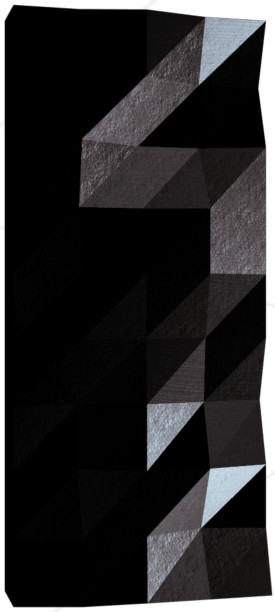

Professional training

Neural network model

Summary: In this Module, you will learn about neural network model (RNN).

Version: 1.00

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Chapter I

Introduction

Greetings!

If you haven't already done so, read en.toolkit.pdf.

What this Module will cover:

In this module, we will dive into the exciting world of weather prediction using Recurrent Neural Networks (RNNs). Weather data, including date and time information, is inherently sequential, making it an ideal domain for applying RNNs.

Next, we will delve into the realm of Recurrent Neural Networks. You will learn how to design, train, and evaluate RNN models for weather prediction. We will cover topics such as sequential modeling, handling data sequences, and interpreting predictions to make informed decisions in the field of weather forecasting.

By the end of this module, you will have gained valuable skills for weather prediction using RNNs, a domain that holds significant importance in daily decision-making, whether it's planning outdoor activities, managing energy resources, or preparing for extreme weather conditions.

We wish you great success in your learning journey.

Chapter II

General instructions

Unless explicitely specified, the following rules will apply every day of this Professional training.

- This subject is the one and only trustable source. Don't trust any rumor.
- This subject can be updated up to one hour before the turn-in deadline.
- The assignments in a subject must be done in the given order. Later assignments won't be rated unless all the previous ones are perfectly executed.
- Be careful about the access rights of your files and folders.
- Your assignments will be evaluated by your peers.
- You must not leave in your turn-in your workspace any file other than the ones explicitly requested By the assignments.
- You have a question? Ask your left neighbor. Otherwise, try your luck with your right neighbor.
- Every technical answer you might need is available in the `man` or on the Internet.
- By Thor, by Odin! Use your brain!!!

Chapter III

Exercise 00

	Exercise 00
Data exploration	
Turn-in directory : $ex00/$	
Files to turn in : `Advanced02.ipynb`	
Allowed functions : `All`	

For this first exercise, you'll need to load the data into colab and do some data exploration, i.e. you'll need to understand your data.

