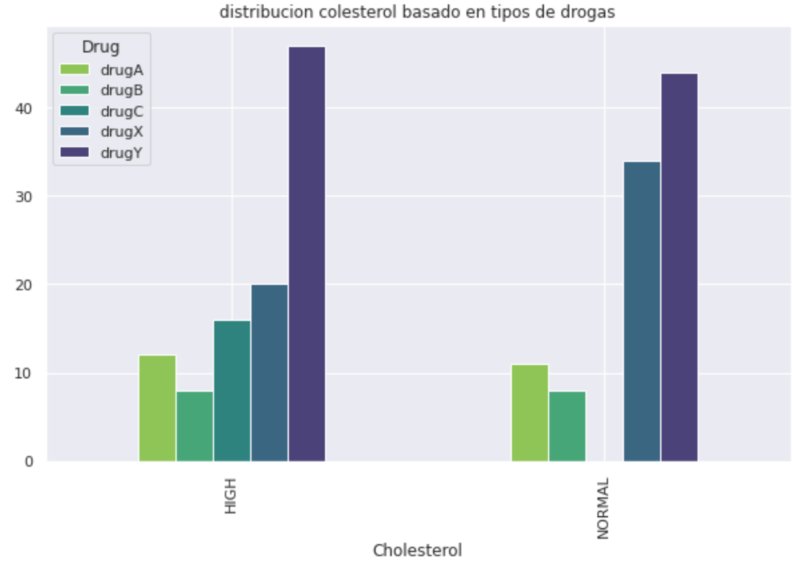
```
#colesterol
sns.set_theme(style='darkgrid')
sns.countplot(x='Cholesterol',data=data,palette='viridis')
plt.xlabel('Tipo Colesterol')
plt.ylabel('Cantidad')
plt.show()
```



```
#crosstab pandas

pd.crosstab(data.Sex,data.Drug).plot(kind='bar',figsize=(10,6),color=['#8fc456','#47a678','#2e837f','#3b6682','#4b4279'])
plt.title('distribucion sexo basado en tipos de drogas')
plt.show()
```



```
pd.crosstab(data.Cholesterol,data.Drug).plot(kind='bar',figsize=(10,6),color=['#8fc456','#47a678','#2e837f','#3b6682','#4b4279'])
plt.title('distribucion colesterol basado en tipos de drogas')
plt.show()
```



SVM

```
#Creacion de modelos de machine learning
#SVM
from sklearn.svm import SVC
from sklearn.model_selection import train_test_split
from sklearn.metrics import accuracy_score,classification_report,confusion_matrix
```

```
data.isnull().sum()
```

```
Age            0
Sex            0
BP             0
Cholesterol    0
Na_to_K        0
Drug           0
dtype: int64
```

```
#seleccion de variables
X = data.drop(['Drug'],axis=1)
X = pd.get_dummies(X)
y = data.Drug
```

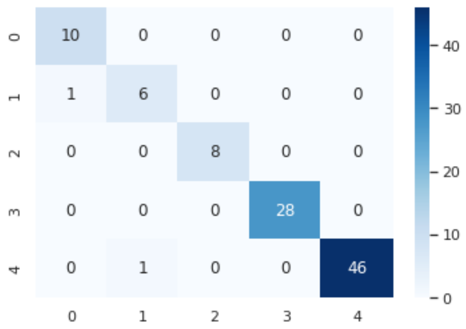
```
#separacion de data de entrenamiento y testeo
X_train,X_test,y_train,y_test = train_test_split(X,y,random_state=0,test_size=0.5)
```

```
SVCModel = SVC(kernel='linear',max_iter=250).fit(X_train,y_train)
y_pred = SVCModel.predict(X_test)

print(classification_report(y_test,y_pred))
print(confusion_matrix(y_test,y_pred))
```

```
              precision    recall  f1-score   support

       drugA       0.91      1.00      0.95        10
       drugB       0.86      0.86      0.86         7
       drugC       1.00      1.00      1.00         8
       drugX       1.00      1.00      1.00        28
       drugY       1.00      0.98      0.99        47

    accuracy                           0.98       100
   macro avg       0.95      0.97      0.96       100
weighted avg       0.98      0.98      0.98       100

[[10  0  0  0  0]
 [ 1  6  0  0  0]
 [ 0  0  8  0  0]
 [ 0  0  0 28  0]
 [ 0  1  0  0 46]]
/usr/local/lib/python3.8/dist-packages/sklearn/svm/_base.py:284: ConvergenceWarning: Solver terminated early (max_iter=250).
  warnings.warn(
```

```
sns.heatmap(pd.DataFrame(confusion_matrix(y_test,y_pred)),annot=True,cmap='Blues')
```

```
<matplotlib.axes._subplots.AxesSubplot at 0x7f44074c8700>
```



```
print(f'accuracy score : {accuracy_score(y_pred,y_test)}')
```

```
accuracy score : 0.98
```

