1、 Results and discussion :
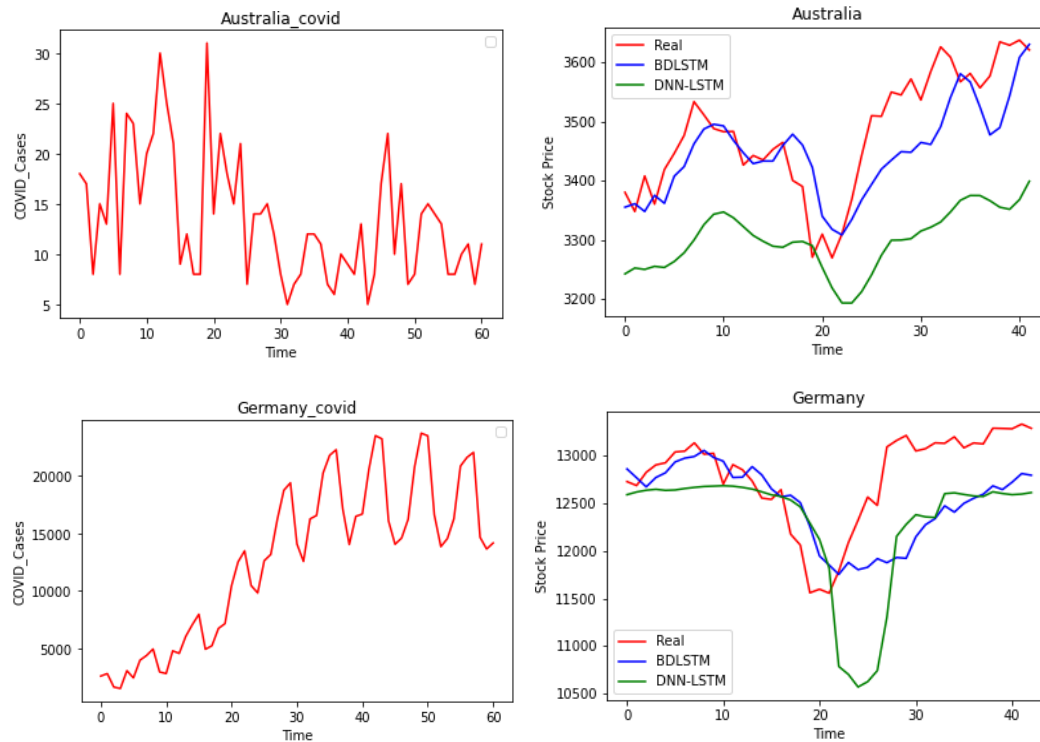
(MSE)	Taiwan	Japan	USA	UAE	UK	Italy
DNN-LSTM	200340	69380	48837	28375	33443	3470509
Bidirectional-LSTM	34558	93024	45948	2245.3	13247	1512497

(MSE)	Germany	Singapore	Brazil	South Africa	Australia
DNN-LSTM	300909	3672	3475292	986201	37638
Bidirectional-LSTM	596048	4142	4475089	247961	4924

First we set 7 days with 1 output day as training and validation data . Training data is from February 2020 to September 2020 and should be shuffle. Validation data is from October 2020 to Novenber 2020.

We use Mean Squared Error as the standard for comparison. The higher value, the lower effect. Generally, BDLSTM model produces better result because it has backward and forward information. It can correctly reflect the influence of

characteristics on the results over a period of time.

As the results above, we can find that some countries have great MSE. It may be that the effect of COVID-19 is not the major factor affecting the stock market.

I think the reason of bad result with DNN-based LSTM is that its depth isn't enough and too little data to train and validate. Over time, its impact has declined due to government policies or the prevalence of working from home. So, the DNN-based LSTM has poor performance in late period.

