Hyperparameter Tuning for Machine Learning Models

Janani Ravi
Co-founder, Loonycorn

www.loonycorn.com

Overview

Hyperparameter tuning

Hyperopt for model tuning

Implement hyperparameter tuning for scikit-learn models

Hyperparameter Tuning

Hyperparameters

Part of the model design.

Hyperparameters

Model configuration properties that define a model, and remain constant during the training of the model.

Understanding Hyperparameters

Model Inputs

Model Parameters

Model Hyperparameters

Understanding Hyperparameters

Model Inputs
Training data from which the model learns

Model Parameters

Model Hyperparameters

Understanding Hyperparameters

Model Inputs
Training data from which the model learns

Model Parameters
Model coefficient and intercept

Model Hyperparameters

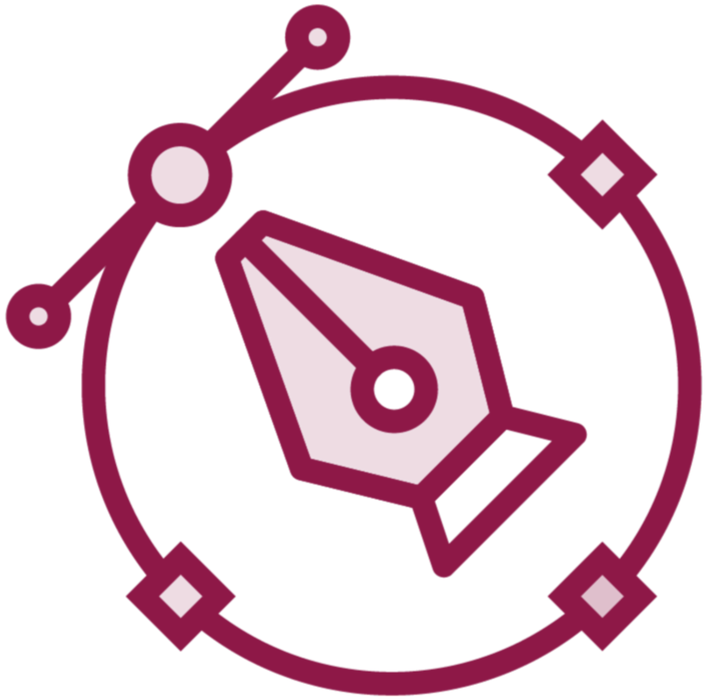
Understanding Hyperparameters

Model Inputs
Training data from which the model learns

Model Parameters
Model coefficient and intercept

Model Hyperparameters
Depth of the decision tree, alpha for regularization

Hyperparameters



Parameters whose values control the learning process

Part of the model's design that does not change during the training process

Values for the hyperparameters set before the training process begins

Hyperparameter Tuning

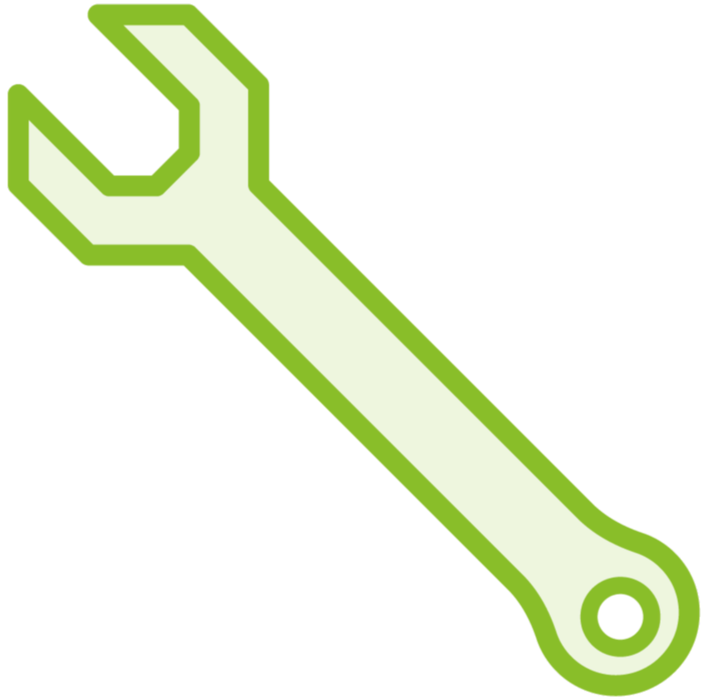
Choosing a set of optimal hyperparameters for a learning algorithm by running multiple trials and then comparing the trials based on an objective function.

