

# ClassifierCV

**mod** classifier\_cv

Definition for ClassifierCV.

**class** ClassifierCV

Bases: BaseAutoCV, ClassifierMixin, ExplainerMixIn

Defines an auto classification tree, based on the bayesian optimization base class.

” Source code in `src/tree_machine/classifier_cv.py`



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▼ Details

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**attr** **scorer** property

```
scorer
```

Returns correct scorer to use when scoring with RegressionCV.

**meth** **\_\_init\_\_**

```
__init__(metric, cv, n_trials, timeout, config)
```

Constructor for ClassifierCV.

**Parameters:**

Name	Type	Description	Default
<code>metric</code>	<code>AcceptableClassifier</code>	Loss metric to use as base for estimation process.	<i>required</i>
<code>cv</code>	<code>BaseCrossValidator</code>	Splitter object to use when estimating the model.	<i>required</i>
<code>n_trials</code>	<code>NonNegativeInt</code>	Number of optimization trials to use when finding a model.	<i>required</i>
<code>timeout</code>	<code>NonNegativeInt</code>	Timeout in seconds to stop the optimization.	<i>required</i>
<code>config</code>	<code>ClassifierCVConfig</code>	Configuration to use when fitting the model.	<i>required</i>

Source code in `src/tree_machine/classifier_cv.py`

```
94 @validate_call(config={"arbitrary_types_allowed": True})
95 def __init__(
96     self,
97     metric: AcceptableClassifier,
98     cv: BaseCrossValidator,
99     n_trials: NonNegativeInt,
100     timeout: NonNegativeInt,
101     config: ClassifierCVConfig,
102 ) -> None:
103     """
104     Constructor for ClassifierCV.
105
106     Args:
107         metric: Loss metric to use as base for estimation process.
108         cv: Splitter object to use when estimating the model.
109         n_trials: Number of optimization trials to use when finding a model.
110         timeout: Timeout in seconds to stop the optimization.
111         config: Configuration to use when fitting the model.
112     """
113     super().__init__(metric, cv, n_trials, timeout)
114     self.config = config
```

**meth** `explain`

```
explain(X, **explainer_params)
```

Explains the inputs.

Source code in `src/tree_machine/classifier_cv.py`

```
116 def explain(self, X: Inputs, **explainer_params) -> dict[str,  
117         NumpyArray[np.float64]]:  
118     """  
119     Explains the inputs.  
120     """  
121     check_is_fitted(self, "model_", msg="Model is not fitted.")  
122  
123     if getattr(self, "explainer_", None) is None:  
124         self.explainer_ = TreeExplainer(self.model_, **explainer_params)  
125  
126     shap_values = self.explainer_.shap_values(self._validate_X(X))  
127     shape = shap_values.shape  
128  
129     return {  
130         "mean_value": self.explainer_.expected_value,  
131         "shap_values": shap_values.reshape(shape[0], shape[1], -1),  
    }
```

meth `fit`

```
fit(X, y, **fit_params)
```

Fits ClassifierCV.

Parameters:

Name	Type	Description	Default
<code>X</code>	<code>Inputs</code>	input data to use in fitting trees.	<i>required</i>
<code>y</code>	<code>GroundTruth</code>	actual targets for fitting.	<i>required</i>

Source code in `src/tree_machine/classifier_cv.py`

```
133 def fit(self, X: Inputs, y: GroundTruth, **fit_params) -> "ClassifierCV":
134     """
135     Fits ClassifierCV.
136
137     Args:
138         X: input data to use in fitting trees.
139         y: actual targets for fitting.
140     """
141     self.feature_names_ = list(X.columns) if isinstance(X, pd.DataFrame) else
142     []
143     constraints = self.config.get_kwargs(self.feature_names_)
144
145     self.model_ = self.optimize(
146         estimator_type=XGBClassifier,
147         X=self._validate_X(X),
148         y=self._validate_y(y),
149         parameters=self.config.parameters,
150         return_train_score=self.config.return_train_score,
151         **constraints,
152     )
153     self.feature_importances_ = self.model_.feature_importances_
154
155     return self
```

meth `predict`

```
predict(X)
```

Returns model predictions.