DECISION TREE CLASSIFIER

```
from sklearn.tree import DecisionTreeClassifier,plot_tree
```

```
TreeModel = DecisionTreeClassifier(max_leaf_nodes=20).fit(X_train,y_train)
y_pred = TreeModel.predict(X_test)

print(classification_report(y_test,y_pred))
print(confusion_matrix(y_test,y_pred))
print(f'accuracy score: {accuracy_score(y_pred,y_test)}')
```

```
              precision    recall  f1-score   support

       drugA       0.83      1.00      0.91        10
       drugB       1.00      0.71      0.83         7
       drugC       1.00      1.00      1.00         8
       drugX       1.00      0.96      0.98        28
       drugY       0.98      1.00      0.99        47

    accuracy                           0.97       100
   macro avg       0.96      0.94      0.94       100
weighted avg       0.97      0.97      0.97       100
```

```
[[10  0  0  0  0]
 [ 2  5  0  0  0]
 [ 0  0  8  0  0]
 [ 0  0  0 27  1]
 [ 0  0  0  0 47]]
accuracy score: 0.97
```

Random Forest

```
from sklearn.ensemble import RandomForestClassifier
```

```
RFModel = RandomForestClassifier(max_leaf_nodes=20).fit(X_train,y_train)
y_pred = RFModel.predict(X_test)

print(classification_report(y_test,y_pred))
print(confusion_matrix(y_test,y_pred))
print(f'accuracy score: {accuracy_score(y_pred,y_test)}')
```

```
              precision    recall  f1-score   support

       drugA       0.83      1.00      0.91        10
       drugB       1.00      0.71      0.83         7
       drugC       1.00      1.00      1.00         8
       drugX       1.00      0.96      0.98        28
       drugY       0.98      1.00      0.99        47

    accuracy                           0.97       100
   macro avg       0.96      0.94      0.94       100
weighted avg       0.97      0.97      0.97       100

[[10  0  0  0  0]
 [ 2  5  0  0  0]
 [ 0  0  8  0  0]
 [ 0  0  0 27  1]
 [ 0  0  0  0 47]]
accuracy score: 0.97
```

K-NN

```
from sklearn.neighbors import KNeighborsClassifier
```

```
KNNModel = KNeighborsClassifier(n_neighbors=20).fit(X_train,y_train)
y_pred = KNNModel.predict(X_test)

print(classification_report(y_test,y_pred))
print(confusion_matrix(y_test,y_pred))
print(f'accuracy score: {accuracy_score(y_pred,y_test)}')
```

```
              precision    recall  f1-score   support

       drugA       0.17      0.10      0.12        10
       drugB       0.21      0.43      0.29         7
       drugC       0.00      0.00      0.00         8
       drugX       0.44      0.57      0.50        28
       drugY       0.93      0.87      0.90        47

    accuracy                           0.61       100
   macro avg       0.35      0.39      0.36       100
weighted avg       0.59      0.61      0.60       100

[[ 1  0  0  9  0]
 [ 0  3  0  4  0]
 [ 2  0  0  5  1]
 [ 3  7  0 16  2]
 [ 0  4  0  2 41]]
accuracy score: 0.61
/usr/local/lib/python3.8/dist-packages/sklearn/metrics/_classification.py:1318: UndefinedMetricWarning: Precision and F-scor
  _warn_prf(average, modifier, msg_start, len(result))
/usr/local/lib/python3.8/dist-packages/sklearn/metrics/_classification.py:1318: UndefinedMetricWarning: Precision and F-scor
  _warn_prf(average, modifier, msg_start, len(result))
/usr/local/lib/python3.8/dist-packages/sklearn/metrics/_classification.py:1318: UndefinedMetricWarning: Precision and F-scor
  _warn_prf(average, modifier, msg_start, len(result))
```

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