**Summary For Time Series Data**

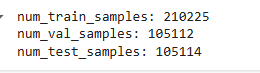
Step 1: Download the Data set “jena\_climate\_2009\_2016.csv.zip” and load the dataset and extract the dataset contents.

Step 2: Now Parsing the data would be second step and do the analysis.

Step 3: The extracted dataset contains temperature and climate information after extracting head and actual records normalize the data, calculate standard deviation.

Step 4: Time series plot is generated to visualize the temperature range. Now splitting the data set into training, testing and validation to make it more standardization.

Now take a dummy data set to understand the parameters better.



The above is the batch sizes and other parameters to analyze the array function of a time series data.

So the above information gives sample od train, test and validation.

Then an sensible base line MAE is implemented.

Applied machine learning models like 1D convolutional model to calculate the effectiveness of the model.

Used LSTM to obtain and forecast time series data.

Implemented Recurrent Neural Network RNN using NumPy to understand more depth of the model.

Using Keras layers to handle sequences step by step with varying output length and provided complete sequence output.

Used dropout techniques to overcome overfitting and stacked more layers.

Finally using Gated Recurrent Unit GRU model with dropout regularization to evaluate and train the model.

Therefore from the analysis of time series we can observe the machine and deep learning models and gives us a through understanding of data analysis forecasting of time series, data reprocessing and evaluating and developing models for the forecasting.

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| **Model** | **Test MAE** |
| Basic Naïve Method | 2.62 |
| Densley connected network model | 2.68 |
| 1D convolutional model | 3.03 |
| LSTM Model | 2.57 |
| RNN Model | 9.95 |
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| Dropout LSTM Model | 2.85 |
| LSTM with 32 units | 2.59 |
| Stacked LSTM with 64 units | 2.54 |
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