

# paper06\_model\_best

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## 1 Timeseries Testing and Modeling

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	temperature	pressure	...	wind_speed	wind_deg
datetime			...		
2021-02-12 06:00:00	21.530000	777.410000	...	2.565310	109.799270
2021-02-12 06:05:00	21.689773	777.389432	...	2.456273	105.132299

[2 rows x 20 columns]

### 1.1 Timeseries

We use the `timeseries_dataset_from_array` function from Keras Timeseries modeling functions. This function creates dataframes with sliding windows over time as an array.

This function work as follow:

```
tf.keras.utils.timeseries_dataset_from_array(  
    X, Y,                # our dataset  
    sequence_length,     # Length of the output sequences (in number of timesteps): we need to text different s  
    sequence_stride=1,   # 1 is the default value for s, data[i], data[i + s], data[i + 2 * s]  
    sampling_rate=1,     # 1 is the default value for timesteps data[i], data[i + r], ... data[i + sequence_leng  
    shuffle=False,       # shuffle the records sorting, we set it in the default false value as the original ord  
    seed=None,           # we set a fixed seed to have repeatable experiments  
    #...  
)
```

On our research it is relevant to have an adequate sequence length. Then we can focus a brief research on empiric good times. Our proposal are:

#### 1.1.1 1 Minute Resampling

- 2 days before: i.e. on our resampling for every 5 min we'd have 2880 records. This is because  $2 \text{ days} \times 24 \text{ hours} \times 60 \text{ min} \div 5 \text{ min}$
- 7 days before: i.e. on our resampling for every 5 min we'd have 10,080 records. This is because  $7 \text{ days} \times 24 \text{ hours} \times 60 \text{ min} \div 5 \text{ min}$
- 15 days before: i.e. on our resampling for every 5 min we'd have 21600 records. This is because  $15 \text{ days} \times 24 \text{ hours} \times 60 \text{ min} \div 5 \text{ min}$

#### 1.1.2 2 Minute Resampling

- 2 days before: i.e. on our resampling for every 5 min we'd have 1,440 records. This is because  $2 \text{ days} \times 24 \text{ hours} \times 60 \text{ min} \div 10 \text{ min}$
- 7 days before: i.e. on our resampling for every 5 min we'd have 5040 records. This is because  $7 \text{ days} \times 24 \text{ hours} \times 60 \text{ min} \div 10 \text{ min}$
- 15 days before: i.e. on our resampling for every 5 min we'd have 10,080 records. This is because  $15 \text{ days} \times 24 \text{ hours} \times 60 \text{ min} \div 10 \text{ min}$

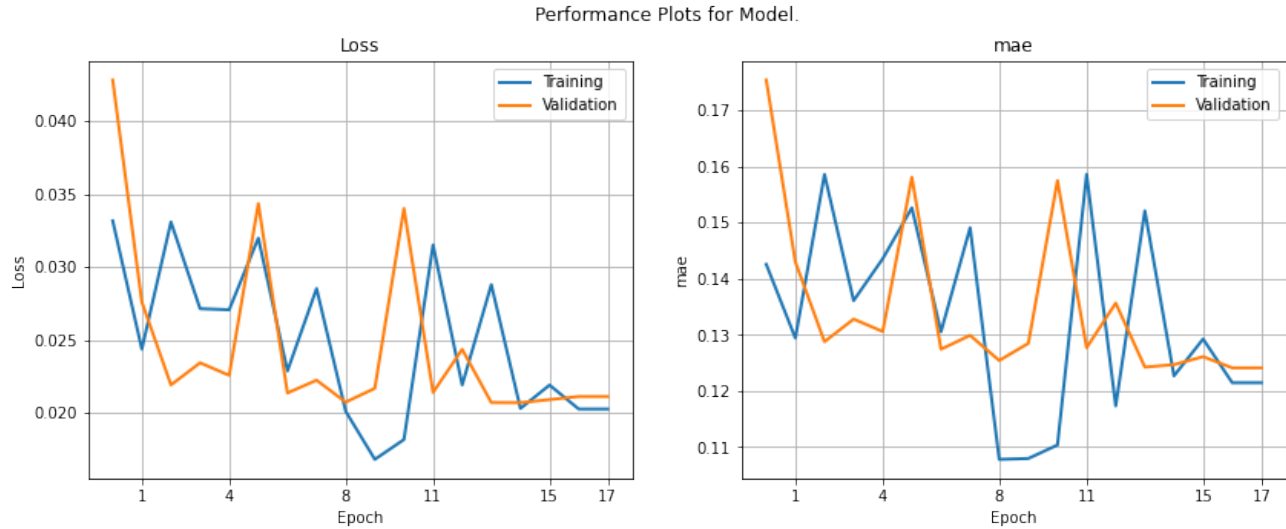
### 1.1.3 5 Minute Resampling

- 2 days before: i.e. on our resampling for every 5 min we'd have 576 records. This is because  $2 \text{ days} \times 24 \text{ hours} \times 60 \text{ min} \div 5 \text{ min}$
- 7 days before: i.e. on our resampling for every 5 min we'd have 2016 records. This is because  $7 \text{ days} \times 24 \text{ hours} \times 60 \text{ min} \div 5 \text{ min}$
- 15 days before: i.e. on our resampling for every 5 min we'd have 4320 records. This is because  $15 \text{ days} \times 24 \text{ hours} \times 60 \text{ min} \div 5 \text{ min}$

We set this the number of days in a variable we set as **WINDOW\_SIZE\_DAYS**

### 1.2 5 Minute Resampling and 7 Days of History.

Processing Time: 262.98 segundos.

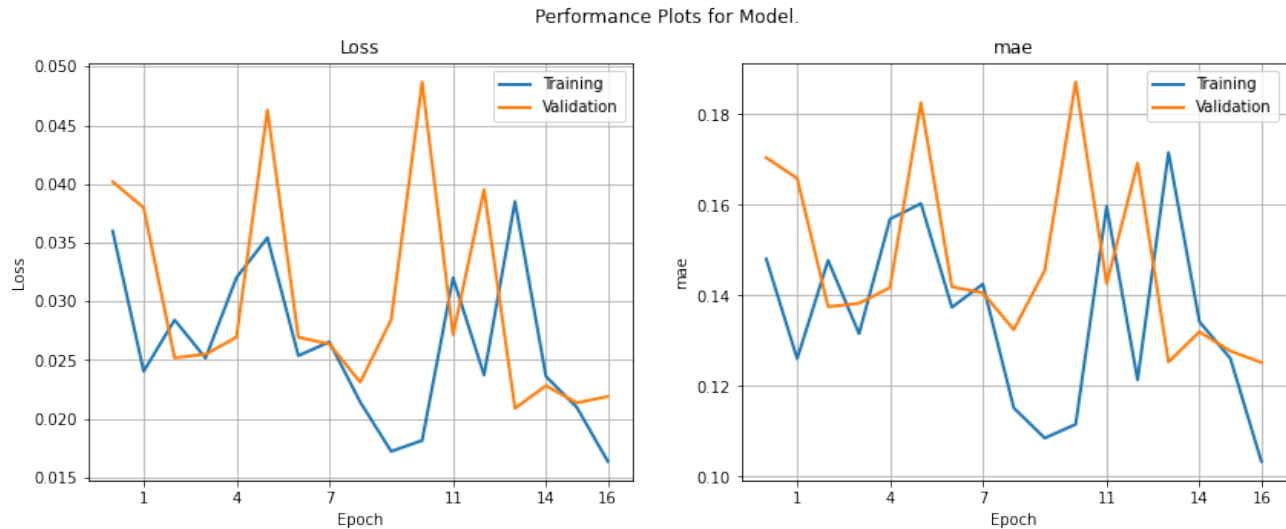


- Mean Absolute Error in Real Scale of the last Epoch: **61.5097 IAQ points**.

