Package ‘kerastuneR’

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Type Package

Title Interface to 'Keras Tuner'

Version 0.1.0.3

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Description 'Keras Tuner' <https://keras-team.github.io/kerastuner/> is a hypertuning framework made for humans. It aims at making the life of AI practitioners, hypertuner algorithm creators and model designers as simple as possible by providing them with a clean and easy to use API for hypertuning. 'Keras Tuner' makes moving from a base model to a hypertuned one quick and easy by only requiring you to change a few lines of code.

License Apache License 2.0

URL https://github.com/henry090/kerastuneR

BugReports https://github.com/henry090/kerastuneR/issues

SystemRequirements TensorFlow >= 2.0 (https://www.tensorflow.org/)

Encoding UTF-8

LazyData true

RoxygenNote 7.1.1

Imports reticulate, tensorflow, rstudioapi, plotly, data.table, RJSONIO, rjson, tidyjson, dplyr, echarts4r, crayon, keras, magick

Suggests knitr, tfdatasets, testthat, purrr, rmarkdown

VignetteBuilder knitr

NeedsCompilation no

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Repository CRAN

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Description

Tuner base class.

Usage

BaseTuner(
  oracle,
  hypermodel,
  directory = NULL,
  project_name = NULL,
  logger = NULL,
  overwrite = FALSE
)
Arguments

oracle Instance of Oracle class.
hypermodel Instance of HyperModel class (or callable that takes hyperparameters and returns a Model instance).
directory String. Path to the working directory (relative).
project_name Name to use as prefix for files saved by this Tuner.
logger Optional. Instance of Logger class, used for streaming data to Cloud Service for monitoring.
overwrite Bool, default ‘FALSE’. If ‘FALSE’, reloads an existing project of the same name if one is found. Otherwise, overwrites the project.

Details

May be subclassed to create new tuners, including for non-Keras models.

Value

base tuner object

Description

Bayesian optimization oracle.

Usage

BayesianOptimization(
    objective,
    max_trials,
    num_initial_points = NULL,
    alpha = 1e-04,
    beta = 2.6,
    seed = NULL,
    hyperparameters = NULL,
    allow_new_entries = TRUE,
    tune_new_entries = TRUE
)
Arguments

- **objective**: String or ‘kerastuner.Objective’. If a string, the direction of the optimization (min or max) will be inferred.
- **max_trials**: Int. Total number of trials (model configurations) to test at most. Note that the oracle may interrupt the search before ‘max_trial’ models have been tested if the search space has been exhausted.
- **num_initial_points**: (Optional) Int. The number of randomly generated samples as initial training data for Bayesian optimization. If not specified, a value of 3 times the dimensionality of the hyperparameter space is used.
- **alpha**: Float. Value added to the diagonal of the kernel matrix during fitting. It represents the expected amount of noise in the observed performances in Bayesian optimization.
- **beta**: Float. The balancing factor of exploration and exploitation. The larger it is, the more explorative it is.
- **seed**: Int. Random seed.
- **hyperparameters**: HyperParameters class instance. Can be used to override (or register in advance) hyperparameters in the search space.
- **allow_new_entries**: Whether the hypermodel is allowed to request hyperparameter entries not listed in ‘hyperparameters’.
- **tune_new_entries**: Whether hyperparameter entries that are requested by the hypermodel but that were not specified in ‘hyperparameters’ should be added to the search space, or not. If not, then the default value for these parameters will be used.

Details

It uses Bayesian optimization with a underlying Gaussian process model. The acquisition function used is upper confidence bound (UCB), which can be found in the following link: https://www.cse.wustl.edu/~garnett/cse515t/spring_2015/files/lecture_notes/12.pdf

Value

BayesianOptimization tuning with Gaussian process

be found in the following link


Examples

```r
## Not run:
# The usage of 'tf$keras'
library(tensorflow)
tf$keras$Input(shape=list(28L, 28L, 1L))
```
callback_tuner

## End(Not run)

callback_tuner | Tuner Callback

Description
Abstract base class used to build new callbacks.

