Support Vector Regression (SVR) using linear and non-linear kernels

Toy example of 1D regression using linear, polynomial and RBF kernels.

In [1]:

```python
# import and check needed libraies

import matplotlib.pyplot as plt
import numpy as np

from sklearn.svm import SVR

# to check the time of execution, import function time
import time

# check versions of libraries
print('numpy version is: {}'.format(np.__version__))

```

```
numpy version is: 1.18.1
```

In [2]:

```python
#generate sample data

X = np.sort(5 * np.random.rand(40, 1), axis=0)
y = np.sin(X).ravel()

# add noise to targets
y[::5] += 3 * (0.5 - np.random.rand(8))
```

In [3]:

```python
# Fit regression model

svr_rbf = SVR(kernel="rbf", C=100, gamma=0.1, epsilon=0.1)
svr_lin = SVR(kernel="linear", C=100, gamma="auto")
svr_poly = SVR(kernel="poly", C=100, gamma="auto", degree=3, epsilon=0.1, coef0=1)

```

In [4]:

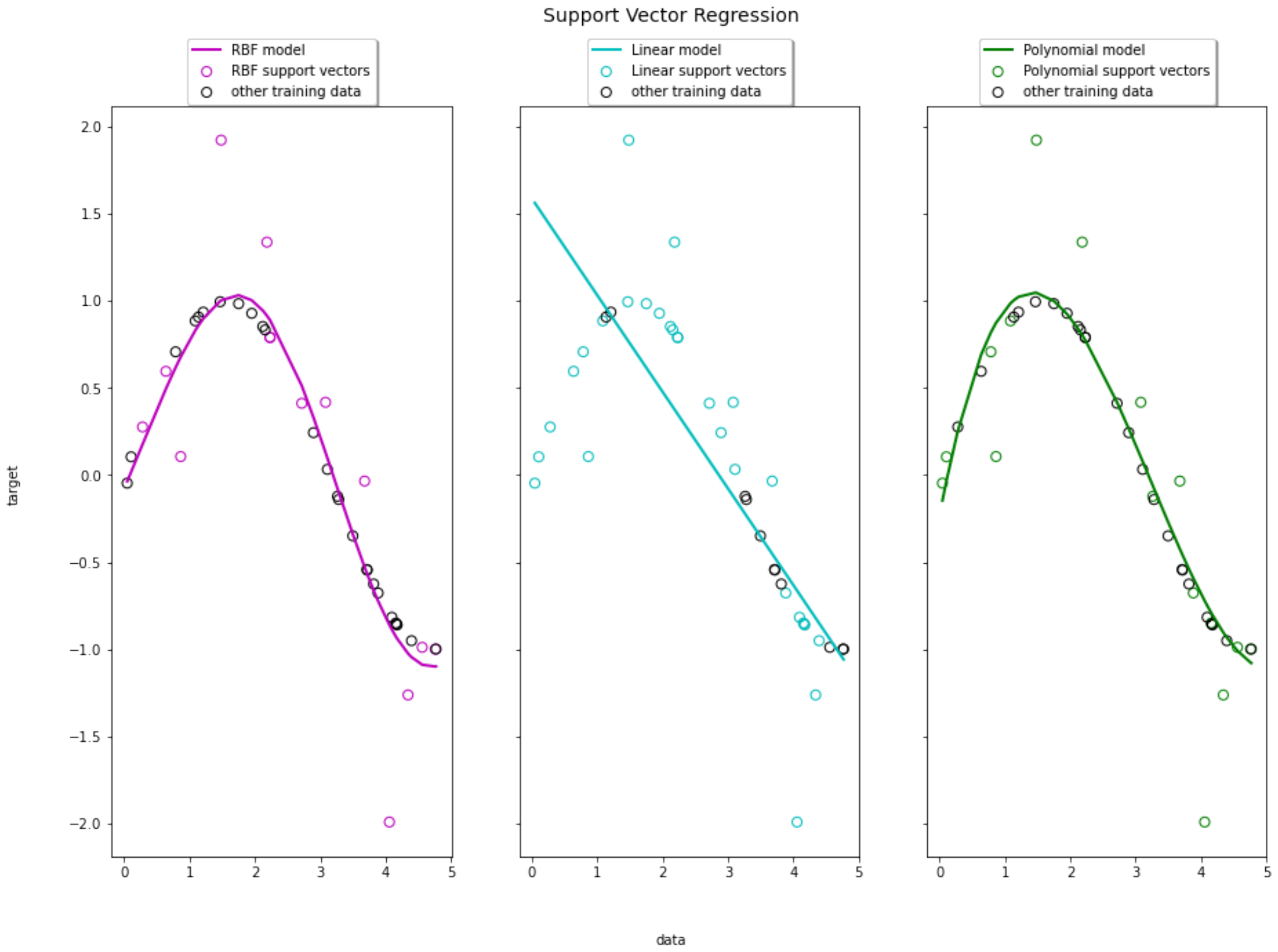
```
#Look at the results

lw = 2

svrs = [svr_rbf, svr_lin, svr_poly]
kernel_label = ["RBF", "Linear", "Polynomial"]
model_color = ["m", "c", "g"]

fig, axes = plt.subplots(nrows=1, ncols=3, figsize=(15, 10), sharey=True)
for ix, svr in enumerate(svrs):
    axes[ix].plot(
        X,
        svr.fit(X, y).predict(X),
        color=model_color[ix],
        lw=lw,
        label="{} model".format(kernel_label[ix]),
    )
    axes[ix].scatter(
        X[svr.support_],
        y[svr.support_],
        facecolor="none",
        edgecolor=model_color[ix],
        s=50,
        label="{} support vectors".format(kernel_label[ix]),
    )
    axes[ix].scatter(
        X[np.setdiff1d(np.arange(len(X)), svr.support_)],
        y[np.setdiff1d(np.arange(len(X)), svr.support_)],
        facecolor="none",
        edgecolor="k",
        s=50,
        label="other training data",
    )
    axes[ix].legend(
        loc="upper center",
        bbox_to_anchor=(0.5, 1.1),
        ncol=1,
        fancybox=True,
        shadow=True,
    )

fig.text(0.5, 0.04, "data", ha="center", va="center")
fig.text(0.06, 0.5, "target", ha="center", va="center", rotation="vertical")
fig.suptitle("Support Vector Regression", fontsize=14)
plt.show()
```



In [5]:

```python
# Print current date and time

print('******* Aktuelles Datum und Zeit*********')
print("Date & Time:",time.strftime("%d.%m.%Y  %H:%M:%S"))
# end of import test
print ("Ende Python-Programm ***SVR_Example ***")

```

```
******* Aktuelles Datum und Zeit*********
Date & Time: 21.11.2024  17:03:18
Ende Python-Programm ***SVR_Example ***
```