### 1.3 5 Minute Resampling and 2 Days of History with 2 Sampling Rate.

On our previous examples this quickly becomes unmanageable the we propose skipping some records and getting the previous hour by setting the **sampling\_rate** parameter of 10 minute.

Processing Time: 215.13 segundos.

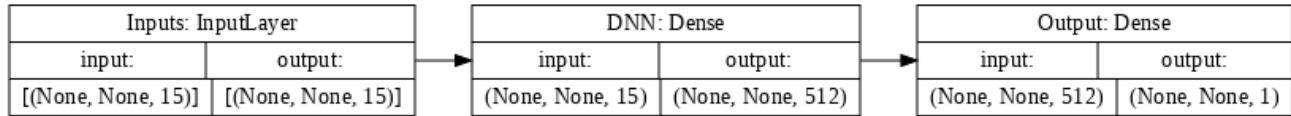


- Mean Absolute Error in Real Scale of the last Epoch: **62.0461 IAQ points**.

## 1.4 Model DNN01

Time series parameters:

```
timeseries_dataset_from_array( sequence_length=576, sampling_rate=1, batch_size=256, seed=175904)
```

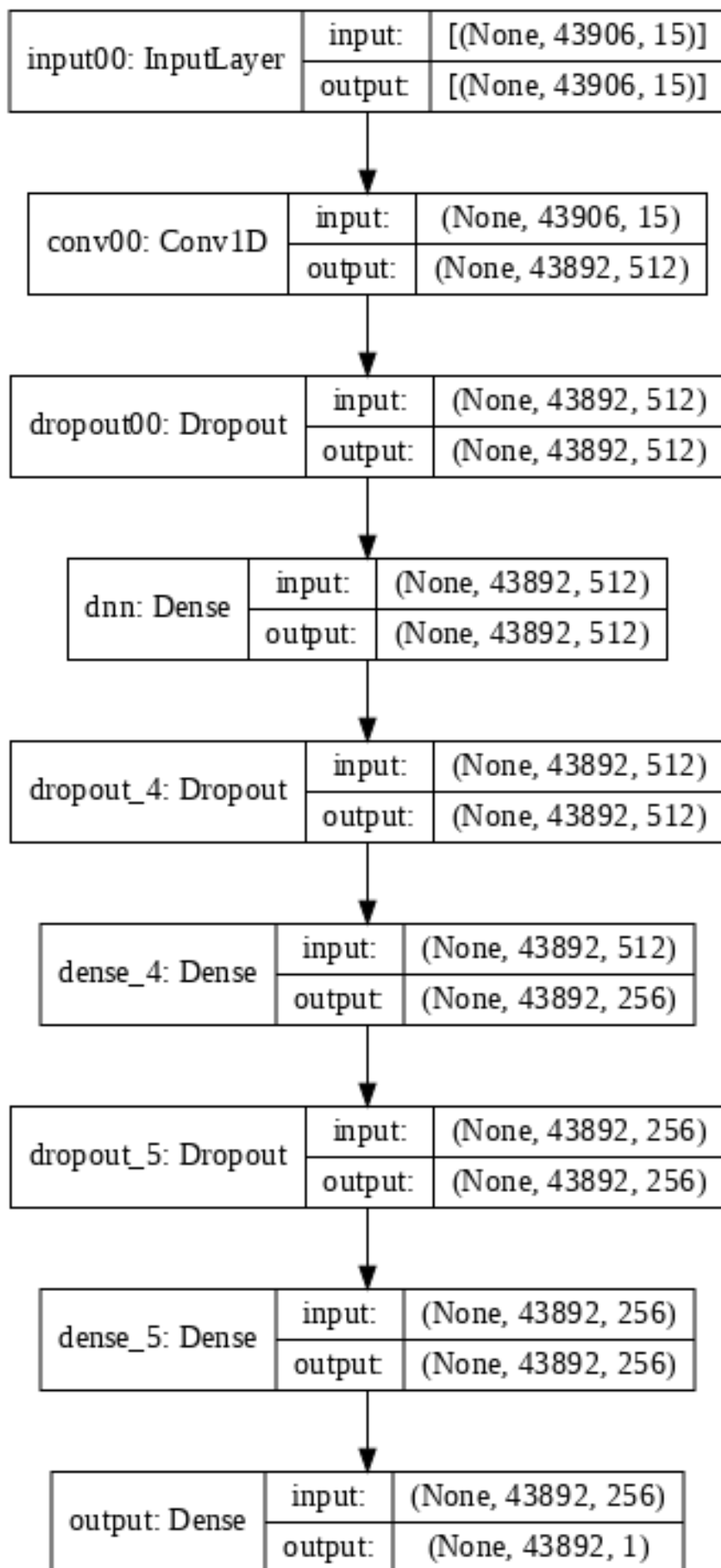


Saving file: drive/MyDrive/Colab Notebooks/proyecto-final/models-paper/scaler-iaq.dill... Done!

## 1.5 Model Best 03a

Time series parameters:

