

## Limits of a prediction model using RNN with four layers LSTM for CRDS data

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**Abstract:** Prediction models can be very useful when dealing with cyclic temporal sequence of data. For cyclic sequences that have chaotic behavior, like atmospheric measures, the Recurrent Neural Network (RNN) is a potential option to create accurate prediction models. This type of neural network is effective in dealing with temporal sequences because it uses its internal state as a memory to process certain data intervals.

In building the model, it is necessary to use layers with neurons to discern a trend that the data sequence takes, for this, in the RNN model it is possible to use the long short-term memory (LSTM) architecture to more easily predict unusual behaviors in the data stream, since its use facilitates the recognition of long-term sequences in the analyzed sequence. This type of architecture can be added in layers to increase model efficiency.

For the training and testing of the model, data obtained by the Metroclima project with a Cavity Ring Down Spectroscopy (CRDS) at the UNICID station located in São Paulo were used, with the data ranging from 2019 to 2021. In this process, four LSTM layers will be used to create a prediction model that will be tested to its limit on the effectiveness of predicting atmospheric data of this type.

**Keywords:** CRDS; RNN; LSTM.

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