Usage

```
callback_tuner(tuner, trial)
```

Arguments

<table>
<thead>
<tr>
<th>Argument</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>tuner</td>
<td>tuner object</td>
</tr>
<tr>
<td>trial</td>
<td>trial ID</td>
</tr>
</tbody>
</table>

Details
Attributes: `params`: dict. Training parameters (eg. verbosity, batch size, number of epochs...), `model`: instance of `keras.models.Model`. Reference of the model being trained. `validation_data`: Deprecated. Do not use. The ‘logs’ dictionary that callback methods take as argument will contain keys for quantities relevant to the current batch or epoch. Currently, the ‘.fit()’ method of the ‘Model’ class will include the following quantities in the ‘logs’ that it passes to its callbacks:
- on_epoch_end: logs include ‘acc’ and ‘loss’, and optionally include ‘val_loss’ (if validation is enabled in ‘fit’), and ‘val_acc’ (if validation and accuracy monitoring are enabled).
- on_batch_end: logs include ‘size’, the number of samples in the current batch.

Value

None

Attributes

<table>
<thead>
<tr>
<th>Attribute</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>params</td>
<td>dict. Training parameters (eg. verbosity, batch size, number of epochs...), <code>model</code>: instance of <code>keras.models.Model</code>. Reference of the model being trained. <code>validation_data</code>: Deprecated. Do not use.</td>
</tr>
</tbody>
</table>
**Description**

Start the search for the best hyperparameter configuration. The call to `search` has the same signature as "model.fit()". Models are built iteratively by calling the model-building function, which populates the hyperparameter space (search space) tracked by the `hp` object. The tuner progressively explores the space, recording metrics for each configuration.

**Usage**

```r
fit_tuner(
  tuner,
  x = NULL,
  y = NULL,
  steps_per_epoch = NULL,
  batch_size = NULL,
  epochs = NULL,
  validation_data = NULL,
  validation_steps = NULL,
  ...
)
```

**Arguments**

- `tuner` A tuner object
- `x` Vector, matrix, or array of training data (or list if the model has multiple inputs). If all inputs in the model are named, you can also pass a list mapping input names to data. `x` can be `NULL` (default) if feeding from framework-native tensors (e.g., TensorFlow data tensors).
- `y` Vector, matrix, or array of target (label) data (or list if the model has multiple outputs). If all outputs in the model are named, you can also pass a list mapping output names to data. `y` can be `NULL` (default) if feeding from framework-native tensors (e.g., TensorFlow data tensors).
- `steps_per_epoch` Integer. Total number of steps (batches of samples) to yield from generator before declaring one epoch finished and starting the next epoch. It should typically be equal to `ceil(num_samples / batch_size)`. Optional for Sequence: if unspecified, will use the `len(generator)` as a number of steps.
- `batch_size` Integer or 'NULL'. Number of samples per gradient update. If unspecified, 'batch_size' will default to 32.
- `epochs` to train the model. Note that in conjunction with `initial_epoch`, `epochs` is to be understood as 'final epoch'. The model is not trained for a number of iterations given by epochs, but merely until the epoch of index epochs is reached.
validation_data

Data on which to evaluate the loss and any model metrics at the end of each epoch. The model will not be trained on this data. validation_data will override validation_split. validation_data could be: - tuple (x_val, y_val) of Numpy arrays or tensors - tuple (x_val, y_val, val_sample_weights) of Numpy arrays - dataset or a dataset iterator

validation_steps

Only relevant if steps_per_epoch is specified. Total number of steps (batches of samples) to validate before stopping.