Introducing Hyperopt

Hyperopt

Open-source tool that automates the process of model selection and hyperparameter tuning.

Hyperopt



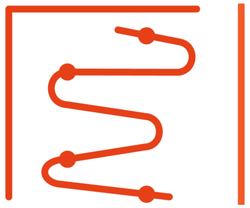
Facilitates distributed hyperparameter tuning and model selection

Allows you to vary algorithms and hyperparameters across a search space

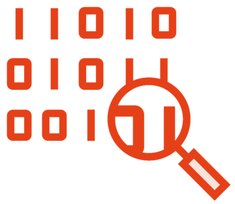
Works with single-machine models such as scikit-learn and TensorFlow

Works with distributed ML algorithms such as Apache Spark MLlib and Horovod

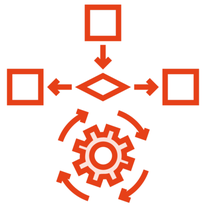
Basic Steps When Using Hyperopt



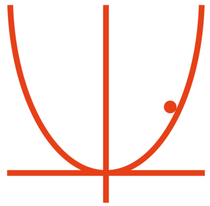
Define an objective function to minimize (training or validation loss)



Define the hyperparameter search space (specify values for the different design parameters in your model)



Specify the search algorithm to use to find the best hyperparameters - more efficient than a deterministic grid search



Run the Hyperopt function fmin() which actually performs the hyperparameter tuning using the search space and search algorithm

fmin() Input Parameters

fn

space

algo

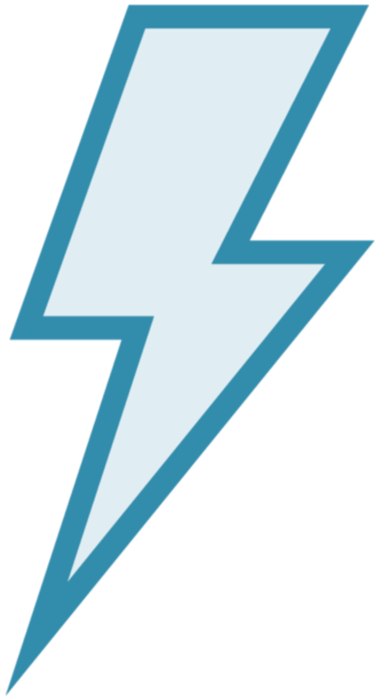
max_evals

max_queue_len

trials

early_stopping_fn

SparkTrials



Designed to parallelize computations for single-machine ML models

Accelerates machine learning by distributing trials to Spark workers

A trial fits one model on one set of hyperparameters

For distributed ML algorithms such as Spark MLlib or Horovod use the Trials class

Demo

Using Hyperopt for hyperparameter tuning of scikit-learn models

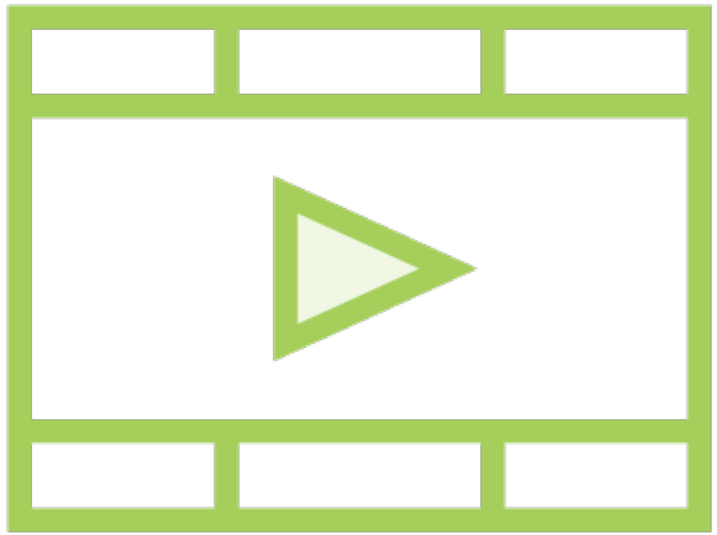
Summary

Hyperparameter tuning

Hyperopt for model tuning

Implement hyperparameter tuning for scikit-learn models

Related Courses



Building Deep Learning Models on Databricks

Managing Models Using MLflow on Databricks