Source code in `src/tree_machine/classifier_cv.py`

```
156 def predict(self, X: Inputs) -> Predictions:
157     """
158     Returns model predictions.
159     """
160     check_is_fitted(self, "model_", msg="Model is not fitted.")
161     return self.model_.predict(self._validate_X(X))
```

meth `predict_proba`

```
predict_proba(X)
```

Returns model probability predictions.

” Source code in `src/tree_machine/classifier_cv.py`

```
163 def predict_proba(self, X: Inputs) -> Predictions:
164     """
165     Returns model probability predictions.
166     """
167     check_is_fitted(self, "model_", msg="Model is not fitted.")
168     return self.model_.predict_proba(self._validate_X(X))
```

### **class** ClassifierCVConfig

Available config to use when fitting a classification model.

 **dictionary containing monotonicity direction allowed for each**

variable. 0 means no monotonicity, 1 means increasing and -1 means decreasing monotonicity.

interactions: list of lists containing permitted relationships in data. parameters: dictionary with distribution bounds for each hyperparameter to search on during optimization. n\_jobs: Number of jobs to use when fitting the model. sampler: `imblearn` sampler to use when fitting models.



Source code in `src/tree_machine/classifier_cv.py`

```
27 @dataclass(frozen=True, config={"arbitrary_types_allowed": True})
28 class ClassifierCVConfig:
29     """
30     Available config to use when fitting a classification model.
31
32     monotone_constraints: dictionary containing monotonicity direction allowed
33     for each
34         variable. 0 means no monotonicity, 1 means increasing and -1 means
35     decreasing
36         monotonicity.
37     interactions: list of lists containing permitted relationships in data.
38     parameters: dictionary with distribution bounds for each hyperparameter to
39     search
40         on during optimization.
41     n_jobs: Number of jobs to use when fitting the model.
42     sampler: `imblearn` sampler to use when fitting models.
43     """
44
45     monotone_constraints: dict[str, int]
46     interactions: list[list[str]]
47     n_jobs: int
48     parameters: OptimizerParams
49     return_train_score: bool
50
51     def get_kwargs(self, feature_names: list[str]) -> dict:
52         """
53         Returns parsed and validated constraint configuration for a
54         ClassifierCV model.
55
56         Args:
57             feature_names: list of feature names. If empty, will return empty
58                 constraints dictionaries and lists.
59         """
60         return {
61             "monotone_constraints": {
62                 feature_names.index(key): value
63                 for key, value in self.monotone_constraints.items()
64             },
65             "interaction_constraints": [
66                 [feature_names.index(key) for key in lt] for lt in
67                 self.interactions
68             ],
69             "n_jobs": self.n_jobs,
70         }
```

meth `get_kwargs`

`get_kwargs(feature_names)`

Returns parsed and validated constraint configuration for a ClassifierCV model.

**Parameters:**

Name	Type	Description	Default
<code>feature_names</code>	<code>list[str]</code>	list of feature names. If empty, will return empty constraints dictionaries and lists.	<i>required</i>

” Source code in `src/tree_machine/classifier_cv.py`

```
48 def get_kwargs(self, feature_names: list[str]) -> dict:
49     """
50     Returns parsed and validated constraint configuration for a ClassifierCV
51     model.
52
53     Args:
54         feature_names: list of feature names. If empty, will return empty
55         constraints dictionaries and lists.
56     """
57     return {
58         "monotone_constraints": {
59             feature_names.index(key): value
60             for key, value in self.monotone_constraints.items()
61         },
62         "interaction_constraints": [
63             [feature_names.index(key) for key in lt] for lt in
64 self.interactions
65         ],
66         "n_jobs": self.n_jobs,
67     }
```