... Some additional arguments

Value

performs a search for best hyperparameter configurations

Examples

```r
## Not run:
library(keras)
x_data <- matrix(data = runif(500,0,1),nrow = 50,ncol = 5)
y_data <- ifelse(runif(50,0,1) > 0.6, 1L,0L) %>% as.matrix()
x_data2 <- matrix(data = runif(500,0,1),nrow = 50,ncol = 5)
y_data2 <- ifelse(runif(50,0,1) > 0.6, 1L,0L) %>% as.matrix()

HyperModel <- PyClass(
    'HyperModel',
    inherit = HyperModel_class(),
    list(
        '__init__' = function(self, num_classes) {
            self$num_classes = num_classes
            NULL
        },
        build = function(self,hp) {
            model = keras_model_sequential()
            model $ layer_dense(units = hp$Int('units',
                min_value = 32,
                max_value = 512,
                step = 32),
                input_shape = ncol(x_data),
                activation = 'relu') $%
            layer_dense(as.integer(self$num_classes), activation = 'softmax') $%
            compile(
                optimizer = tf$keras$optimizers$Adam(
                    hp$Choice('learning_rate',
                        values = c(1e-2, 1e-3, 1e-4)),
                    loss = 'sparse_categorical_crossentropy',
                    metrics = 'accuracy')
    }
)
```
```r
hypermodel = HyperModel(num_classes=10L)

tuner = RandomSearch(hypermodel = hypermodel,
  objective = 'val_accuracy',
  max_trials = 2,
  executions_per_trial = 1,
  directory = 'my_dir5',
  project_name = 'helloworld')

tuner %>% fit_tuner(x_data, y_data, epochs = 1, validation_data = list(x_data2,y_data2))
## End(Not run)
```

---

### Description

The function for retrieving the top best models with hyperparameters. Returns the best model(s), as determined by the tuner's objective. The models are loaded with the weights corresponding to their best checkpoint (at the end of the best epoch of best trial). This method is only a convenience shortcut. For best performance, it is recommended to retrain your Model on the full dataset using the best hyperparameters found during search.

### Usage

```r
get_best_models(tuner = NULL, num_models = NULL)
```

### Arguments

- **tuner**: A tuner object
- **num_models**: When search is over, one can retrieve the best model(s)

### Value

the list of best model(s)
**Hyperband**

**Description**

Variation of HyperBand algorithm.

**Usage**

```r
Hyperband(
  hypermodel,
  optimizer = NULL,
  loss = NULL,
  metrics = NULL,
  hyperparameters = NULL,
  objective,
  max_epochs,
  factor = 3,
  hyperband_iterations = 1,
  seed = NULL,
  tune_new_entries = TRUE,
  allow_new_entries = TRUE,
  distribution_strategy = NULL,
  directory = NULL,
  project_name = NULL,
  ...
)
```

**Arguments**

- **hypermodel**: Define a model-building function. It takes an argument "hp" from which you can sample hyperparameters.
- **optimizer**: An optimizer is one of the arguments required for compiling a Keras model.
- **loss**: A loss function (or objective function, or optimization score function) is one of the parameters required to compile a model.
- **metrics**: A metric is a function that is used to judge the performance of your model.
- **hyperparameters**: HyperParameters class instance. Can be used to override (or register in advance) hyperparameters in the search space.
- **objective**: A loss metrics function for tracking the model performance e.g. "val_precision". The name of the objective to optimize (whether to minimize or maximize is automatically inferred for built-in metrics).
- **max_epochs**: to train the model. Note that in conjunction with initial_epoch, epochs is to be understood as "final epoch". The model is not trained for a number of iterations given by epochs, but merely until the epoch of index epochs is reached.
factor  
Int. Reduction factor for the number of epochs and number of models for each bracket.

hyperband_iterations  
Int >= 1. The number of times to iterate over the full Hyperband algorithm. One iteration will run approximately "max_epochs * (math.log(max_epochs, factor) ** 2)" cumulative epochs across all trials. It is recommended to set this to as high a value as is within your resource budget.

seed  
Int. Random seed.

tune_new_entries  
Whether hyperparameter entries that are requested by the hypermodel but that were not specified in hyperparameters should be added to the search space, or not. If not, then the default value for these parameters will be used.

allow_new_entries  
Whether the hypermodel is allowed to request hyperparameter entries not listed in 'hyperparameters'.

**kwargs: Keyword arguments relevant to all 'Tuner' subclasses. Please see the docstring for 'Tuner'.

distribution_strategy  
Scale up from running single-threaded locally to running on dozens or hundreds of workers in parallel. Distributed Keras Tuner uses a chief-worker model. The chief runs a service to which the workers report results and query for the hyperparameters to try next. The chief should be run on a single-threaded CPU instance (or alternatively as a separate process on one of the workers). Keras Tuner also supports data parallelism via tf.distribute. Data parallelism and distributed tuning can be combined. For example, if you have 10 workers with 4 GPUs on each worker, you can run 10 parallel trials with each trial training on 4 GPUs by using tf.distribute.MirroredStrategy. You can also run each trial on TPUs via tf.distribute.experimental.TPUStrategy. Currently tf.distribute.MultiWorkerMirroredStrategy is not supported, but support for this is on the roadmap.

directory  
The dir where training logs are stored.

project_name  
Detailed logs, checkpoints, etc, in the folder my_dir/helloworld, i.e. directory/project_name.

