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tf.train.RMSPropOptimizer

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Class `RMSPropOptimizer`

Optimizer that implements the RMSProp algorithm.

Inherits From: `Optimizer`

Aliases:

- Class `tf.compat.v1.train.RMSPropOptimizer`

See the paper.

__init__

View source

```
__init__(
    learning_rate,
    decay=0.9,
    momentum=0.0,
    epsilon=1e-10,
    use_locking=False,
    centered=False,
    name='RMSProp'
)
```

Construct a new RMSProp optimizer.

Note that in the dense implementation of this algorithm, variables and their corresponding accumulators (momentum, gradient moving average, square gradient moving average) will be updated even if the gradient is zero (i.e. accumulators will decay, momentum will be applied). The sparse implementation (used when the gradient is an `IndexedSlices` object, typically because of `tf.gather` or an embedding lookup in the forward pass) will not update variable slices or their accumulators unless those slices were used in the forward pass (nor is there an "eventual" correction to account for these omitted updates). This leads to more efficient updates for large embedding lookup tables (where most of the slices are not accessed in a particular graph execution), but differs from the published algorithm.

Args:

- **`learning_rate`**: A Tensor or a floating point value. The learning rate.
- **`decay`**: Discounting factor for the history/coming gradient
- **`momentum`**: A scalar tensor.
- **`epsilon`**: Small value to avoid zero denominator.
- **`use_locking`**: If True use locks for update operation.
- **`centered`**: If True, gradients are normalized by the estimated variance of the gradient; if False, by the uncentered second moment. Setting this to True may help with training, but is slightly more expensive in terms of computation and memory. Defaults to False.
- **`name`**: Optional name prefix for the operations created when applying gradients. Defaults to "RMSProp".

Eager Compatibility

When eager execution is enabled, `learning_rate`, `decay`, `momentum`, and `epsilon` can each be a callable that takes no arguments and returns the actual value to use. This can be useful for changing these values across different invocations of optimizer functions.

Methods

apply_gradients

View source

```
apply_gradients(
    grads_and_vars,
    global_step=None,
    name=None
)
```

Apply gradients to variables.

This is the second part of `minimize()`. It returns an `Operation` that applies gradients.

Args:

- **`grads_and_vars`**: List of (gradient, variable) pairs as returned by `compute_gradients()`.
- **`global_step`**: Optional `Variable` to increment by one after the variables have been updated.
- **`name`**: Optional name for the returned operation. Default to the name passed to the `Optimizer` constructor.

Returns:

An `Operation` that applies the specified gradients. If `global_step` was not None, that operation also increments `global_step`.

Raises:

- **`TypeError`**: If `grads_and_vars` is malformed.
- **`ValueError`**: If none of the variables have gradients.
- **`RuntimeError`**: If you should use `_distributed_apply()` instead.

`compute_gradients`

View source

```
compute_gradients(
    loss,
    var_list=None,
    gate_gradients=GATE_OP,
    aggregation_method=None,
    colocate_gradients_with_ops=False,
    grad_loss=None
)
```

Compute gradients of `loss` for the variables in `var_list`.

This is the first part of `minimize()`. It returns a list of (gradient, variable) pairs where "gradient" is the gradient for "variable". Note that "gradient" can be a `Tensor`, an `IndexedSlices`, or `None` if there is no gradient for the given variable.

Args:

- **`loss`**: A Tensor containing the value to minimize or a callable taking no arguments which returns the value to minimize. When eager execution is enabled it must be a callable.
- **`var_list`**: Optional list or tuple of `tf.Variable` to update to minimize `loss`. Defaults to the list of variables collected in the graph under the key `GraphKeys.TRAINABLE_VARIABLES`.
- **`gate_gradients`**: How to gate the computation of gradients. Can be `GATE_NONE`, `GATE_OP`, or `GATE_GRAPH`.
- **`aggregation_method`**: Specifies the method used to combine gradient terms. Valid values are defined in the class `AggregationMethod`.
- **`colocate_gradients_with_ops`**: If True, try colocating gradients with the corresponding op.
- **`grad_loss`**: Optional. A `Tensor` holding the gradient computed for `loss`.

Returns:

A list of (gradient, variable) pairs. Variable is always present, but gradient can be `None`.

Raises:

- **`TypeError`**: If `var_list` contains anything else than `Variable` objects.
- **`ValueError`**: If some arguments are invalid.
- **`RuntimeError`**: If called with eager execution enabled and `loss` is not callable.

Eager Compatibility

When eager execution is enabled, `gate_gradients`, `aggregation_method`, and `colocate_gradients_with_ops` are ignored.

`get_name`

View source

```
get_name()
```

`get_slot`

View source

```
get_slot(
    var,
    name
)
```

Return a slot named `name` created for `var` by the Optimizer.

Some `Optimizer` subclasses use additional variables. For example `Momentum` and `Adagrad` use variables to accumulate updates. This method gives access to these `Variable` objects if for some reason you need them.

Use `get_slot_names()` to get the list of slot names created by the `Optimizer`.

Args:

- **`var`**: A variable passed to `minimize()` or `apply_gradients()`.
- **`name`**: A string.

Returns:

The `Variable` for the slot if it was created, `None` otherwise.

`get_slot_names`

View source

```
get_slot_names()
```

Return a list of the names of slots created by the `Optimizer`.

See `get_slot()`.

Returns:

A list of strings.

`minimize`

View source

```
minimize(
    loss,
    global_step=None,
    var_list=None,
    gate_gradients=GATE_OP,
```

```
    aggregation_method=None,
    colocate_gradients_with_ops=False,
    name=None,
    grad_loss=None
)
```

Add operations to minimize `loss` by updating `var_list`.

This method simply combines calls `compute_gradients()` and `apply_gradients()`. If you want to process the gradient before applying them call `compute_gradients()` and `apply_gradients()` explicitly instead of using this function.

Args:

- **`loss`**: A `Tensor` containing the value to minimize.
- **`global_step`**: Optional `Variable` to increment by one after the variables have been updated.
- **`var_list`**: Optional list or tuple of `Variable` objects to update to minimize `loss`. Defaults to the list of variables collected in the graph under the key `GraphKeys.TRAINABLE_VARIABLES`.
- **`gate_gradients`**: How to gate the computation of gradients. Can be `GATE_NONE`, `GATE_OP`, or `GATE_GRAPH`.
- **`aggregation_method`**: Specifies the method used to combine gradient terms. Valid values are defined in the class `AggregationMethod`.
- **`colocate_gradients_with_ops`**: If True, try colocating gradients with the corresponding op.
- **`name`**: Optional name for the returned operation.
- **`grad_loss`**: Optional. A `Tensor` holding the gradient computed for `loss`.

Returns:

An Operation that updates the variables in `var_list`. If `global_step` was not `None`, that operation also increments `global_step`.

Raises:

- **`ValueError`**: If some of the variables are not `Variable` objects.

Eager Compatibility

When eager execution is enabled, `loss` should be a Python function that takes no arguments and computes the value to be minimized. Minimization (and gradient computation) is done with respect to the elements of `var_list` if not None, else with respect to any trainable variables created during the execution of the `loss` function. `gate_gradients`, `aggregation_method`, `colocate_gradients_with_ops` and `grad_loss` are ignored when eager execution is enabled.

`variables`

View source

```
variables()
```

A list of variables which encode the current state of `Optimizer`.

Includes slot variables and additional global variables created by the optimizer in the current default graph.

Returns:

A list of variables.

Class Members

- `GATE_GRAPH = 2`
- `GATE_NONE = 0`
- `GATE_OP = 1`
