svmimplementation

2019 年 3 月 1 日

1　SVM 実装

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In [1]: from sklearn import datasets
        import numpy as np
        import matplotlib.pyplot as plt
        import layers
        from layers import decisionregionplotfunction as drp
        from sklearn.model_selection import train_test_split
        from sklearn.preprocessing import StandardScaler
        from sklearn.svm import SVC
```

```
In [2]: #線形のみ OK（スラック変数あり）
        iris=datasets.load_iris()
        x=iris.data[:,[2,3]]
        y=iris.target
        x_train,x_test,y_train,y_test=train_test_split(x,y,test_size=0.3,random_state=1,stratify=y)

        sc=StandardScaler()
        sc.fit(x_train)

        x_train_std=sc.transform(x_train)
        x_test_std=sc.transform(x_test)

        svm=SVC(kernel='linear',C=1.0,random_state=1)

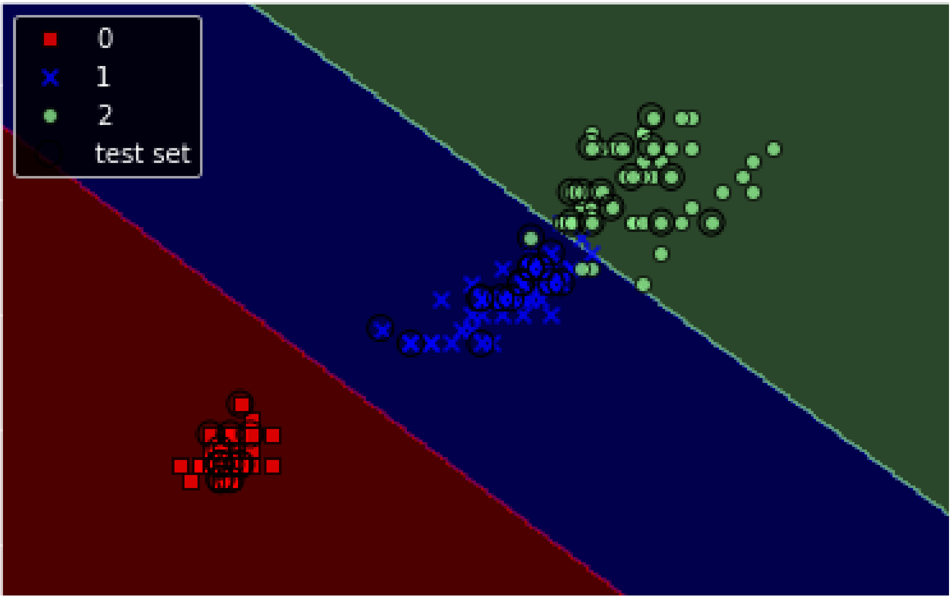
        svm.fit(x_train_std,y_train)

        x_combined_std=np.vstack((x_train_std,x_test_std))
        y_combined=np.hstack((y_train,y_test))

        drp.plot_decision_regions(x=x_combined_std,y=y_combined,classifier=svm,test_idx=range(105,15

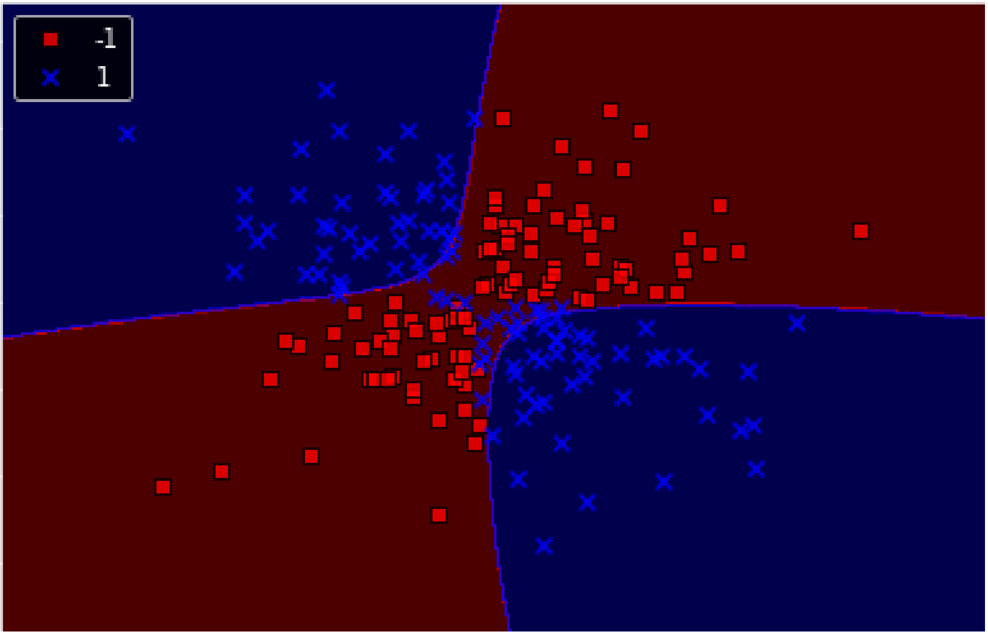
        plt.xlabel('petal length [standardized]')
        plt.ylabel('petal width [standardized]')
plt.legend(loc='upper left')