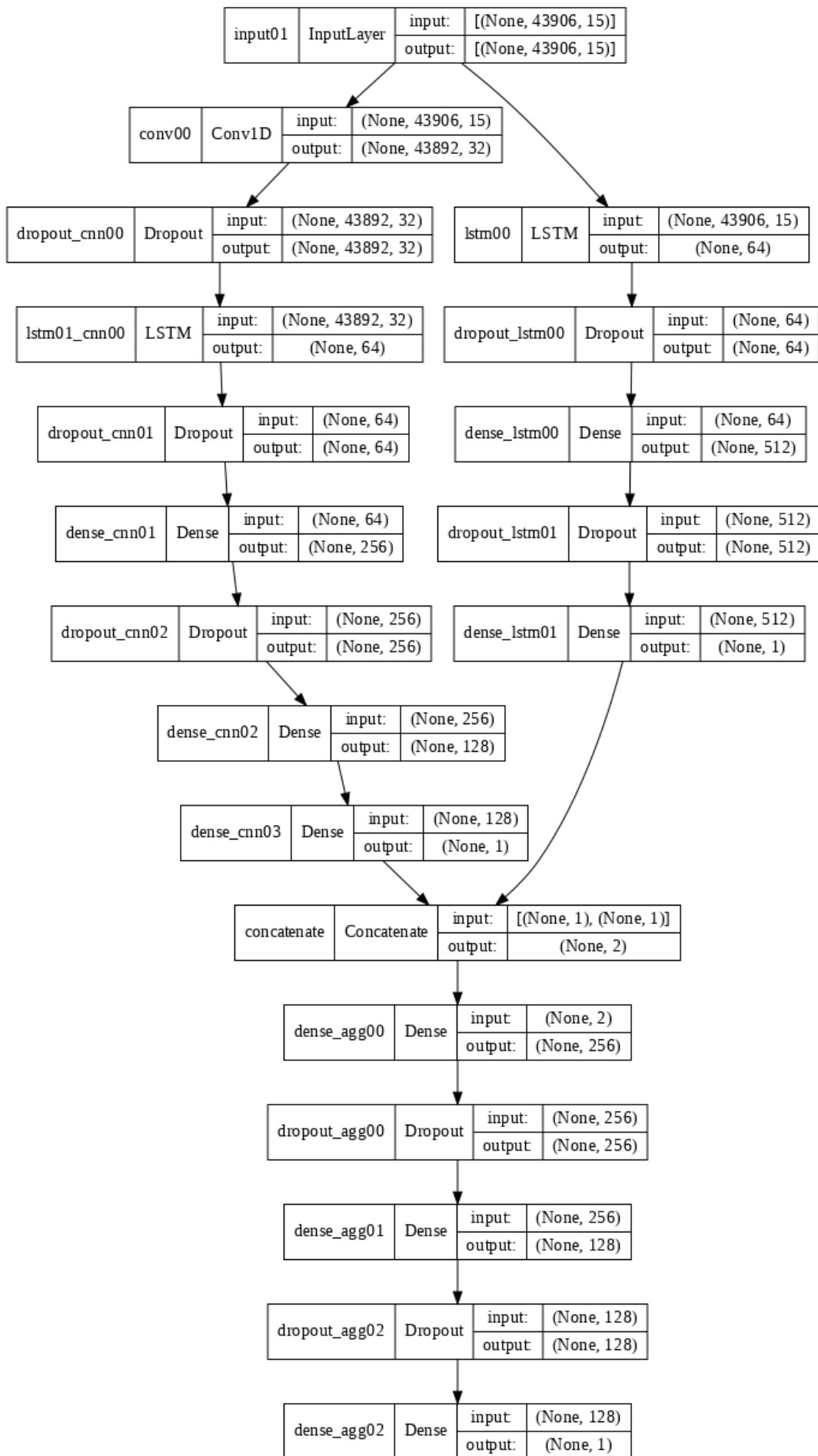
```
timeseries_dataset_from_array( sequence_length=576, sampling_rate=1, batch_size=256, seed=175904)
```



## 1.6 Model Best 03b

Time series parameters:

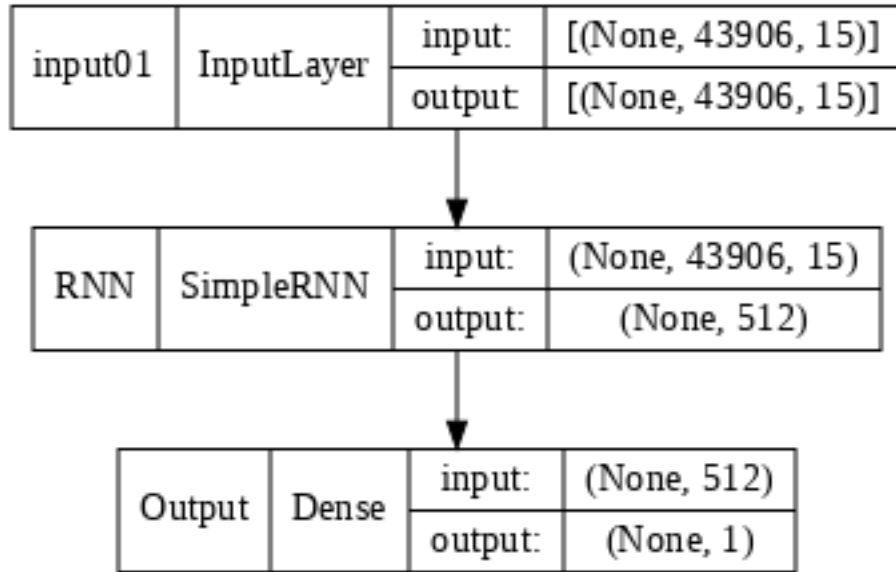
```
timeseries_dataset_from_array( sequence_length=576, sampling_rate=1, batch_size=256, seed=175904)
```



## 1.7 Model RNN00

Time series parameters:

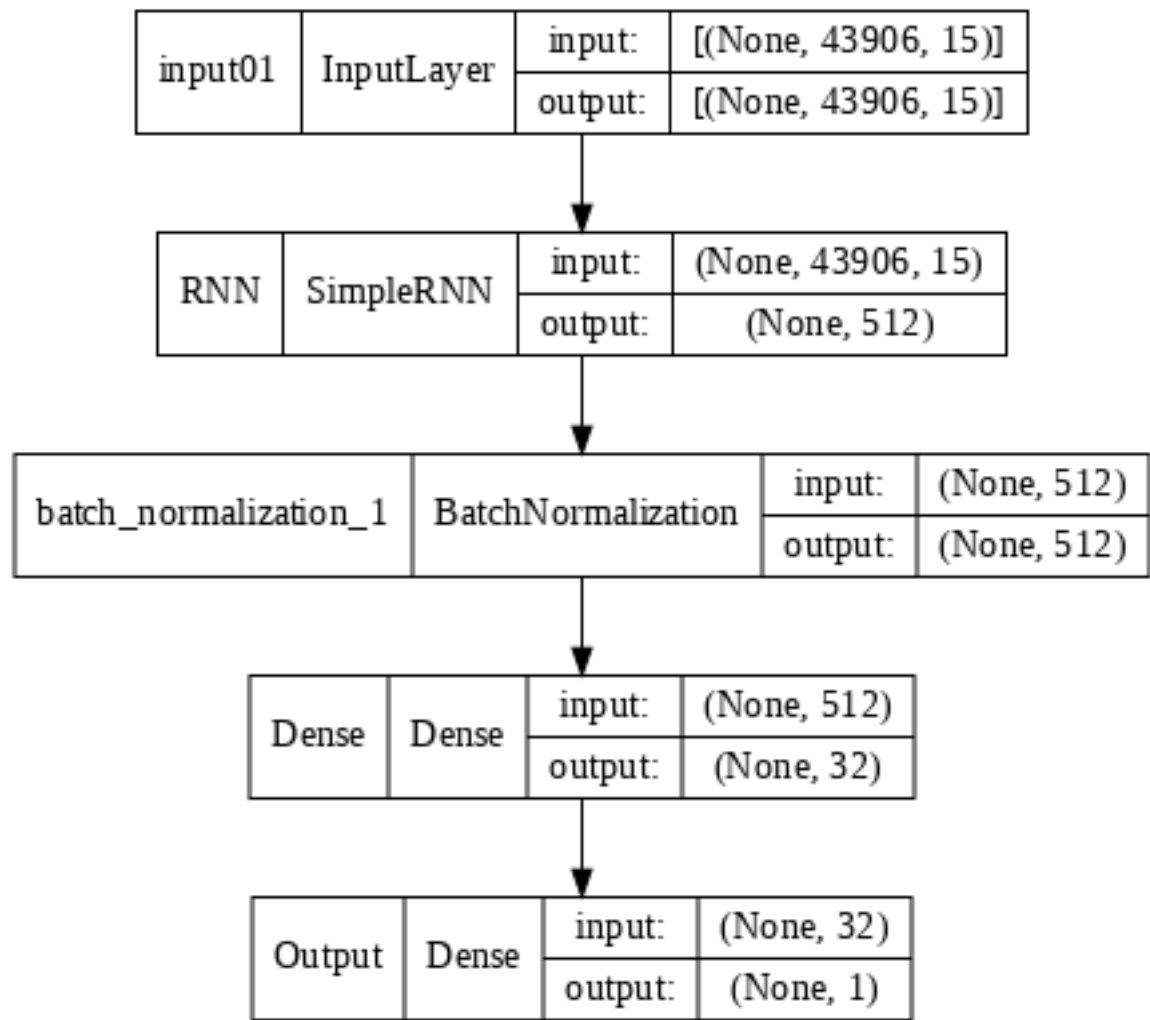
```
timeseries_dataset_from_array( sequence_length=576, sampling_rate=1, batch_size=256, seed=175904)
```



