

文献阅读

(1)Question:

Changes in the ocean environment have profound impact on weather and climate, to study global climate changes, the paper chooses to predict sea surface temperatures.

So how can we predict global SST by using deep learning network to enhance the accuracy of prediction?

(2)Approach:

1 common method:

Artificial empirical, numerical models, statistical predictions.

disadvantage: influenced by the parameter settings and the degree of human cognition, computationally intensive, low efficiency.

2 the paper use:

LSTM network for predicting spatio-temporal sequences and propose two multi-region prediction models based on the encoding and decoding network structures.

(3)Model:

1 data: range from 90° S to 90° N and 180° E to 180° W (1440 × 720 grid)

training set: 36 years

test set: 2 years

2 workflow of the global SST prediction framework

picture

Split the region into small sections--load a region--train the model--complete multi-region training--save multi-region model--match the model and data loading--output

3 LSTM model: a special recurrent neural network(RNN)

consist of: forgetting gate, input gate and output gate

4 Two models based on encoding and decoding network framework

1 MR-EDLSTM:use two LSTM layers respectively as the encoding and decoding parts using 365 days to predict the next 10 days

2 MR-EDConvLSTM:

use 30 days to predict the next 10 days

5 Evaluate Metrics:

Bias, Standard Deviation (Std_Dev), Root Mean Square Error (RMSE), Accuracy (ACC), and Coefficient of Determination (R2)

RMSE: 均方根误差

picture

(4)Results:

The model proposed in this paper has better prediction performance and verifies the validity of the model,the MR-EDLSTM method is better at prediction of global SST.

(5)Discussion and Conclusion:

The MR-EDLSTM model is more suitable for predicting SST in coastal areas.

The MR-EDConvLSTM model is more suitable for predicting SST in seas near the equator.