

# Deep Classification Trees (Experimental)

## **mod** classifier

Deep-forest classification estimator built on Keras.

This module provides :class: `~tree_machine.deep_trees.classifier.DFClassifier`, an sklearn-compatible classifier that builds a differentiable forest model using Keras.

The estimator follows the familiar `fit / predict / predict_proba / score` API and supports both built-in and user-provided Keras losses/metrics.

## **class** DFClassifier

Bases: `BaseDeep`, `ClassifierMixin`

A deep-forest classifier with an sklearn-compatible API.

### Parameters:

Name	Type	Description	Default
<code>metric</code>	<code>AcceptableMetric</code>	Name of the built-in metric/loss key. Currently only <code>"cross_entropy"</code> is supported.	<code>'cross_entropy'</code>
<code>n_estimators</code>	<code>int</code>	Number of trees/estimators to build.	<code>100</code>
<code>internal_size</code>	<code>int</code>	Internal representation size used by the differentiable tree layers.	<code>12</code>
<code>max_depth</code>	<code>int</code>	Maximum depth of each differentiable tree.	<code>6</code>

<code>feature_fraction</code>	<code>float</code>	Fraction of features sampled per estimator.	<code>1.0</code>
<code>loss</code>	<code>LossLike   None</code>	Optional custom Keras loss (callable/instance/class). If omitted (and <code>metrics</code> is also omitted), the built-in loss derived from <code>metric</code> is used.	<code>None</code>
<code>metrics</code>	<code>Sequence[MetricLike]   None</code>	Optional sequence of custom Keras metrics (callables/instances/classes).	<code>None</code>
<code>compile_kwargs</code>	<code>dict[str, Any]   None</code>	Extra keyword arguments forwarded to <code>Model.compile</code> . If <code>compile_kwargs</code> does not define an optimizer, "adam" is used.	<code>None</code>
<code>decision_l1/decision_l2</code>		L1/L2 regularization strength applied to routing Dense weights.	<i>required</i>
<code>leaf_l1/leaf_l2</code>		L1/L2 regularization strength applied to leaf values.	<i>required</i>
<code>feature_dropout</code>	<code>float</code>	Dropout rate applied to inputs during training.	<code>0.0</code>
<code>routing_dropout</code>	<code>float</code>	Dropout rate applied to routing probabilities during training.	<code>0.0</code>



#### Notes



- Each call to `:meth: fit` builds and compiles a new Keras model.
- `:meth: score` returns the negative loss value on `(X, y)`.

< > Source code in `src/tree_machine/deep_trees/classifier.py`



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