## 1.8 Model RNN02

Time series parameters:

```
timeseries_dataset_from_array( sequence_length=576, sampling_rate=1, batch_size=256, seed=175904)
```

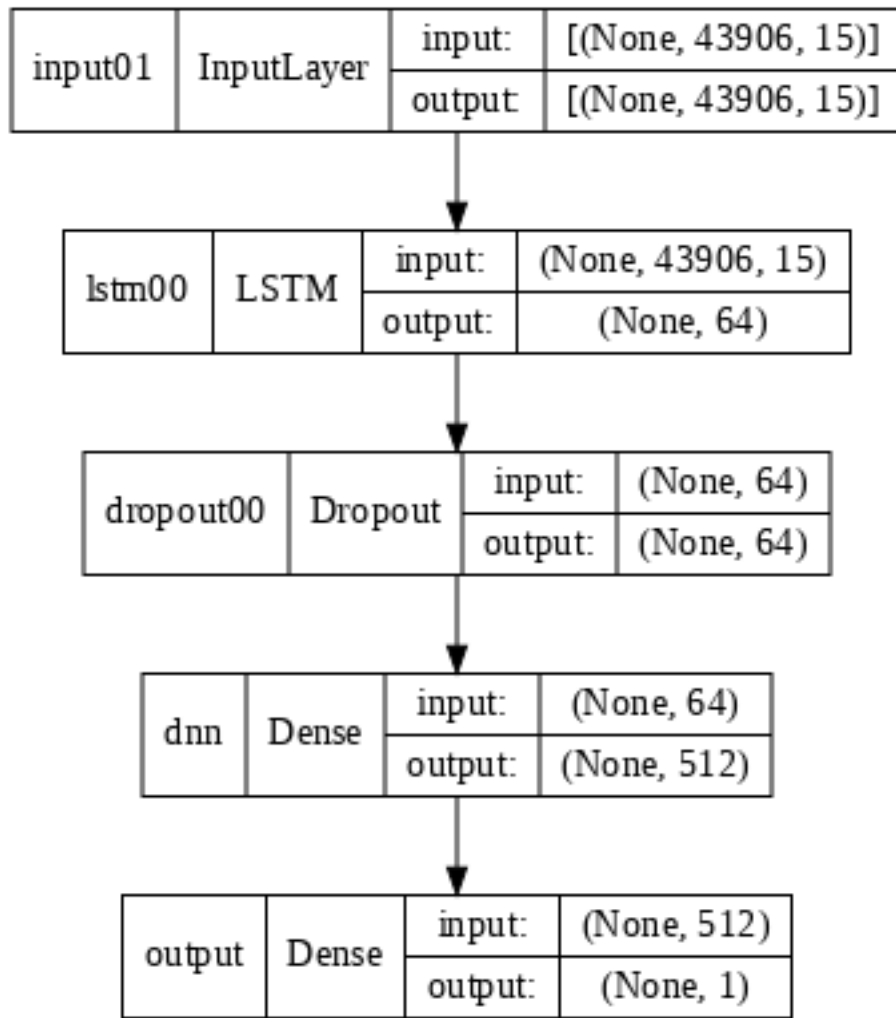


## 1.9 Model LSTM00

Time series parameters:

```
timeseries_dataset_from_array( sequence_length=576, sampling_rate=1, batch_size=256, seed=175904)
```

