

## tf.contrib.crf.CrfForwardRnnCell

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## Class **CrfForwardRnnCell**

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Inherits From: [RNNCell](#)

Defined in [tensorflow/contrib/crf/python/ops/crf.py](#).

See the guide: [CRF \(contrib\)](#)

Computes the alpha values in a linear-chain CRF.

See <http://www.cs.columbia.edu/~mccollins/fb.pdf> for reference.

## Properties

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### **activity\_regularizer**

Optional regularizer function for the output of this layer.

### **dtype**

### **graph**

### **input**

Retrieves the input tensor(s) of a layer.

Only applicable if the layer has exactly one input, i.e. if it is connected to one incoming layer.

Returns:

Input tensor or list of input tensors.

Raises:

- `AttributeError`: if the layer is connected to more than one incoming layers.

Raises:

- `RuntimeError` : If called in Eager mode.
- `AttributeError` : If no inbound nodes are found.

## **input\_shape**

Retrieves the input shape(s) of a layer.

Only applicable if the layer has exactly one input, i.e. if it is connected to one incoming layer, or if all inputs have the same shape.

Returns:

Input shape, as an integer shape tuple (or list of shape tuples, one tuple per input tensor).

Raises:

- `AttributeError` : if the layer has no defined `input_shape`.
- `RuntimeError` : if called in Eager mode.

## **losses**

### **name**

### **non\_trainable\_variables**

### **non\_trainable\_weights**

### **output**

Retrieves the output tensor(s) of a layer.

Only applicable if the layer has exactly one output, i.e. if it is connected to one incoming layer.

Returns:

Output tensor or list of output tensors.

Raises:

- `AttributeError` : if the layer is connected to more than one incoming layers.
- `RuntimeError` : if called in Eager mode.

## **output\_shape**

Retrieves the output shape(s) of a layer.

Only applicable if the layer has one output, or if all outputs have the same shape.

Returns:

Output shape, as an integer shape tuple (or list of shape tuples, one tuple per output tensor).

Raises:

- `AttributeError` : if the layer has no defined output shape.
- `RuntimeError` : if called in Eager mode.

**output\_size**

**scope\_name**

**state\_size**

**trainable\_variables**

**trainable\_weights**

**updates**

**variables**

Returns the list of all layer variables/weights.

Returns:

A list of variables.

**weights**

Returns the list of all layer variables/weights.

Returns:

A list of variables.

## Methods

---

**`__init__`**

```
__init__(transition_params)
```

Initialize the CrfForwardRnnCell.

Args:

- `transition_params` : A [num\_tags, num\_tags] matrix of binary potentials. This matrix is expanded into a [1, num\_tags, num\_tags] in preparation for the broadcast summation occurring within the cell.

**`__call__`**

```
__call__(
    inputs,
    state,
    scope=None
)
```

Build the CrfForwardRnnCell.

Args:

- `inputs` : A [batch\_size, num\_tags] matrix of unary potentials.
- `state` : A [batch\_size, num\_tags] matrix containing the previous alpha values.
- `scope` : Unused variable scope of this cell.

Returns:

`new_alphas, new_alphas`: A pair of [batch\_size, num\_tags] matrices values containing the new alpha values.

## `__deepcopy__`

```
__deepcopy__(memo)
```

## `add_loss`

```
add_loss(
    losses,
    inputs=None
)
```

Add loss tensor(s), potentially dependent on layer inputs.

Some losses (for instance, activity regularization losses) may be dependent on the inputs passed when calling a layer. Hence, when reusing a same layer on different inputs `a` and `b`, some entries in `layer.losses` may be dependent on `a` and some on `b`. This method automatically keeps track of dependencies.

The `get_losses_for` method allows to retrieve the losses relevant to a specific set of inputs.

Arguments:

- `losses` : Loss tensor, or list/tuple of tensors.
- `inputs` : Optional input tensor(s) that the loss(es) depend on. Must match the `inputs` argument passed to the `__call__` method at the time the losses are created. If `None` is passed, the losses are assumed to be unconditional, and will apply across all dataflows of the layer (e.g. weight regularization losses).

Raises:

- `RuntimeError` : If called in Eager mode.

## `add_update`

```
add_update(  
    updates,  
    inputs=None  
)
```

Add update op(s), potentially dependent on layer inputs.

Weight updates (for instance, the updates of the moving mean and variance in a BatchNormalization layer) may be dependent on the inputs passed when calling a layer. Hence, when reusing a same layer on different inputs **a** and **b**, some entries in **layer.updates** may be dependent on **a** and some on **b**. This method automatically keeps track of dependencies.

The **get\_updates\_for** method allows to retrieve the updates relevant to a specific set of inputs.

This call is ignored in Eager mode.

Arguments:

- **updates**: Update op, or list/tuple of update ops.
- **inputs**: Optional input tensor(s) that the update(s) depend on. Must match the **inputs** argument passed to the **\_\_call\_\_** method at the time the updates are created. If **None** is passed, the updates are assumed to be unconditional, and will apply across all dataflows of the layer.