...  
Some additional arguments

Details


# Arguments
hypermodel: Instance of HyperModel class (or callable that takes hyperparameters and returns a Model instance).
objective: String. Name of model metric to minimize or maximize, e.g. "val_accuracy".
max_epochs: Int. The maximum number of epochs to train one model. It is recommended to set this to a value slightly higher than the expected time to convergence for your largest Model, and to use early stopping during training (for example, via ‘tf.keras.callbacks.EarlyStopping’).
factor: Int. Reduction factor for the number of epochs and number of models for each bracket.
hyperband_iterations: Int >= 1. The number of times to iterate over the full Hyperband algorithm. One iteration will run approximately ‘max_epochs * (math.log(max_epochs, factor) ** 2)’ cumulative epochs across all trials. It is recommended to set this to as high a value as is within your resource budget.
seed: Int. Random seed.
HyperParameters class instance. Can be used to override (or register in advance) hyperparameters in the search space. `tune_new_entries`: Whether hyperparameter entries that are requested by the hypermodel but that were not specified in ‘hyperparameters’ should be added to the search space, or not. If not, then the default value for these parameters will be used. `allow_new_entries`: Whether the hypermodel is allowed to request hyperparameter entries not listed in ‘hyperparameters’. `**kwargs`: Keyword arguments relevant to all ‘Tuner’ subclasses. Please see the docstring for ‘Tuner’.

Value

- a hyperparameter tuner object Hyperband

Reference


HyperModel_class

Description

Defines a searchable space of Models and builds Models from this space.

Usage

```r
HyperModel_class(name = NULL, tunable = TRUE)
```

Arguments

- `name`: The name of this HyperModel.
- `tunable`: Whether the hyperparameters defined in this hypermodel should be added to search space. If ‘FALSE’, either the search space for these parameters must be defined in advance, or the default values will be used.

Value

- None
Description

The HyperParameters class serves as a hyperparameter container. A HyperParameters instance contains information about both the search space and the current values of each hyperparameter. Hyperparameters can be defined inline with the model-building code that uses them. This saves you from having to write boilerplate code and helps to make the code more maintainable.

Usage

HyperParameters(...)  

Arguments

...  

Pass hyperparameter arguments to the tuner constructor

Value

container for both a hyperparameter space, and current values

Description

A ResNet HyperModel.

Usage

HyperResNet(
    include_top = TRUE,
    input_shape = NULL,
    input_tensor = NULL,
    classes = NULL,
    ...
)
HyperResNet

Arguments

- **include_top**: Whether to include the fully-connected layer at the top of the network.
- **input_shape**: Optional shape list, e.g. `(256, 256, 3)`. One of `input_shape` or `input_tensor` must be specified.
- **input_tensor**: Optional Keras tensor (i.e. output of `layers.Input()`) to use as image input for the model. One of `input_shape` or `input_tensor` must be specified.
- **classes**: Optional number of classes to classify images into, only to be specified if `include_top` is `TRUE`, and if no `weights` argument is specified. Additional keyword arguments that apply to all HyperModels. See `kerastuner.HyperModel`.
  
  Additional keyword arguments that apply to all HyperModels.

Value

A pre-trained ResNet model

Examples

```r
## Not run:

cifar <- dataset_cifar10()

hypermodel = HyperResNet(input_shape = list(32L, 32L, 3L), classes = 10L)
hypermodel2 = HyperXception(input_shape = list(32L, 32L, 3L), classes = 10L)

tuner = Hyperband(
  hypermodel = hypermodel,
  objective = Virginia`accuracy`,
  loss = `sparse_categorical_crossentropy`,
  max_epochs = 1,
  directory = 'my_dir',
  project_name='helloworld')

train_data = cifar$train$x[1:30,1:32,1:32,1:3]

test_data = cifar$train$y[1:30,1] %>% as.matrix()

tuner %>% fit_tuner(train_data,test_data, epochs = 1)

## End(Not run)
```
HyperXception

Description
An Xception HyperModel.