Using two method to analyse how COVID-19 affects the stock market is a good way. The results show that it's not accurate enough and can only be used as a reference factor. Through these two methods, the general trend of the stock market can be interpreted. We can use older data for training but it may not reflect the impact the effect of COVID-19 for stock market.
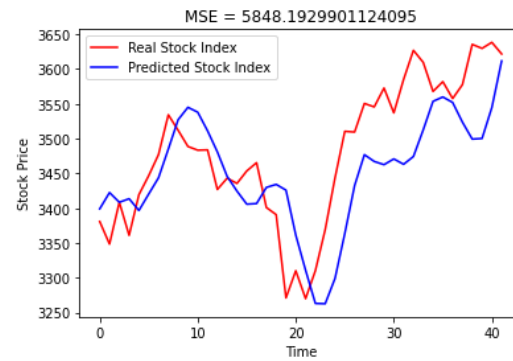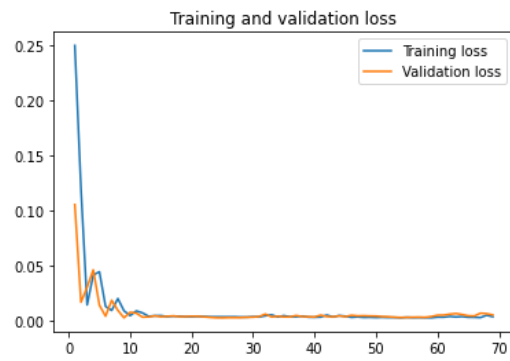
2、 Additional simulation :
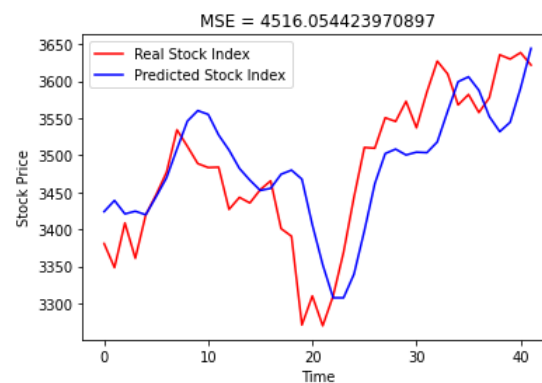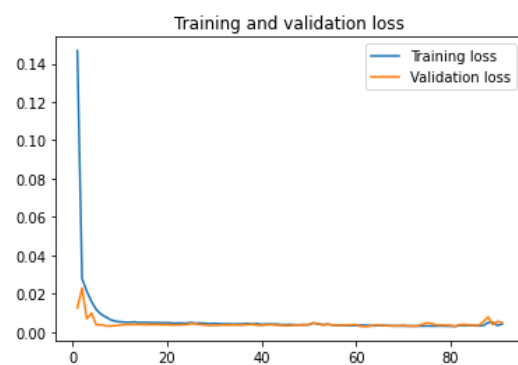BDLSTM : (use Australia as example with other structure)
(a)

(b)
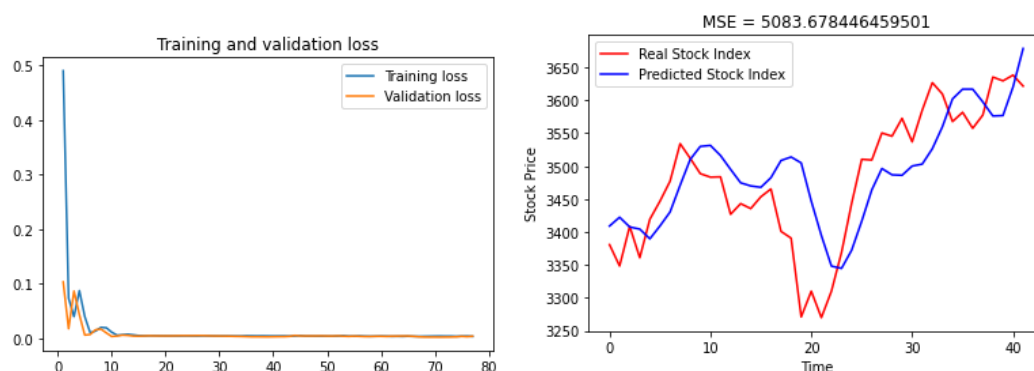
| Layer (type)	Output Shape	Param #
bidirectional_8 (Bidirection	(None, 5, 256)	142336
bidirectional_9 (Bidirection	(None, 256)	394240
dense_7 (Dense)	(None, 1)	257