## add\_variable

```
add_variable(  
    name,  
    shape,  
    dtype=None,  
    initializer=None,  
    regularizer=None,  
    trainable=True,  
    constraint=None  
)
```

Adds a new variable to the layer, or gets an existing one; returns it.

Arguments:

- **name**: variable name.
- **shape**: variable shape.
- **dtype**: The type of the variable. Defaults to **self.dtype** or **float32**.
- **initializer**: initializer instance (callable).
- **regularizer**: regularizer instance (callable).
- **trainable**: whether the variable should be part of the layer's "trainable\_variables" (e.g. variables, biases) or "non\_trainable\_variables" (e.g. BatchNorm mean, stddev).
- **constraint**: constraint instance (callable).

Returns:

The created variable.

Raises:

- `RuntimeError` : If called in Eager mode with regularizers.

## **apply**

```
apply(  
    inputs,  
    *args,  
    **kwargs  
)
```

Apply the layer on a input.

This simply wraps `self.__call__` .

Arguments:

- `inputs` : Input tensor(s).
- `*args` : additional positional arguments to be passed to `self.call` .
- `**kwargs` : additional keyword arguments to be passed to `self.call` .

Returns:

Output tensor(s).

## **build**

```
build(_)
```

## **call**

```
call(  
    inputs,  
    **kwargs  
)
```

The logic of the layer lives here.

Arguments:

- `inputs` : input tensor(s).
- `**kwargs` : additional keyword arguments.

Returns:

Output tensor(s).

## **count\_params**

```
count_params()
```

Count the total number of scalars composing the weights.

Returns:

An integer count.

Raises:

- `ValueError` : if the layer isn't yet built (in which case its weights aren't yet defined).

## **get\_input\_at**

```
get_input_at(node_index)
```

Retrieves the input tensor(s) of a layer at a given node.

Arguments:

- `node_index` : Integer, index of the node from which to retrieve the attribute. E.g. `node_index=0` will correspond to the first time the layer was called.

Returns:

A tensor (or list of tensors if the layer has multiple inputs).

Raises:

- `RuntimeError` : If called in Eager mode.

## **get\_input\_shape\_at**

```
get_input_shape_at(node_index)
```

Retrieves the input shape(s) of a layer at a given node.

Arguments:

- `node_index` : Integer, index of the node from which to retrieve the attribute. E.g. `node_index=0` will correspond to the first time the layer was called.

Returns:

A shape tuple (or list of shape tuples if the layer has multiple inputs).

Raises:

- `RuntimeError` : If called in Eager mode.

## **get\_losses\_for**

```
get_losses_for(inputs)
```

Retrieves losses relevant to a specific set of inputs.

Arguments:

- `inputs` : Input tensor or list/tuple of input tensors. Must match the `inputs` argument passed to the `__call__` method at the time the losses were created. If you pass `inputs=None`, unconditional losses are returned, such as weight regularization losses.

Returns:

List of loss tensors of the layer that depend on `inputs`.

Raises:

- `RuntimeError` : If called in Eager mode.

## get\_output\_at

```
get_output_at(node_index)
```

Retrieves the output tensor(s) of a layer at a given node.

Arguments:

- `node_index` : Integer, index of the node from which to retrieve the attribute. E.g. `node_index=0` will correspond to the first time the layer was called.

Returns:

A tensor (or list of tensors if the layer has multiple outputs).

Raises:

- `RuntimeError` : If called in Eager mode.

## get\_output\_shape\_at

```
get_output_shape_at(node_index)
```

Retrieves the output shape(s) of a layer at a given node.

Arguments:

- `node_index` : Integer, index of the node from which to retrieve the attribute. E.g. `node_index=0` will correspond to the first time the layer was called.

Returns:



A shape tuple (or list of shape tuples if the layer has multiple outputs).

Raises:

- `RuntimeError` : If called in Eager mode.

## get\_updates\_for

```
get_updates_for(inputs)
```

Retrieves updates relevant to a specific set of inputs.

Arguments:

- `inputs` : Input tensor or list/tuple of input tensors. Must match the `inputs` argument passed to the `__call__` method at the time the updates were created. If you pass `inputs=None`, unconditional updates are returned.

Returns:

List of update ops of the layer that depend on `inputs`.

Raises:

- `RuntimeError` : If called in Eager mode.

## zero\_state

```
zero_state(  
    batch_size,  
    dtype  
)
```

Return zero-filled state tensor(s).

Args:

- `batch_size` : int, float, or unit Tensor representing the batch size.
- `dtype` : the data type to use for the state.

Returns:

If `state_size` is an int or `TensorShape`, then the return value is a **N-D** tensor of shape `[batch_size x state_size]` filled with zeros.

If `state_size` is a nested list or tuple, then the return value is a nested list or tuple (of the same structure) of **2-D** tensors with the shapes `[batch_size x s]` for each `s` in `state_size`.

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