

Meta Learning for Defaults – Symbolic Defaults

Jan N. van Rijn, Florian Pfisterer, Janek Thomas, Andreas Müller, Bernd Bischl, Joaquin Vanschoren



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scikit-learn v0.20.1

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sklearn.svm.SVC

```
class sklearn.svm.SVC(C=1.0, kernel='rbf', degree=3, gamma='auto_deprecated', coe0=0.0, shrinking=True, probability=False, tol=0.001, cache_size=200, class_weight=None, verbose=False, max_iter=1, decision_function_shape='ovr', random_state=None)
```

[\[source\]](#)

C-Support Vector Classification.

The implementation is based on libsvm. The fit time complexity is more than quadratic with the number of samples which makes it hard to scale to dataset with more than a couple of 10000 samples.

The multiclass support is handled according to a one-vs-one scheme.

For details on the precise mathematical formulation of the provided kernel functions and how gamma, coe0 and degree affect each other, see the corresponding section in the narrative documentation: [Kernel functions](#).

Read more in the [User Guide](#).

Parameters: **C : float, optional (default=1.0)**

Penalty parameter C of the error term.

kernel : string, optional (default='rbf')

Specifies the kernel type to be used in the algorithm. It must be one of 'linear', 'poly', 'rbf', 'sigmoid', 'precomputed' or a callable. If none is given, 'rbf' will be used. If a callable is given it is used to pre-compute the kernel matrix from data matrices; that matrix should be an array of shape (n_samples, n_samples).

degree : int, optional (default=3)

Degree of the polynomial kernel function ('poly'). Ignored by all other kernels.

gamma : float, optional (default='auto')

Kernel coefficient for 'rbf', 'poly' and 'sigmoid'.

Current default is 'auto' which uses $1 / n_{\text{features}}$, if `gamma='scale'` is passed then it uses $1 / (n_{\text{features}} * X.\text{std}())$ as value of gamma. The current default of gamma, 'auto', will change to 'scale' in version 0.22. 'auto_deprecated', a deprecated version of 'auto' is used as a default indicating that no explicit value of gamma was passed.

coe0 : float, optional (default=0.0)

Independent term in kernel function. It is only significant in 'poly' and 'sigmoid'.

shrinking : boolean, optional (default=True)

- Defaults commonly used in Machine Learning research and practise



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The screenshot shows the documentation for `sklearn.svm.SVC`. The left sidebar contains navigation links like 'Previous', 'Next', and 'Up', as well as a 'cite us' button. The main content area has a header 'sklearn.svm.SVC' and a class definition. Below this, it describes 'C-Support Vector Classification'. The 'Parameters' section lists several parameters with their default values circled in red: `C` (default=1.0), `kernel` (default='rbf'), `degree` (default=3), `gamma` (default='auto'), `coef0` (default=0.0), and `shrinking` (default=True).

sklearn.svm.SVC

```
class sklearn.svm.SVC(C=1.0, kernel='rbf', degree=3, gamma='auto_deprecated', coef0=0.0, shrinking=True, probability=False, tol=0.001, cache_size=200, class_weight=None, verbose=False, max_iter=1, decision_function_shape='ovr', random_state=None)
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Parameters:

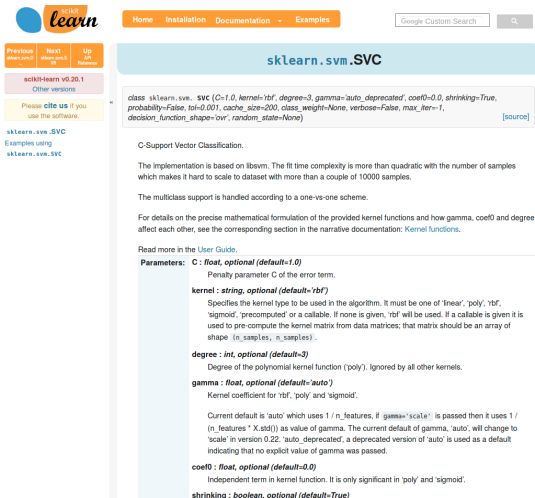
- C**: float, optional (default=1.0)
Penalty parameter C of the error term.
- kernel**: string, optional (default='rbf')
Specifies the kernel type to be used in the algorithm. It must be one of 'linear', 'poly', 'rbf', 'sigmoid', 'precomputed' or a callable. If none is given, 'rbf' will be used. If a callable is given it is used to pre-compute the kernel matrix from data matrices; that matrix should be an array of shape (n_samples, n_samples).
- degree**: int, optional (default=3)
Degree of the polynomial kernel function ('poly'). Ignored by all other kernels.
- gamma**: float, optional (default='auto')
Kernel coefficient for 'rbf', 'poly' and 'sigmoid'.

Current default is 'auto' which uses $1 / n_features$, if `gamma='scale'` is passed then it uses $1 / (n_features * X.std())$ as value of gamma. The current default of gamma, 'auto', will change to 'scale' in version 0.22. 'auto_deprecated', a deprecated version of 'auto' is used as a default indicating that no explicit value of gamma was passed.
- coef0**: float, optional (default=0.0)
Independent term in kernel function. It is only significant in 'poly' and 'sigmoid'.
- shrinking**: boolean, optional (default=True)

- Defaults commonly used in Machine Learning research and practise
- Example: $SVM(C=1.0, \gamma=0.0125, \text{kernel}=\text{RBF})$

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```

C-Support Vector Classification.

The implementation is based on libsvm. The fit time complexity is more than quadratic with the number of samples which makes it hard to scale to dataset with more than a couple of 10000 samples.

The multiclass support is handled according to a one-vs-one scheme.

For details on the precise mathematical formulation of the provided kernel functions and how gamma, coef0 and degree affect each other, see the corresponding section in the narrative documentation: [Kernel functions](#).

Read more in the [User Guide](#).

Parameters:

- C** : float, optional (default=1.0)
Penalty parameter C of the error term.
- kernel** : string, optional (default='rbf')
Specifies the kernel type to be used in the algorithm. It must be one of 'linear', 'poly', 'rbf', 'sigmoid', 'precomputed' or a callable. If none is given, 'rbf' will be used. If a callable is given it is used to pre-compute the kernel matrix from data matrices; that matrix should be an array of shape (n_samples, n_samples).
- degree** : int, optional (default=3)
Degree of the polynomial kernel function ('poly'). Ignored by all other kernels.
- gamma** : float, optional (default='auto')
Kernel coefficient for 'rbf', 'poly' and 'sigmoid'.

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- coef0** : float, optional (default=0.0)
Independent term in kernel function. It is only significant in 'poly' and 'sigmoid'.
- shrinking** : boolean, optional (default=True)

- Defaults commonly used in Machine Learning research and practise
- Example: $\text{SVM}(C=1.0, \gamma=0.0125, \text{kernel}=\text{RBF})$
- Goal: Defaults based on meta-feature
- Example: $\text{SVM}(C=85, \gamma=0.2 / \text{num. features}, \text{kernel}=\text{RBF})$
- Classical form of meta-learning
- Question: How to find good symbolic defaults?
- Answer: Let's discuss this at our poster!