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In [1]: # 导入操作系统库
import os
# 更改工作目录
os.chdir(r"D:\softwares\applied statistics\pythoncodelearning\chap3\sourcecode")
# 导入基础计算库
import numpy as np
# 导入绘图库
import matplotlib.pyplot as plt
# 导入支持向量机模型
from sklearn.svm import SVR
# 导入绘图库中的字体管理包
from matplotlib import font_manager
# 实现中文字符正常显示
font = font_manager.FontProperties(fname=r"C:\Windows\Fonts\SimKai.ttf")
# 使用seaborn风格绘图
plt.style.use("seaborn-v0_8")
# 生成样本
X = np.sort(5 * np.random.rand(40, 1), axis=0)
y = np.sin(X).ravel()
# 添加噪声
y[:5] += 3 * (0.5 - np.random.rand(8))
# rbf核函数的SVR
svr_rbf = SVR(kernel="rbf", C=100, gamma=0.1, epsilon=0.1)
# 线性核函数的SVR
svr_lin = SVR(kernel="linear", C=100, gamma="auto")
# 多项式核函数的SVR
svr_poly = SVR(kernel="poly", C=100, gamma="auto", degree=3, epsilon=0.1, coef0=
lw = 2
# 构造迭代对象列表
svrs = [svr_rbf, svr_lin, svr_poly]
kernel_label = ["RBF", "Linear", "Polynomial"]
model_color = ["m", "c", "g"]
# 开始绘图
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="{0} model".format(kernel_label[ix]),
    )
    axes[ix].scatter(
        X[svr.support_],
        y[svr.support_],
        facecolor="none",
        edgecolor=model_color[ix],
        s=50,
        label="{0} 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",
    )

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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()
fig.savefig("../codeimage/code5.pdf")

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