RÉPUBLIQUE FRANÇAISE
Liberté
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METEO FRANCE

Défi IA

Predict the accumulated daily rainfall on ground stations

1. Context & Objective

Forecast challenge made by the french national meteorology school (ENM)

Predict the accumulated daily rainfall on ground stations

AI algorithms

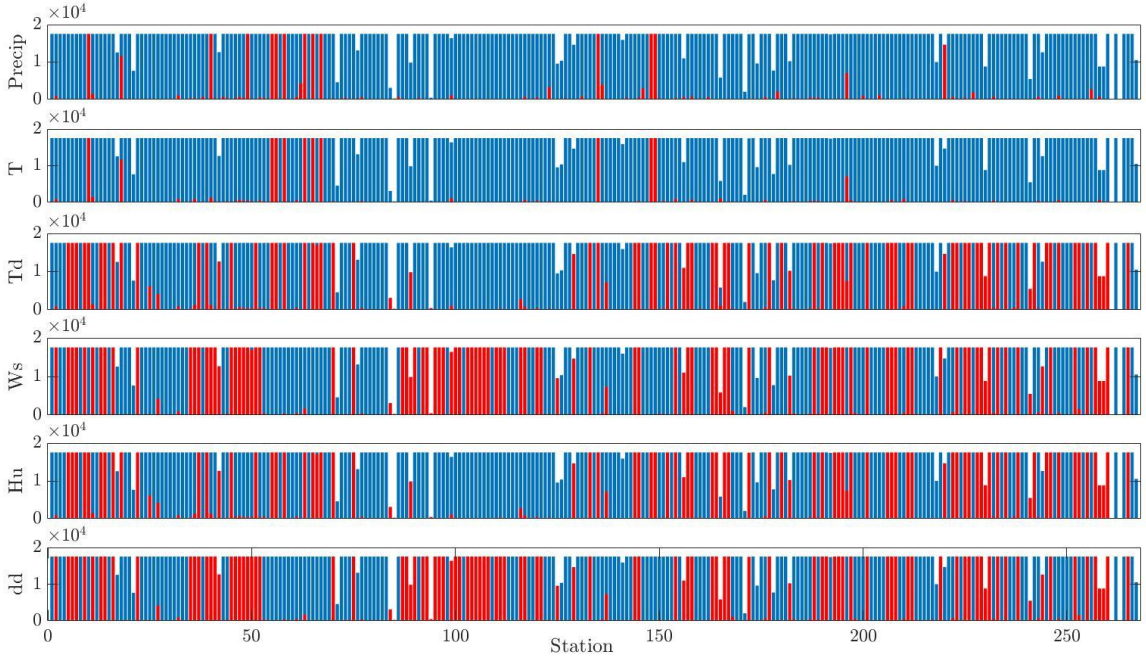
Scoring

$$MAPE = \frac{100\%}{n} \sum_{i=1}^{n} \left| \frac{y_i - \hat{y}_i}{y_i} \right|$$

2. Availability and NaNs in Ground Stations

	number_sta	date	ff	t	td	hu	dd	precip	Id
4403495	14066001	2017-12-30 19:00:00	9.63	285.38	283.40	87.7	233.0	0.2	14066001_729_19
4403496	14066001	2017-12-30 20:00:00	9.80	285.70	283.16	84.6	230.0	0.0	14066001_729_20
4403497	14066001	2017-12-30 21:00:00	10.67	286.07	282.83	80.8	230.0	0.0	14066001_729_21
4403498	14066001	2017-12-30 22:00:00	10.02	286.53	283.01	79.4	230.0	0.0	14066001_729_22
4403499	14066001	2017-12-30 23:00:00	10.67	286.84	283.22	78.9	230.0	0.0	14066001_729_23