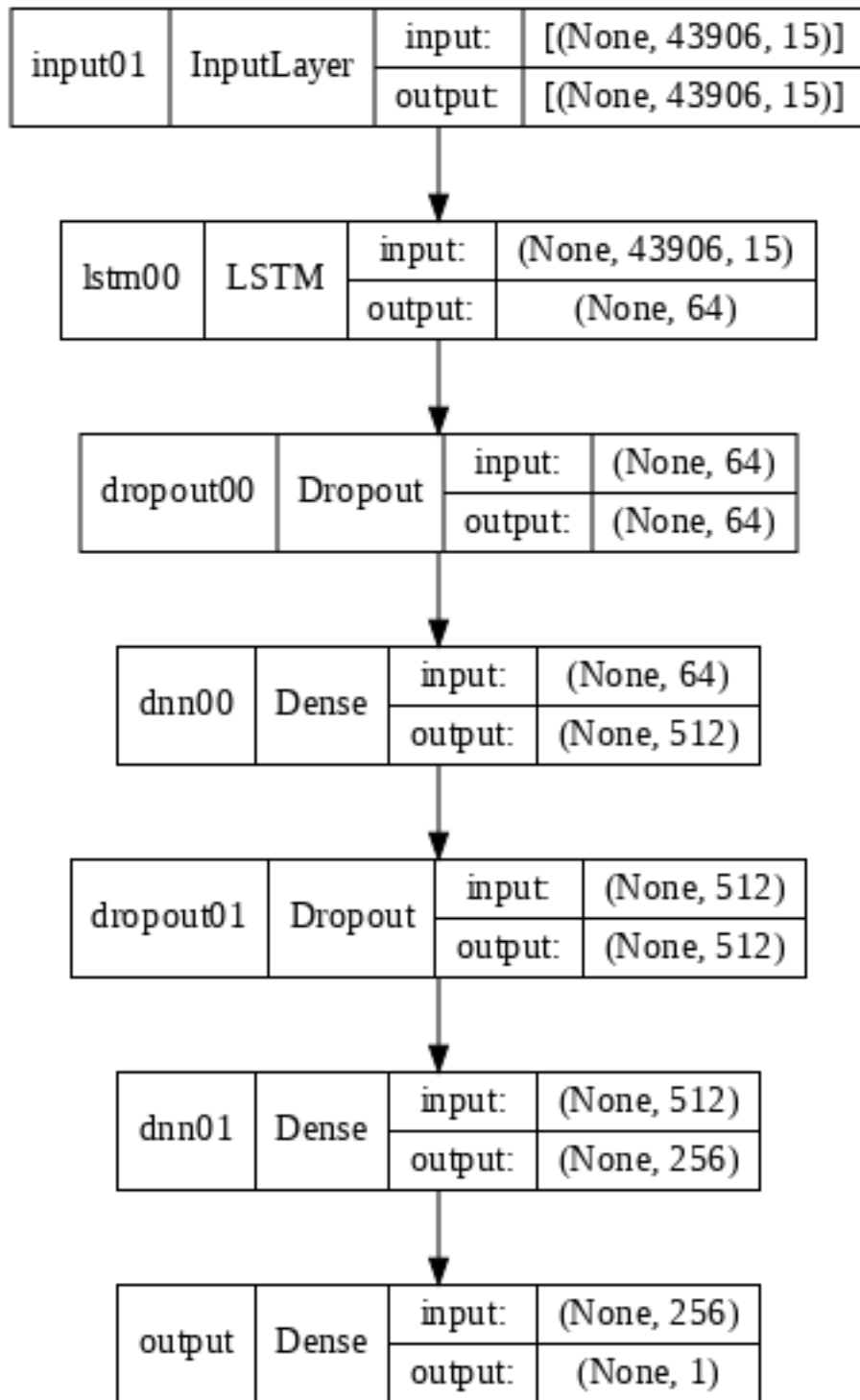




## 1.10 Model LSTM02

Time series parameters:

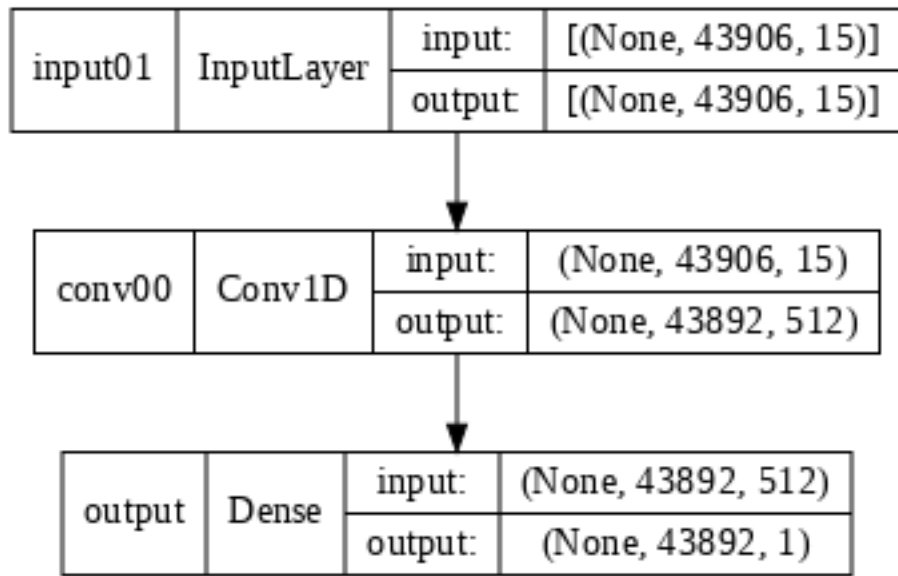
```
timeseries_dataset_from_array( sequence_length=576, sampling_rate=1, batch_size=256, seed=175904)
```



### 1.11 Model Conv00

Time series parameters:

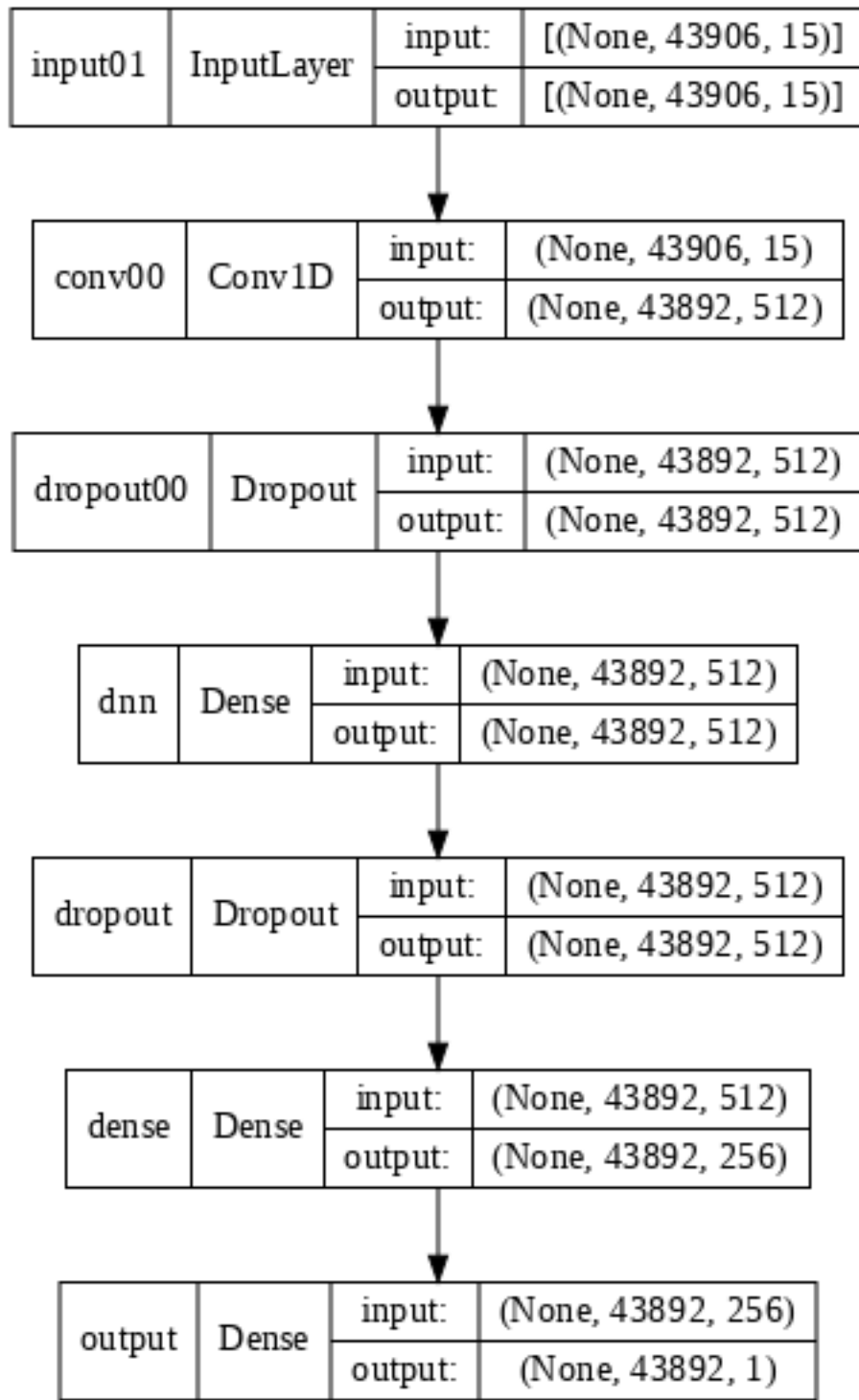
```
timeseries_dataset_from_array( sequence_length=576, sampling_rate=1, batch_size=256, seed=175904)
```