Usage
HyperXception(
    include_top = TRUE,
    input_shape = NULL,
    input_tensor = NULL,
    classes = NULL,
    ...
)

Arguments
include_top  whether to include the fully-connected layer at the top of the network.
input_shape  Optional shape list, e.g. `(256, 256, 3)`. One of `input_shape` or `input_tensor` must be specified.
input_tensor Optional Keras tensor (i.e. output of `layers.Input()`) to use as image input for the model. One of `input_shape` or `input_tensor` must be specified.
classes      optional number of classes to classify images into, only to be specified if `include_top` is TRUE, and if no `weights` argument is specified. **kwargs: Additional keyword arguments that apply to all HyperModels. See `kerastuner.HyperModel`.
...
    Additional keyword arguments that apply to all HyperModels.

Value
a pre-trained Xception model

install_kerastuner

Description
This function is used to install the Keras Tuner python module
install_kerastuner(
version = NULL,
..., 
restart_session = TRUE,
from_git = FALSE
)

Arguments

version for specific version of Keras Tuner, e.g. "1.0.1"
... other arguments passed to [reticulate::py_install()].
restart_session Restart R session after installing (note this will only occur within RStudio).
from_git install the recent GitHub version of Keras Tuner

Value

a python module kerastuner

Value

Version of Keras Tuner

Description

Get the current version of Keras Tuner

Usage

keras_tuner_version()

Value

prints the version.
load_model  Load model

Description
Loads a Model from a given trial

Usage
load_model(tuner, trial)

Arguments

tuner  A tuner object
trial  A ‘Trial’ instance. For models that report intermediate results to the ‘Oracle’, generally ‘load_model’ should load the best reported ‘step’ by relying of ‘trial.best_step’

Value
None

Objective  Objective

Description
Objective(name, direction) includes strings, the direction of the optimization (min or max) will be inferred.

Usage
Objective(name, direction, ...)

Arguments

<table>
<thead>
<tr>
<th>Argument</th>
<th>Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>name</td>
<td>name</td>
</tr>
<tr>
<td>direction</td>
<td>direction</td>
</tr>
<tr>
<td>...</td>
<td>Some additional arguments</td>
</tr>
</tbody>
</table>

Value
None
Oracle

Description

Implements a hyperparameter optimization algorithm.

Usage

Oracle(
    objective,
    max_trials = NULL,
    hyperparameters = NULL,
    allow_new_entries = TRUE,
    tune_new_entries = TRUE
)

Arguments

objective String. Name of model metric to minimize or maximize, e.g. "val_accuracy".
max_trials The maximum number of hyperparameter combinations to try.
hyperparameters HyperParameters class instance. Can be used to override (or register in advance) hyperparameters in the search space.
allow_new_entries Whether the hypermodel is allowed to request hyperparameter entries not listed in 'hyperparameters'.
tune_new_entries Whether hyperparameter entries that are requested by the hypermodel but that were not specified in 'hyperparameters' should be added to the search space, or not. If not, then the default value for these parameters will be used.

Value

None

plot_keras_model  Plot Keras model

Description

Converts a Keras model to dot format and save to a file.
Usage

plot_keras_model(
    model,
    to_file = "model.png",
    show_shapes = FALSE,
    show_layer_names = TRUE,
    rankdir = "TB",
    expand_nested = FALSE,
    dpi = 96
)

Arguments

model  A Keras model instance
to_file File name of the plot image.
show_shapes whether to display shape information.
show_layer_names whether to display layer names.
rankdir  'rankdir' argument passed to PyDot, a string specifying the format of the plot: 'TB' creates a vertical plot; 'LR' creates a horizontal plot.
expand_nested Whether to expand nested models into clusters.
dpi  Dots per inch.

Value

saves a png image on the system and builds a plot in R

plot_tuner  Plot the tuner results with 'plotly'

Description

Plot the search space results

Usage

plot_tuner(tuner, height = NULL, width = NULL, type = "plotly")

Arguments

tuner  A tuner object
height  height of the plot
width  width of the plot
type  Type parameter has 2 options:
  * By default it uses 'plotly'
  * Second option is 'echarts4r'
**Note** that 'echarts4r' ignores width and height parameters
RandomSearch

Value

a list which contains a dataframe of results and a plot

Description

Random search tuner.