Ground Stations : 267



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4403495	14066001	2017-12-30 19:00:00	9.63	285.38	283.40	87.7	233.0	0.2	14066001_729_19
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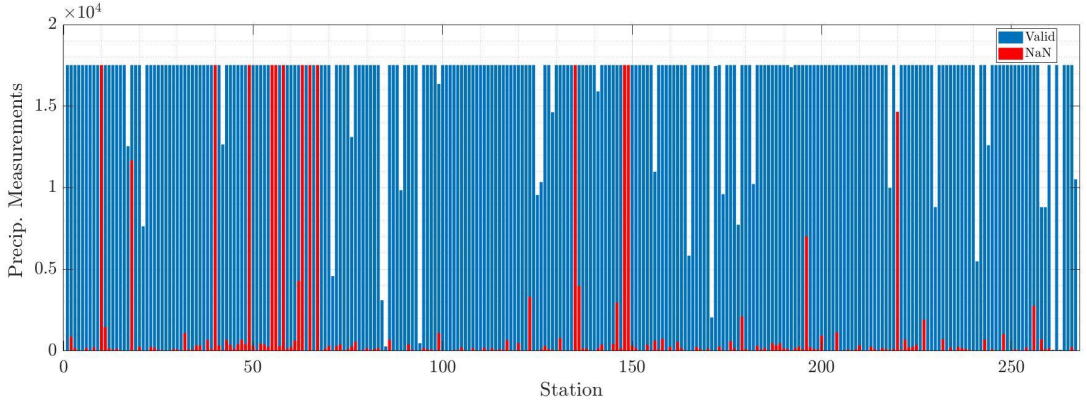
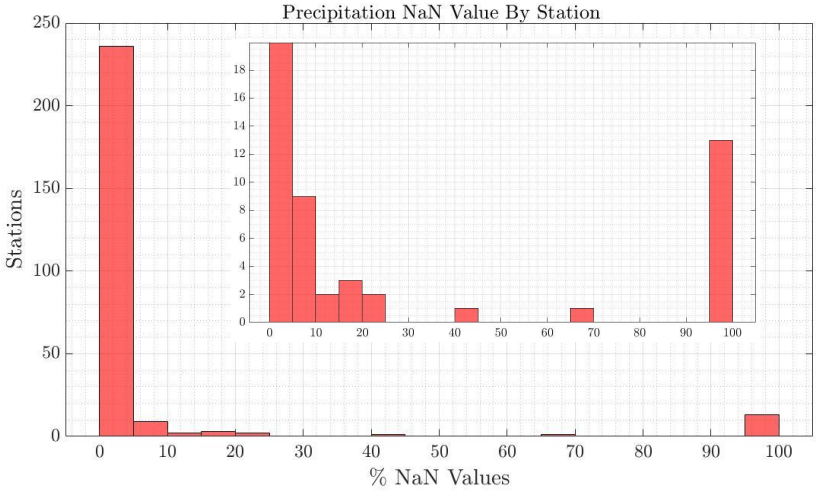




Labels

$$Y_{day} = 24 * \sum(valid\ hour\ values) \,/\, \#(valid\ values)$$

$$X \rightarrow NaN = 0$$

3. Approach

Data Sources

- measurement stations
- weather forecast systems from METEO FRANCE

Training Set : 2016-1-1 → 2017-9-31
Validation Set: 2017-10-1 → 2017-12-31

Small seasonal bias ?

$$X_{data}\,(one\ day)\ :\ Concat\,(\underbrace{Month\ +\ [ff,\ t,\ td,\ hu,\ dd,\ precip]\ +\ \ldots * 24[\ldots]_{hr}}_{145})$$