### 1.12 Model Conv02

Time series parameters:

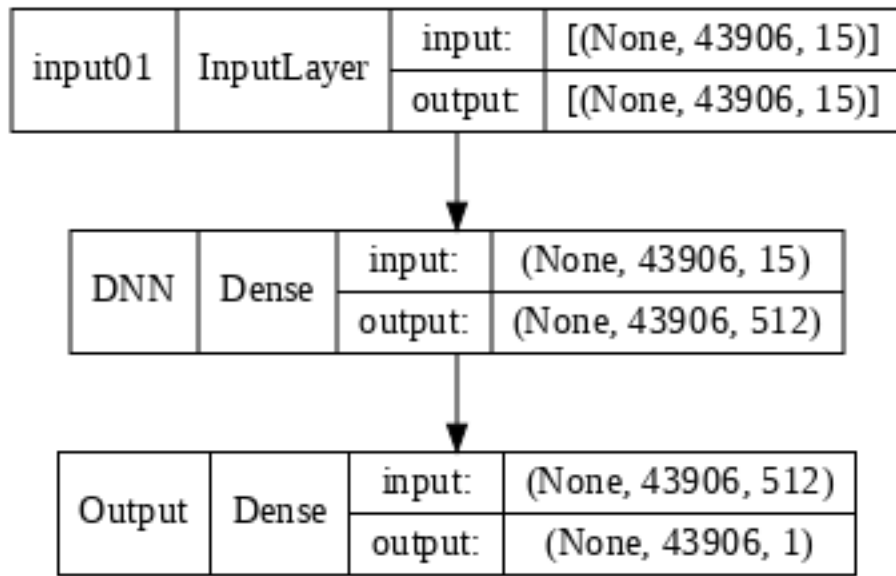
```
timeseries_dataset_from_array( sequence_length=576, sampling_rate=1, batch_size=256, seed=175904)
```



### 1.13 Model DNN00

Time series parameters:

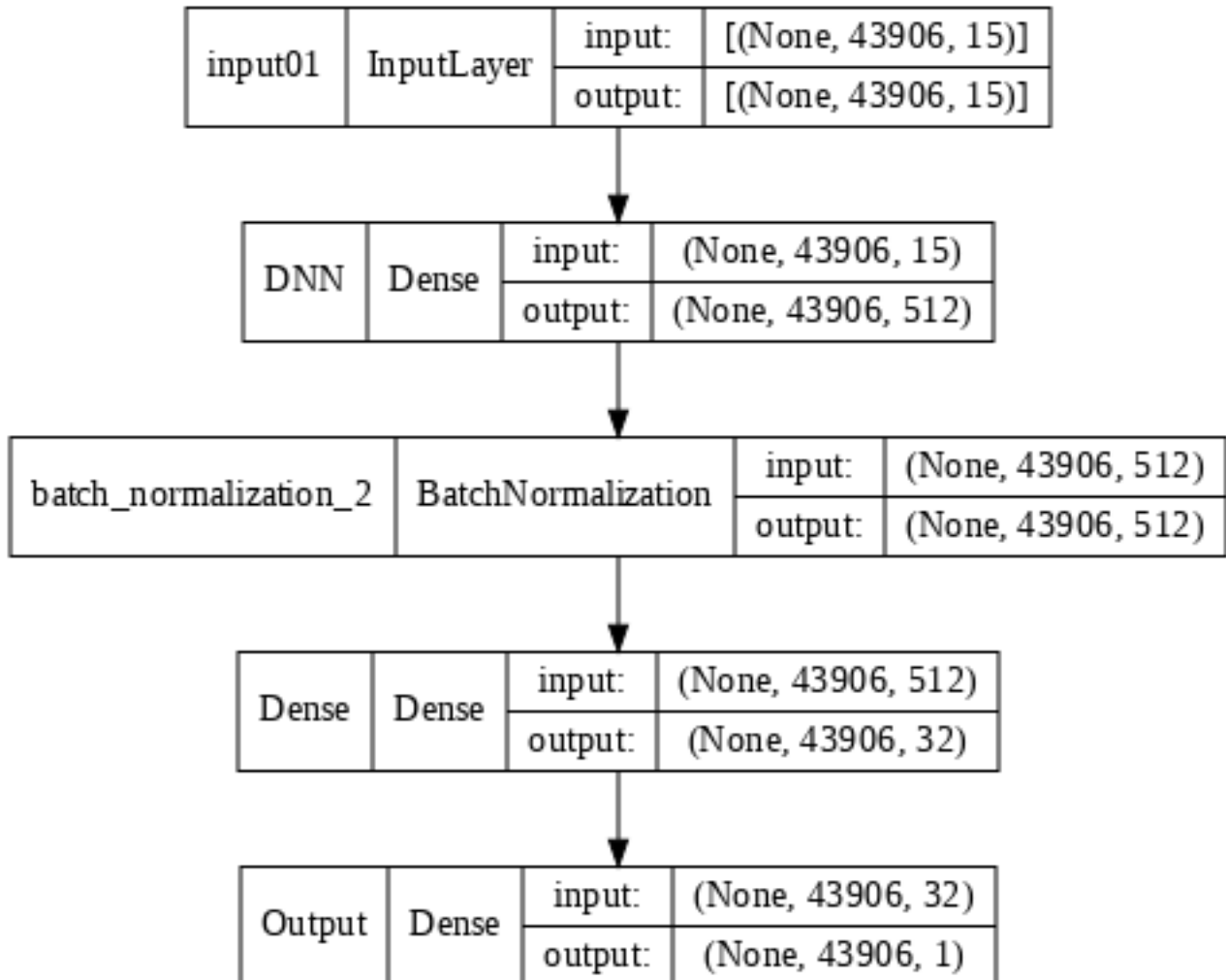
```
timeseries_dataset_from_array( sequence_length=576, sampling_rate=1, batch_size=256, seed=175904)
```



