Setup

```
import pandas as pd
import numpy as np
import matplotlib.pyplot as plt
from sklearn import datasets
from sklearn.model_selection import train_test_split
from sklearn.svm import SVC
from sklearn.inspection import DecisionBoundaryDisplay
```

```
iris = datasets.load_iris()
```

```
iris = pd.DataFrame(
    data= np.c_[iris['data'], iris['target']],
    columns= iris['feature_names'] + ['target']
    )
iris.head()
```

	sepal length (cm)	sepal width (cm)	petal length (cm)	petal width (cm)	target
0	5.1	3.5	1.4	0.2	0.0
1	4.9	3.0	1.4	0.2	0.0
2	4.7	3.2	1.3	0.2	0.0
3	4.6	3.1	1.5	0.2	0.0
4	5.0	3.6	1.4	0.2	0.0

```
species = []

for i in range(len(iris['target'])):
    if iris['target'][i] == 0:
        species.append("setosa")
    elif iris['target'][i] == 1:
        species.append('versicolor')
    else:
        species.append('virginica')


iris['species'] = species

iris.head()
```

	sepal length (cm)	sepal width (cm)	petal length (cm)	petal width (cm)	target	species
0	5.1	3.5	1.4	0.2	0.0	setosa
1	4.9	3.0	1.4	0.2	0.0	setosa
2	4.7	3.2	1.3	0.2	0.0	setosa
3	4.6	3.1	1.5	0.2	0.0	setosa
4	5.0	3.6	1.4	0.2	0.0	setosa

Analisis Exploratorio

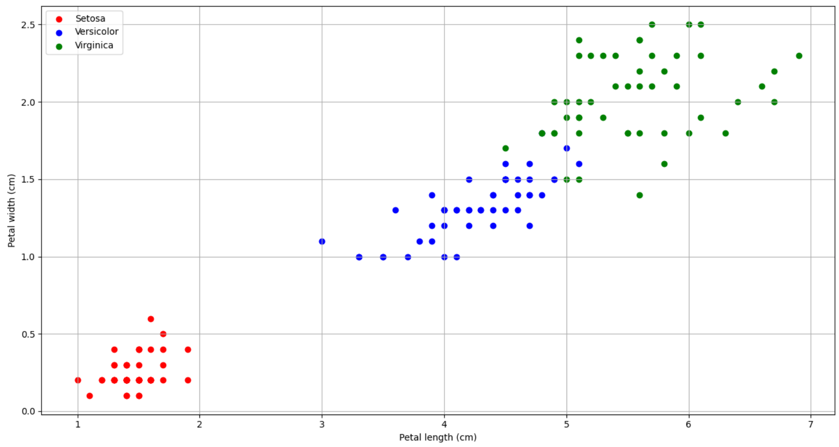
```
iris.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 150 entries, 0 to 149
Data columns (total 6 columns):
 #   Column             Non-Null Count  Dtype  
---  ------             --------------  -----  
 0   sepal length (cm)  150 non-null    float64
 1   sepal width (cm)   150 non-null    float64
 2   petal length (cm)  150 non-null    float64
 3   petal width (cm)   150 non-null    float64
 4   target             150 non-null    float64
 5   species            150 non-null    object 
dtypes: float64(5), object(1)
memory usage: 7.2+ KB
```

```
iris.describe()
```

	sepal length (cm)	sepal width (cm)	petal length (cm)	petal width (cm)	target
count	150.000000	150.000000	150.000000	150.000000	150.000000
mean	5.843333	3.057333	3.758000	1.199333	1.000000
std	0.828066	0.435866	1.765298	0.762238	0.819232
min	4.300000	2.000000	1.000000	0.100000	0.000000
25%	5.100000	2.800000	1.600000	0.300000	0.000000
50%	5.800000	3.000000	4.350000	1.300000	1.000000
75%	6.400000	3.300000	5.100000	1.800000	2.000000
max	7.900000	4.400000	6.900000	2.500000	2.000000