Shape : (145, nb_days) → Data Scaling

3. Approach

For 1 Ground station

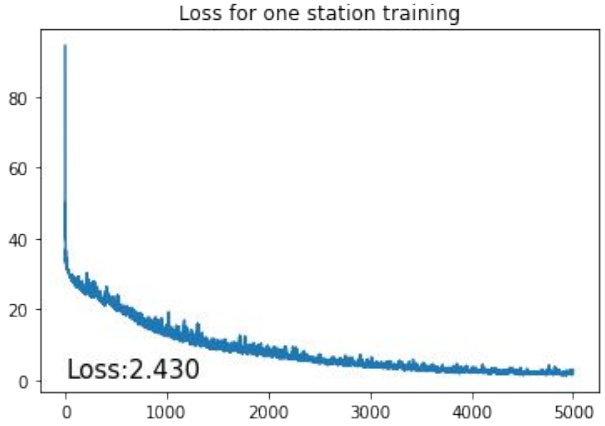
Model Architecture

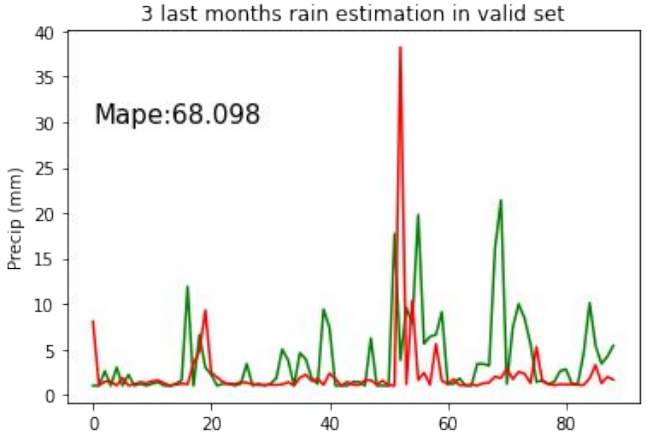
```
model = Sequential()
model.add(Dense(500, input_dim=input_size, activation= "relu"))
model.add(Dense(100, activation= "relu"))
model.add(Dense(50, activation= "relu"))
model.add(Dense(1))
```

4. Results

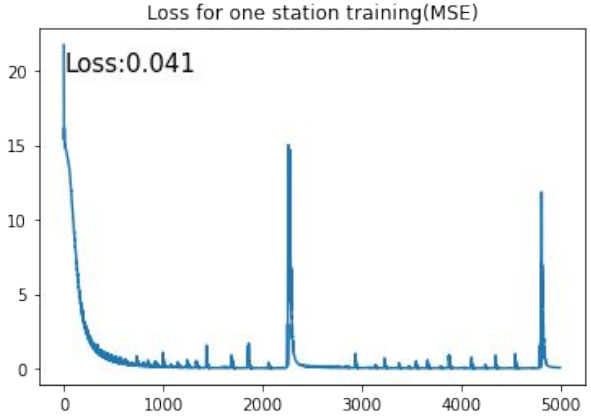
MAPE vs MSE loss function

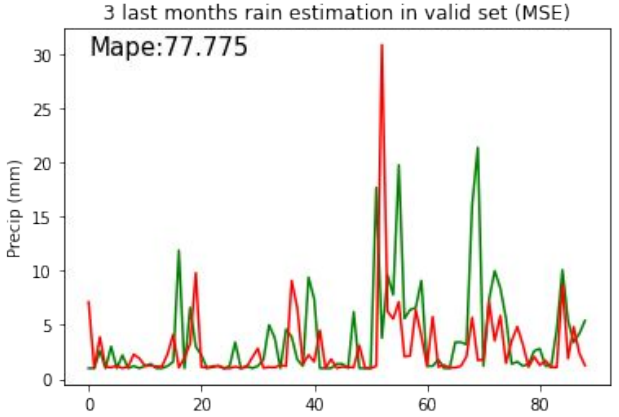
MAPE





MSE





6. Conclusion & Discussion

Potential improvements

1. **Features Management** ➡ Incorporate weather forecast systems from METEO FRANCE and new features

2. **NaN Management** ➡

$$X \rightarrow NaN = Outlier\ default\ value$$

$$\%\ NaN > 50\%\ Values \rightarrow Use\ Forecast\ Prediction$$

3. **Model Architecture** ➡ Test different combinations of hyperparameters (depth, layer size, activation function, optimizer, learning rate, etc)

Thank you for your attention