### 1.14 Model DNN02

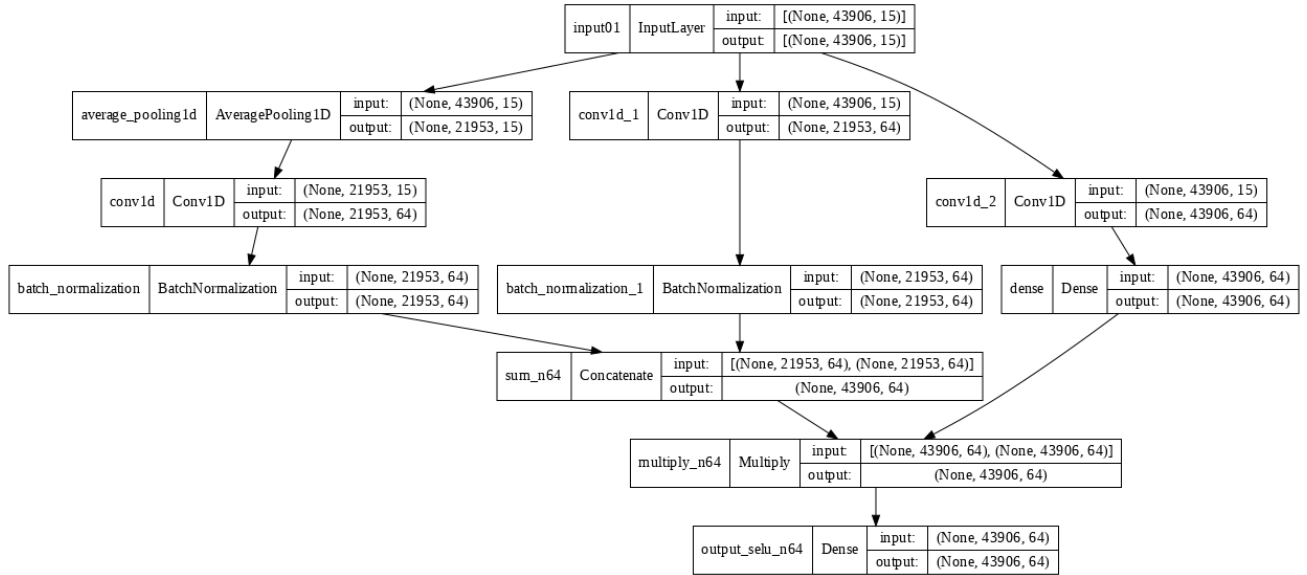
Time series parameters:

```
timeseries_dataset_from_array( sequence_length=576, sampling_rate=1, batch_size=256, seed=175904)
```

