

# RegressionCV

**mod** regression\_cv

Definition for RegressionCV.

**class** RegressionCV

Bases: BaseAutoCV, RegressorMixin, ExplainerMixin

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

” Source code in `src/tree_machine/regression_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 RegressionCV.

**Parameters:**

Name	Type	Description	Default
<code>metric</code>	<code>AcceptableRegression</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>RegressionCVConfig</code>	Configuration to use when fitting the model.	<i>required</i>

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

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

meth `explain`

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

Explains the inputs.

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

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

### meth fit

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

Fits RegressionCV.

#### Parameters:

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

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

```
129 def fit(self, X: Inputs, y: GroundTruth, **fit_params) -> "RegressionCV":
130     """
131     Fits RegressionCV.
132
133     Args:
134         X: input data to use in fitting trees.
135         y: actual targets for fitting.
136     """
137     self.feature_names_ = list(X.columns) if isinstance(X, pd.DataFrame) else
138     []
139     constraints = self.config.get_kwargs(self.feature_names_)
140
141     self.model_ = self.optimize(
142         estimator_type=XGBRegressor,
143         X=self._validate_X(X),
144         y=self._validate_y(y),
145         parameters=self.config.parameters,
146         return_train_score=self.config.return_train_score,
147         **constraints,
148     )
149     self.feature_importances_ = self.model_.feature_importances_
150
151     return self
```

### meth predict

```
predict(X)
```

Returns model predictions.

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

```
152 def predict(self, X: Inputs) -> Predictions:
153     """
154     Returns model predictions.
155     """
156     check_is_fitted(self, "model_", msg="Model is not fitted.")
157     return self.model_.predict(self._validate_X(X))
```

meth `predict_proba`

`predict_proba(X)`

Returns model probability predictions.

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

```
159 def predict_proba(self, X: Inputs) -> Predictions:
160     """
161     Returns model probability predictions.
162     """
163     raise NotImplementedError("Not implemented for RegressionCV.")
```

class `RegressionCVConfig`

Available config to use when fitting a regression 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.

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

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

meth `get_kwargs`

```
get_kwargs(feature_names)
```



Returns parsed and validated constraint configuration for a RegressionCV 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/regression_cv.py`

```
46 def get_kwargs(self, feature_names: list[str]) -> dict:
47     """
48     Returns parsed and validated constraint configuration for a RegressionCV
49     model.
50
51     Args:
52         feature_names: list of feature names. If empty, will return empty
53         constraints dictionaries and lists.
54     """
55     return {
56         "monotone_constraints": {
57             feature_names.index(key): value
58             for key, value in self.monotone_constraints.items()
59         },
60         "interaction_constraints": [
61             [feature_names.index(key) for key in lt] for lt in
62 self.interactions
63         ],
64         "n_jobs": self.n_jobs,
65     }
```