Usage

RandomSearch(
    hypermodel,
    objective,
    max_trials,
    seed = NULL,
    hyperparameters = NULL,
    tune_new_entries = TRUE,
    allow_new_entries = TRUE,
    executions_per_trial = NULL,
    directory = NULL,
    project_name = NULL,
    ...
)

Arguments

hypermodel  Define a model-building function. It takes an argument "hp" from which you can sample hyperparameters.

objective   A loss metrics function for tracking the model performance e.g. "val_precision". The name of the objective to optimize (whether to minimize or maximize is automatically inferred for built-in metrics)

max_trials  the total number of trials (max_trials) to test

seed        Int. Random seed

hyperparameters  HyperParameters class instance. Can be used to override (or register in advance) hyperparameters in the search space

tune_new_entries  Whether hyperparameter entries that are requested by the hypermodel but that were not specified in hyperparameters should be added to the search space, or not. If not, then the default value for these parameters will be used.

allow_new_entries  Whether the hypermodel is allowed to request hyperparameter entries not listed in hyperparameters
RandomSearch

executions_per_trial
the number of models that should be built and fit for each trial (executions_per_trial).
Note: the purpose of having multiple executions per trial is to reduce results
variance and therefore be able to more accurately assess the performance of a
model. If you want to get results faster, you could set executions_per_trial=1
(single round of training for each model configuration)

directory
The dir where training logs are stored

project_name
Detailed logs, checkpoints, etc, in the folder my_dir/helloworld, i.e. directory/project_name.

Value
a hyperparameter tuner object RandomSearch

Examples

## Not run:
x_data <- matrix(data = runif(500,0,1),nrow = 50,ncol = 5)
y_data <- ifelse(runif(50,0,1) > 0.6, 1L,0L) %>% as.matrix()
x_data2 <- matrix(data = runif(500,0,1),nrow = 50,ncol = 5)
y_data2 <- ifelse(runif(50,0,1) > 0.6, 1L,0L) %>% as.matrix()

build_model = function(hp) {
  model = keras_model_sequential()
  model %>% layer_dense(units=hp$Int("units",
    min_value=32L,
    max_value=512L,
    step=32L),
    input_shape = ncol(x_data),
    activation="relu") %>%
  layer_dense(units=1L, activation="softmax") %>%
  compile(
    optimizer = tf$keras$optimizers$Adam(
      hp$Choice('learning_rate',
        values=c(1e-2, 1e-3, 1e-4))),
    loss='binary_crossentropy',
    metrics='accuracy')
  return(model)
}
tuner = RandomSearch(hypermodel = build_model,
  objective = 'val_accuracy',
  max_trials = 2,
  executions_per_trial = 1,
  directory = 'model_dir',
  project_name = 'helloworld')

## End(Not run)
results_summary

Description
Print a summary of the search results (best models)

Usage
results_summary(tuner = NULL, num_trials = NULL)

Arguments
- tuner: Requires a tuner object
- num_trials: Shows the top best models

Value
the list of results summary of the tuner object

save_model

Description
Saves a Model for a given trial

Usage
save_model(tuner, trial_id, model, step = 1)

Arguments
- tuner: A tuner object
- trial_id: The ID of the ‘Trial’ that corresponds to this Model.
- model: The trained model.
- step: For models that report intermediate results to the ‘Oracle’, the step that this saved file should correspond to. For example, for Keras models this is the number of epochs trained.

Value
None
**search_summary**

*Search summary*

**Description**

Print a summary of the search space

**Usage**

```r
search_summary(tuner = NULL)
```

**Arguments**

- `tuner`: Requires a tuner object

**Value**

the summary of search space of the tuner object

---

**TensorBoard**

*TensorBoard*

**Description**

Enable visualizations for TensorBoard.