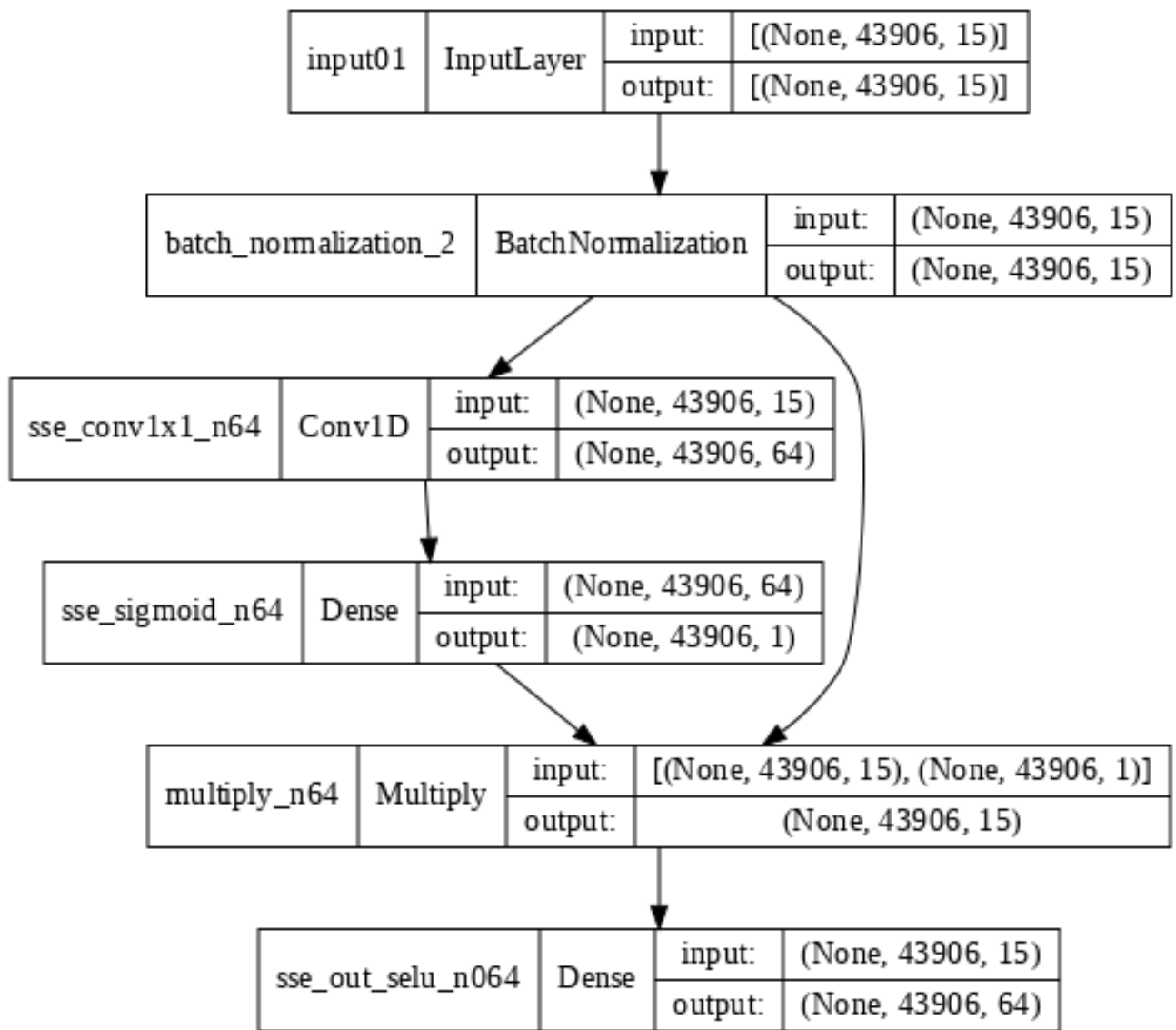


## 1.15 Model ParNet0

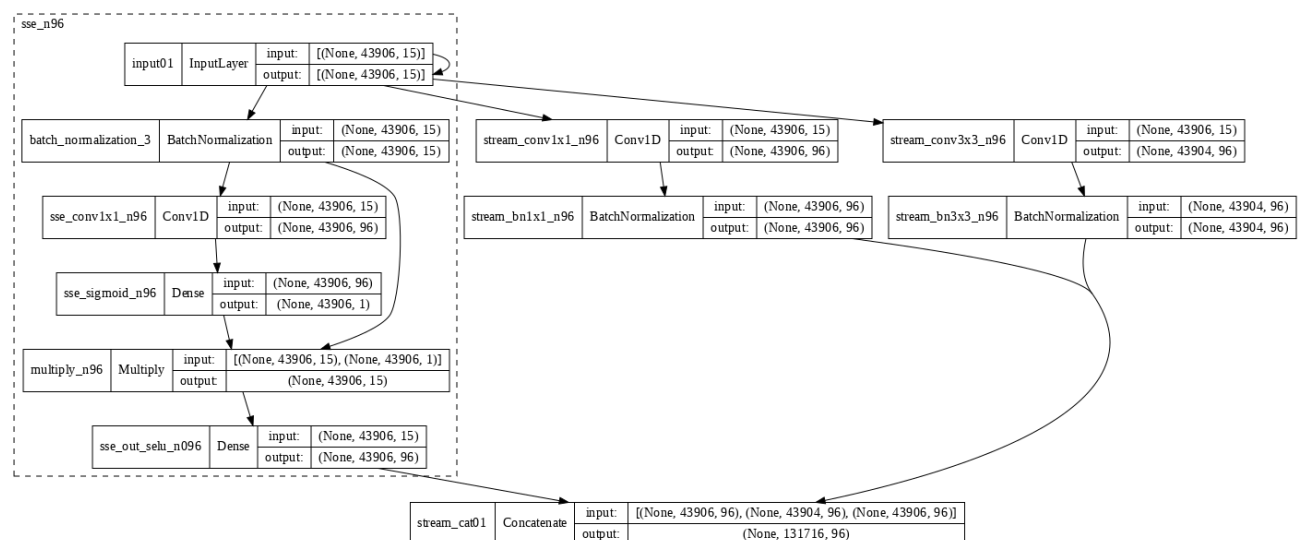
### Downsampling



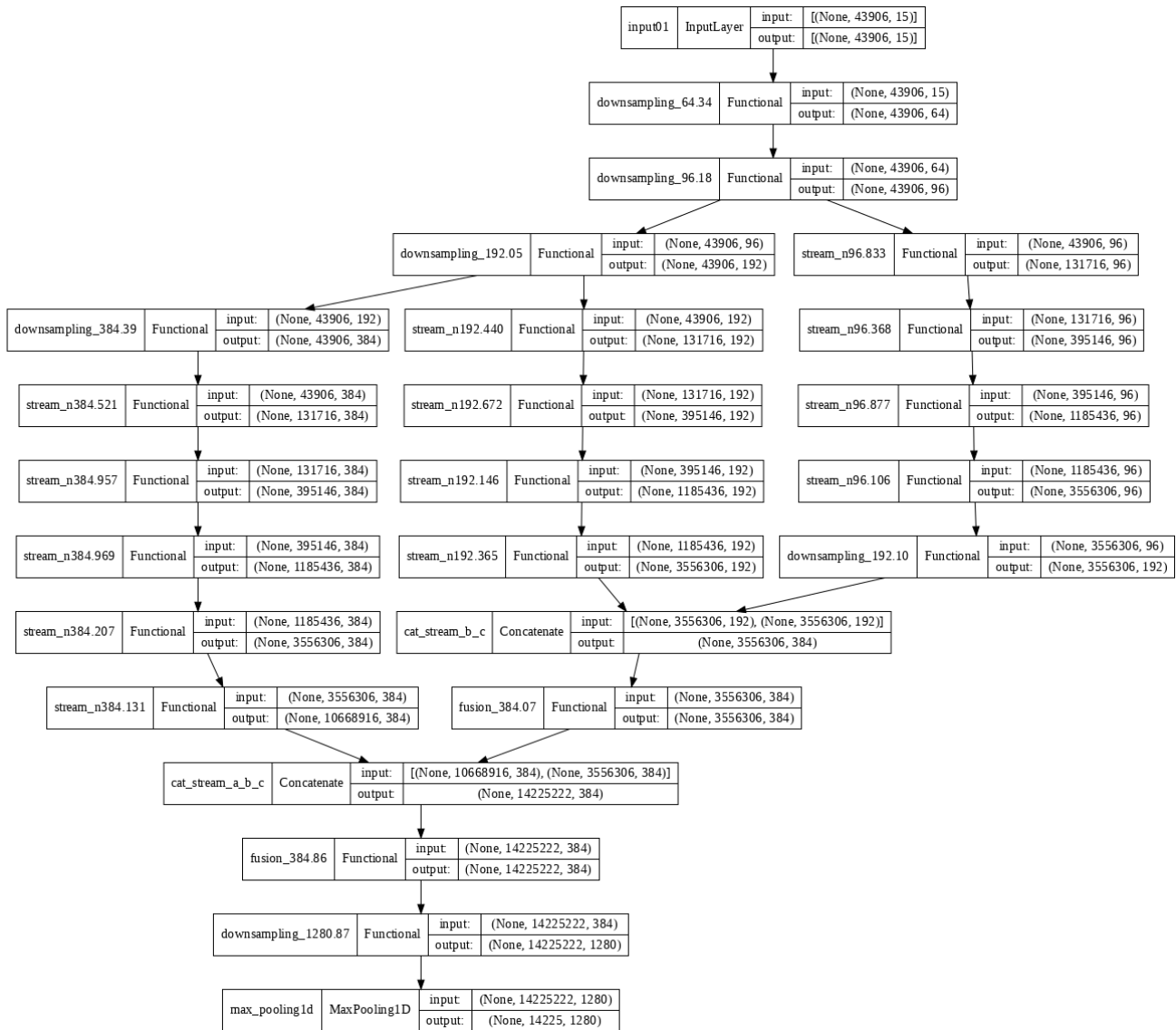
SSE



## Stream



## Sequence



```

/usr/local/lib/python3.7/dist-packages/keras/engine/functional.py:1410:
CustomMaskWarning: Custom mask layers require a config and must override
get_config. When loading, the custom mask layer must be passed to the
custom_objects argument.

```

```

layer_config = serialize_layer_fn(layer)

```

## Job Training

256

0epoch [00:00, ?epoch/s]

0batch [00:00, ?batch/s]

Epoch 1/5

InvocationException

Traceback (most recent call last)

<ipython-input-16-c6465fb85522> in <module>()



```

3         metrics=["mse", "mae"],
4         epochs=5, steps_per_epoch=2,
----> 5         batch_size=BATCH_SIZE, base_dir=base_url)

<ipython-input-1-477fa0ed5883> in train_model(model, train_data, validation_data, epochs, batch_size,
↳ steps_per_epoch, loss, optimizer, metrics, verbose, base_dir)
    119     display(plot_model(model, to_file=os.path.join(base_url,
    120                                                         f"data/{model.name}.png"),
--> 121                     dpi=72, rankdir="TB", show_shapes=True, expand_nested=True))

    122     cbk = TqdmCallback()
    123     tiempo = time.time()

/usr/local/lib/python3.7/dist-packages/keras/utils/vis_utils.py in plot_model(model, to_file,
↳ show_shapes, show_dtype, show_layer_names, rankdir, expand_nested, dpi, layer_range,
↳ show_layer_activations)
    434     extension = extension[1:]
    435     # Save image to disk.
--> 436     dot.write(to_file, format=extension)
    437     # Return the image as a Jupyter Image object, to be displayed in-line.
    438     # Note that we cannot easily detect whether the code is running in a

/usr/local/lib/python3.7/dist-packages/pydot_ng/__init__.py in write(self, path, prog, format)
    1777
    1778         else:
--> 1779             fobj.write(self.create(prog, format))
    1780         finally:
    1781             if close:

/usr/local/lib/python3.7/dist-packages/pydot_ng/__init__.py in create(self, prog, format)
    1889         raise InvocationException(
    1890             'Program terminated with status: %d. stderr follows: %s' % (
--> 1891                 status, stderr_output))

    1892     elif stderr_output:
    1893         print(stderr_output)

InvocationException: Program terminated with status: 1. stderr follows: Error: /tmp/tmp2lzp8hx:
↳ syntax error in line 7 near '.94'

```