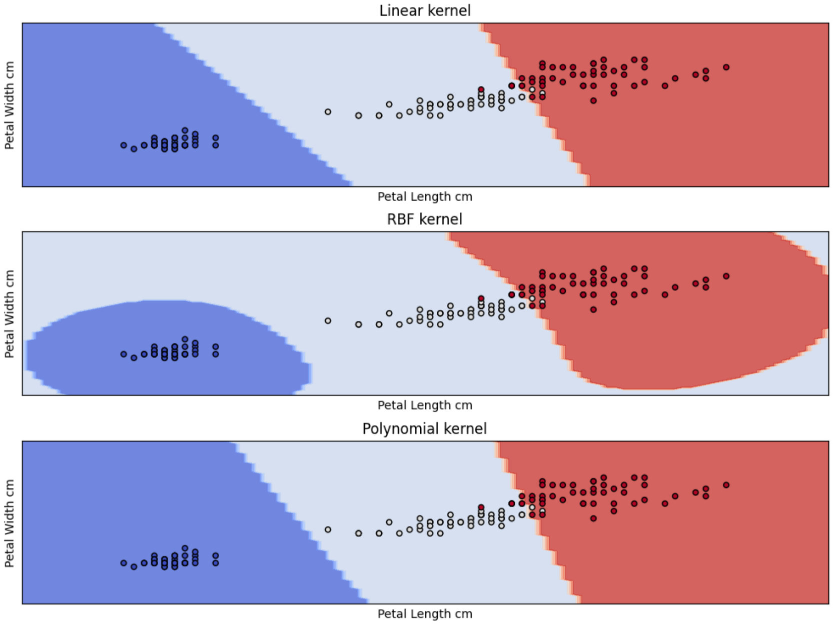
```
setosa = iris[iris['species'] == 'setosa']
versicolor = iris[iris['species'] == 'versicolor']
virginica = iris[iris['species'] == 'virginica']

fig, ax = plt.subplots(figsize = (13,7))

ax.scatter(setosa['petal length (cm)'],setosa['petal width (cm)'], label = 'Setosa', facecolor = "red")
ax.scatter(versicolor['petal length (cm)'],versicolor['petal width (cm)'], label = 'Versicolor', facecolor = "blue")
ax.scatter(virginica['petal length (cm)'],virginica['petal width (cm)'], label = 'Virginica', facecolor = "green")

ax.grid()
ax.legend(loc = 'upper left')
ax.set_xlabel('Petal length (cm)')
ax.set_ylabel('Petal width (cm)')
plt.tight_layout()
plt.show()
```



En el grafico podemos observar los puntos agrupados por colores, donde rojo son datos correspondientes a Setosa, Azules a Versicolor y Verde a Virginica.

Ajuste del modelo

```
X = iris.drop(['sepal width (cm)', 'sepal length (cm)', 'target', 'species'], axis = 1)
y = iris['target']
X_train, X_test, y_train, y_test = train_test_split(X,y,test_size = 0.9, random_state = 1)


#Ajuste de los Modelos SVC
C = 1

models = (
    SVC(kernel="linear", C=C),
    SVC(kernel="rbf", gamma=0.7, C=C),
    SVC(kernel="poly", degree=3, gamma="auto", C=C),
)
models = (clf.fit(X_train, y_train) for clf in models)

titles = (
    "Linear kernel",
    "RBF kernel",
    "Polynomial kernel",
)

#Graficos de los modelos SVC
fig, sub = plt.subplots(3, 1, figsize = (10,8))

X0, X1 = X['petal length (cm)'], X['petal width (cm)']

for clf, title, ax in zip(models, titles, sub.flatten()):
    disp = DecisionBoundaryDisplay.from_estimator(
        clf,
        X,
        response_method="predict",
        cmap=plt.cm.coolwarm,
        alpha=0.8,
        ax=ax,
        xlabel='Petal Length cm',
        ylabel='Petal Width cm',
    )
    ax.scatter(X0, X1, c=y, cmap=plt.cm.coolwarm, s=20, edgecolors="k")
    ax.set_xticks(())
    ax.set_yticks(())
    ax.set_title(title)

plt.tight_layout()
plt.subplots_adjust(top = 0.9)
plt.show()
```



Linear kernel

RBF kernel

Polynomial kernel