**Usage**

```r
TensorBoard(
  log_dir = "logs",
  histogram_freq = 0,
  write_graph = TRUE,
  write_images = FALSE,
  update_freq = "epoch",
  profile_batch = 2,
  embeddings_freq = 0,
  embeddings_metadata = NULL
)
```
TensorBoard

Arguments

log_dir
the path of the directory where to save the log files to be parsed by TensorBoard.

histogram_freq
frequency (in epochs) at which to compute activation and weight histograms for the layers of the model. If set to 0, histograms won’t be computed. Validation data (or split) must be specified for histogram visualizations.

write_graph
whether to visualize the graph in TensorBoard. The log file can become quite large when write_graph is set to TRUE.

write_images
whether to write model weights to visualize as image in TensorBoard.

update_freq
"batch" or "epoch" or integer. When using "batch", writes the losses and metrics to TensorBoard after each batch. The same applies for "epoch". If using an integer, let’s say ‘1000’, the callback will write the metrics and losses to TensorBoard every 1000 samples. Note that writing too frequently to TensorBoard can slow down your training.

profile_batch
Profile the batch to sample compute characteristics. By default, it will profile the second batch. Set profile_batch=0 to disable profiling. Must run in TensorFlow eager mode.

embeddings_freq
frequency (in epochs) at which embedding layers will be visualized. If set to 0, embeddings won’t be visualized.

embeddings_metadata
a dictionary which maps layer name to a file name in which metadata for this embedding layer is saved. See the [details](https://www.tensorflow.org/how_tos/embedding_viz/#metadata_optional) about metadata files format. In case if the same metadata file is used for all embedding layers, string can be passed.

Details

TensorBoard is a visualization tool provided with TensorFlow. This callback logs events for TensorBoard, including: * Metrics summary plots * Training graph visualization * Activation histograms * Sampled profiling If you have installed TensorFlow with pip, you should be able to launch TensorBoard from the command line: “‘sh tensorboard –logdir=path_to_your_logs ‘‘ You can find more information about TensorBoard [here](https://www.tensorflow.org/get_started/summaries_and_tensorboard).

Value

None

Raises

ValueError: If histogram_freq is set and no validation data is provided.
Tuner class

Description

Tuner class for Keras models.

Usage

Tuner_class(
    oracle,
    hypermodel,
    max_model_size = NULL,
    optimizer = NULL,
    loss = NULL,
    metrics = NULL,
    distribution_strategy = NULL,
    directory = NULL,
    project_name = NULL,
    logger = NULL,
    tuner_id = NULL,
    overwrite = FALSE
)

Arguments

oracle Instance of Oracle class.
hypermodel Instance of HyperModel class (or callable that takes hyperparameters and returns a Model instance).
max_model_size Int. Maximum size of weights (in floating point coefficients) for a valid models. Models larger than this are rejected.
optimizer Optional. Optimizer instance. May be used to override the ‘optimizer’ argument in the ‘compile’ step for the models. If the hypermodel does not compile the models it generates, then this argument must be specified.
loss Optional. May be used to override the ‘loss’ argument in the ‘compile’ step for the models. If the hypermodel does not compile the models it generates, then this argument must be specified.
metrics Optional. May be used to override the ‘metrics’ argument in the ‘compile’ step for the models. If the hypermodel does not compile the models it generates, then this argument must be specified.
distribution_strategy Optional. A TensorFlow ‘tf$ distribute’ DistributionStrategy instance. If specified, each trial will run under this scope. For example, ‘tf$ distribute. MirroredStrategy( ['/gpu:0, /gpu:1']) will run each trial on two GPUs. Currently only single-worker strategies are supported.
**Tuner_class**

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>directory</td>
<td>String. Path to the working directory (relative).</td>
</tr>
<tr>
<td>project_name</td>
<td>Name to use as prefix for files saved by this Tuner.</td>
</tr>
<tr>
<td>logger</td>
<td>Optional. Instance of Logger class, used for streaming data to Cloud Service for monitoring.</td>
</tr>
<tr>
<td>tuner_id</td>
<td>tuner_id</td>
</tr>
<tr>
<td>overwrite</td>
<td>Bool, default ‘FALSE’. If ‘FALSE’, reloads an existing project of the same name if one is found. Otherwise, overwrites the project.</td>
</tr>
</tbody>
</table>

**Details**

May be subclassed to create new tuners.

**Value**

a tuner object
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