LSTM-based (other structure) :

(a)

Layer (type)	Output Shape	Param #
lstm_71 (LSTM)	(None, 5, 32)	5504
lstm_72 (LSTM)	(None, 16)	3136
dense_36 (Dense)	(None, 1)	17

Better performance.
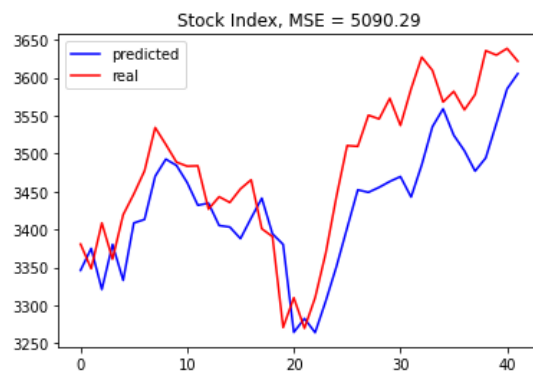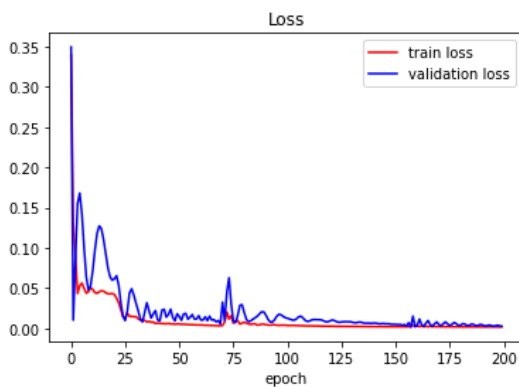
(b)

Layer (type)	Output Shape	Param #
lstm_83 (LSTM)	(None, 5, 32)	5504
dense_43 (Dense)	(None, 5, 32)	1056
dense_44 (Dense)	(None, 5, 16)	528
lstm_84 (LSTM)	(None, 16)	2112
dense_45 (Dense)	(None, 1)	17

Training and validation loss

MSE = 5664.851281009679
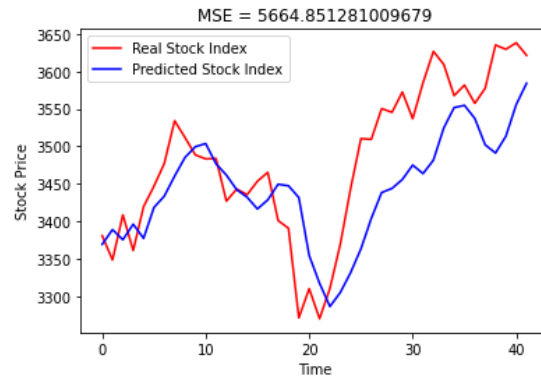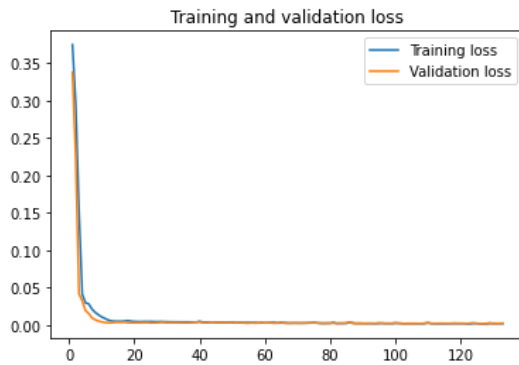
DNN-LSTM (other structure) :

Loss

Stock Index, MSE = 5090.29

Good performance.

3、 Work distribution

Find related paper.

Find data .csv for covid and stock.

Establish a DNN-LSTM model sample.

Improve the final model.

Aggregate results.

Assist report and poster writing.