

```
import numpy as np
from sklearn.neighbors import KNeighborsClassifier
from sklearn.datasets import load_wine
import seaborn as sns
import pandas as pd
import matplotlib.pyplot as plt
from sklearn.model_selection import train_test_split
from sklearn.cluster import KMeans
from sklearn.preprocessing import StandardScaler
```

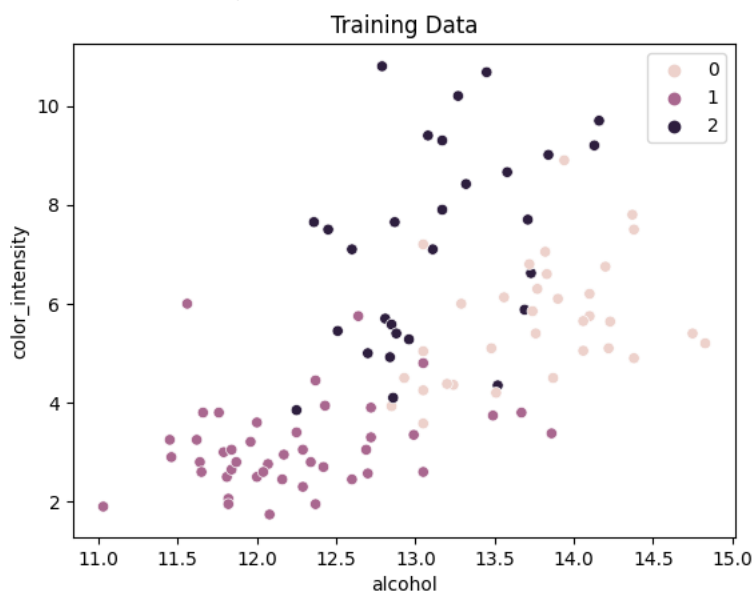
Pre-processing

```
data=load_wine()
# print(data)
X= pd.DataFrame(data=data['data'], columns=data['feature_names'])
y=data['target']
X_train, X_test,y_train,y_test=train_test_split(X,y,train_size=0.6,random_state=42,shuffle=True)
alcohol=X['alcohol']
color=X['color_intensity']
ash = X['ash']
flav = X['flavanoids']
macid = X['malic_acid']
```

Visualization

```
sns.scatterplot(data=X_train,x='alcohol',y='color_intensity',hue=y_train);
plt.title('Training Data')
```

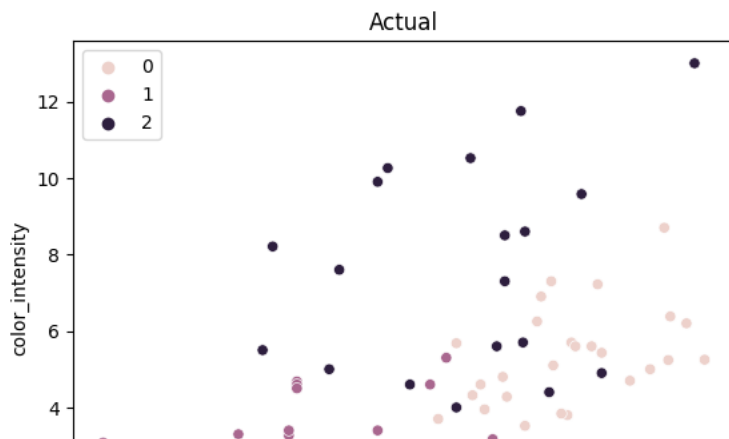
```
Text(0.5, 1.0, 'Training Data')
```



```
Kmeans=KMeans(n_clusters=3,n_init=10).fit(X_train[['alcohol','color_intensity']])
pred = Kmeans.predict(X_test[['alcohol','color_intensity']])
sns.scatterplot(data=X_test,x='alcohol',y='color_intensity',hue=y_test)
plt.title('Actual')
plt.figure(figsize=(4,4))
```

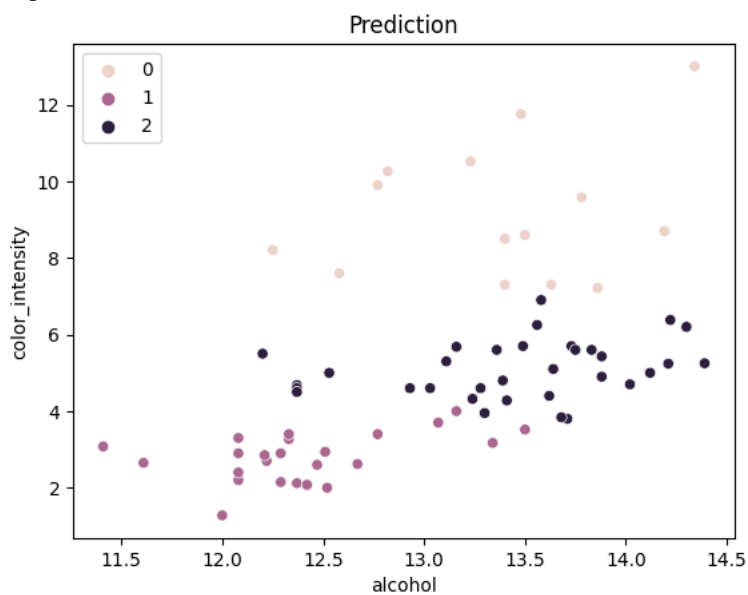


<Figure size 400x400 with 0 Axes>



```
plt.title('Prediction')
sns.scatterplot(data=X_test,x='alcohol',y='color_intensity',hue=pred)
plt.figure(figsize=(3,3))
```

<Figure size 300x300 with 0 Axes>



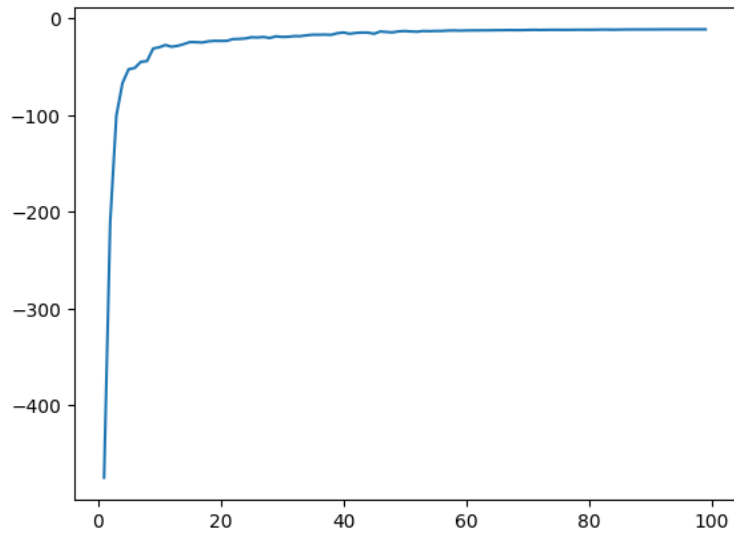
<Figure size 300x300 with 0 Axes>

Train & Test

```
score = []
for i in range(1,100):
    Kmeans=KMeans(n_clusters=i,n_init=10).fit(X_train[['alcohol','color_intensity']])
    pred= Kmeans.predict(X_test[['alcohol','color_intensity']])
    score.append(Kmeans.score(X_test[['alcohol','color_intensity']]))
```

```
k = [k for k in range(1,100)]
plt.plot(k,score)
```

[<matplotlib.lines.Line2D at 0x7efe1f3a8d60>]



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