plt.tight_layout()
plt.show()
```



```
In [3]: #カーネルトリック

        svm=SVC(kernel='rbf',random_state=1,gamma=0.1,C=10.0)
        np.random.seed(1)
        x_xor=np.random.randn(200,2)
        y_xor=np.logical_xor(x_xor[:,0]>0,x_xor[:,1]>0)
        y_xor=np.where(y_xor,1,-1)
        X,Y=x_xor,y_xor
        svm.fit(X,Y)
        drp.plot_decision_regions(X,Y,classifier=svm)
        plt.legend(loc='upper left')
        plt.tight_layout()
        plt.show()
```



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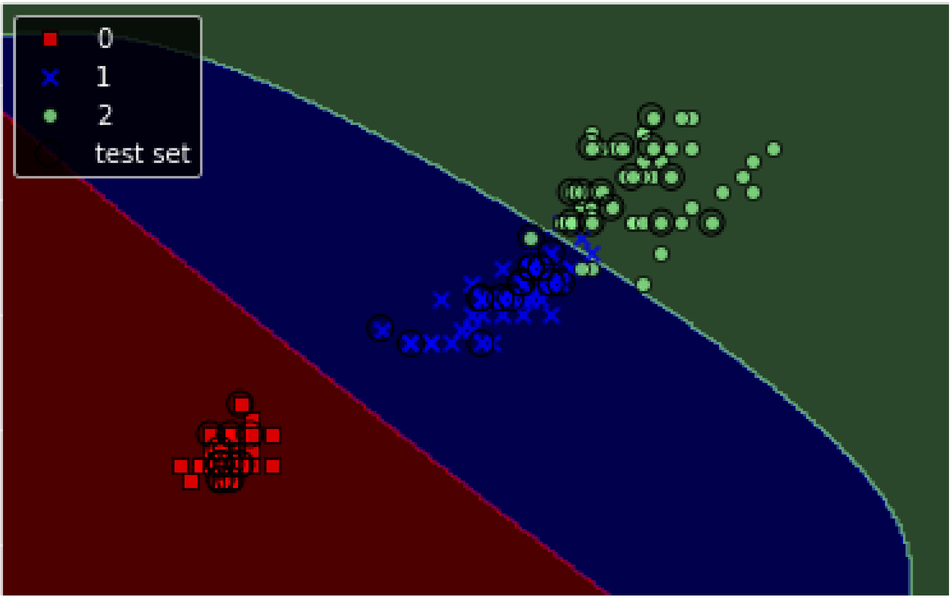
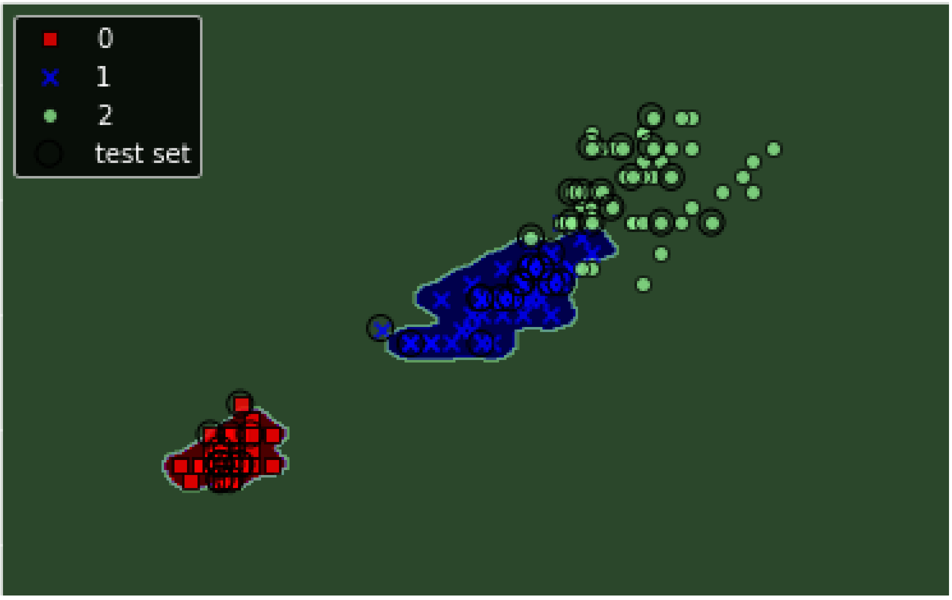
In [4]: #カーネル関数のカットオフパラメータの影響を Iris data で見てみる
        svm=SVC(kernel='rbf',random_state=1,gamma=0.2,C=1.0)
        svm.fit(x_train_std,y_train)

        drp.plot_decision_regions(x_combined_std,y_combined,classifier=svm,test_idx=range(105,150))
        plt.xlabel('petal length [standardized]')
        plt.ylabel('petal width [standardized]')
        plt.legend(loc='upper left')
        plt.tight_layout()
        plt.show()
```



```
In [5]: #カットオフパラメータが大きいとき
        svm=SVC(kernel='rbf',random_state=1,gamma=100.0,C=1.0)
        svm.fit(x_train_std,y_train)

        drp.plot_decision_regions(x_combined_std,y_combined,classifier=svm,test_idx=range(105,150))
        plt.xlabel('petal length [standardized]')
        plt.ylabel('petal width [standardized]')
        plt.legend(loc='upper left')
        plt.tight_layout()
        plt.show()
```



```
In [6]:
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