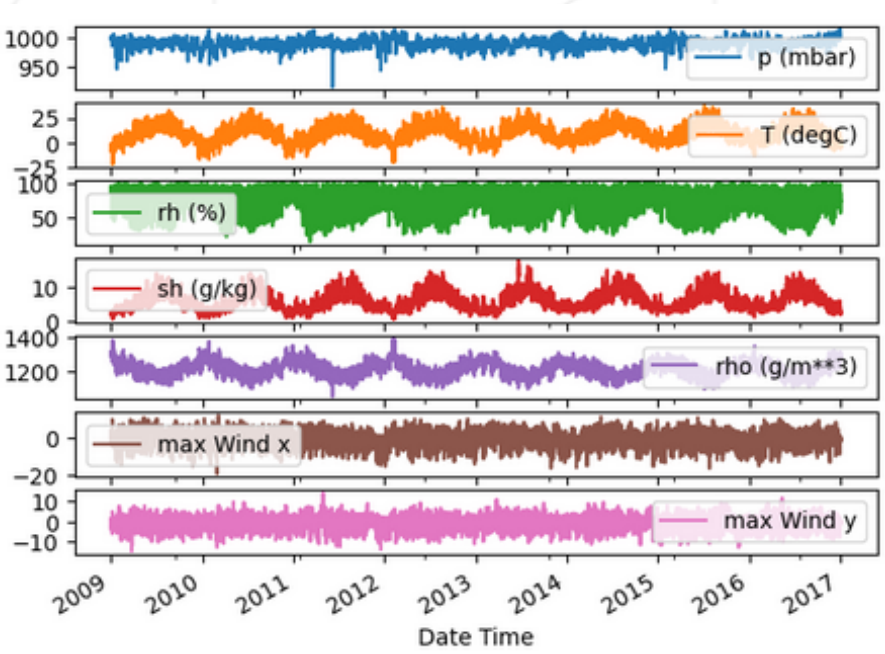
Chapter IV

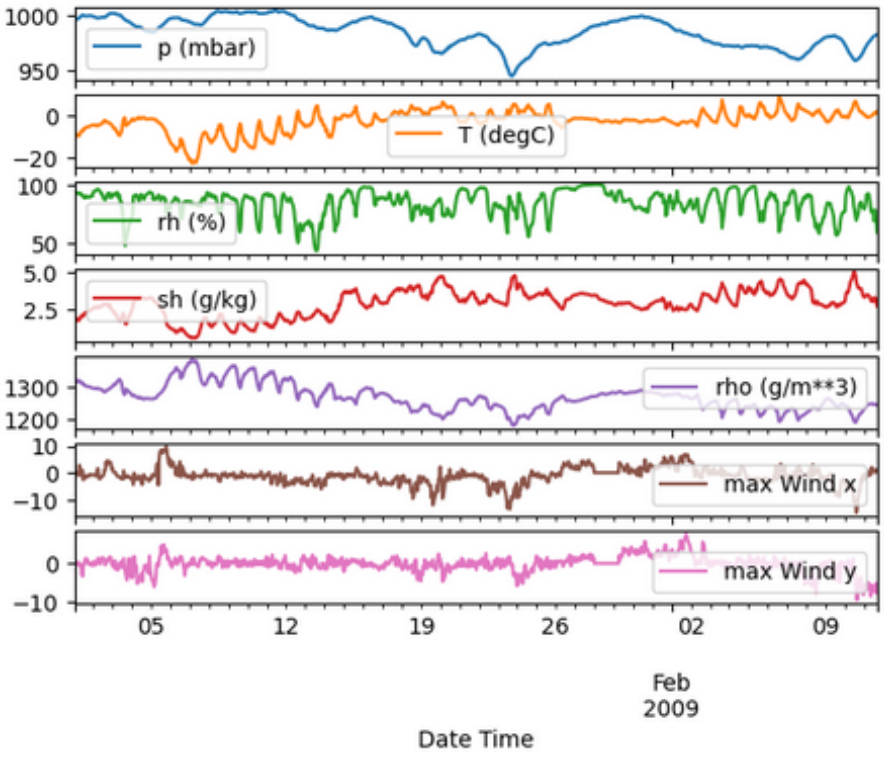
Exercise 01

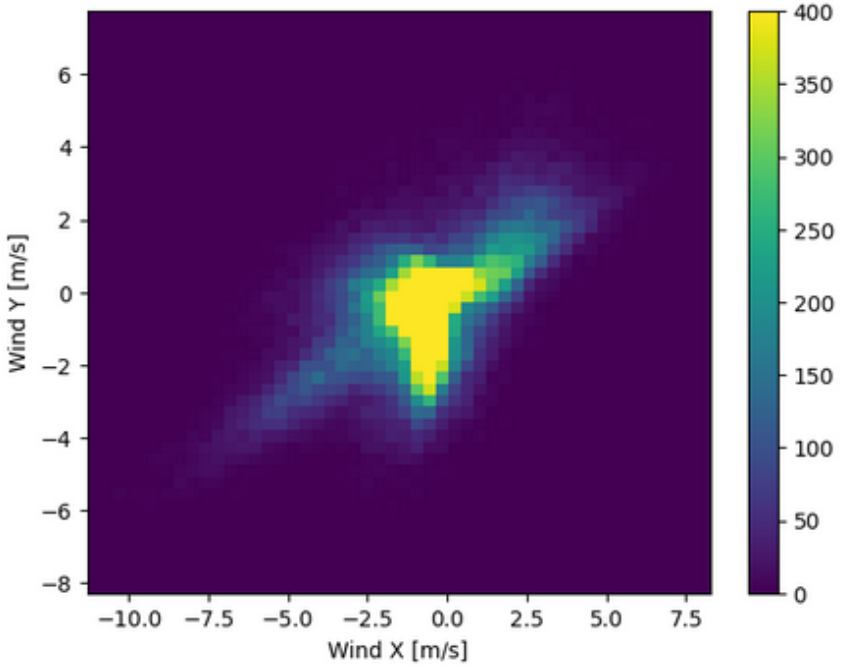
	Exercise 01
	Data Visualisation
Turn-in directory : $ex01/$	
Files to turn in : `Advanced02.ipynb`	
Allowed functions : `All`	

In this exercise, to better understand your data, display a few images of your dataset.

You should have something like this:




p (mbar)
T (degC)
rh (%)
sh (g/kg)
rho (g/m**3)
max Wind x
max Wind y
1000
950
0
−20
100
50
5.0
2.5
1300
1200
10
0
−10
0
−10
05
12
19
26
02
09
Feb
2009
Date Time

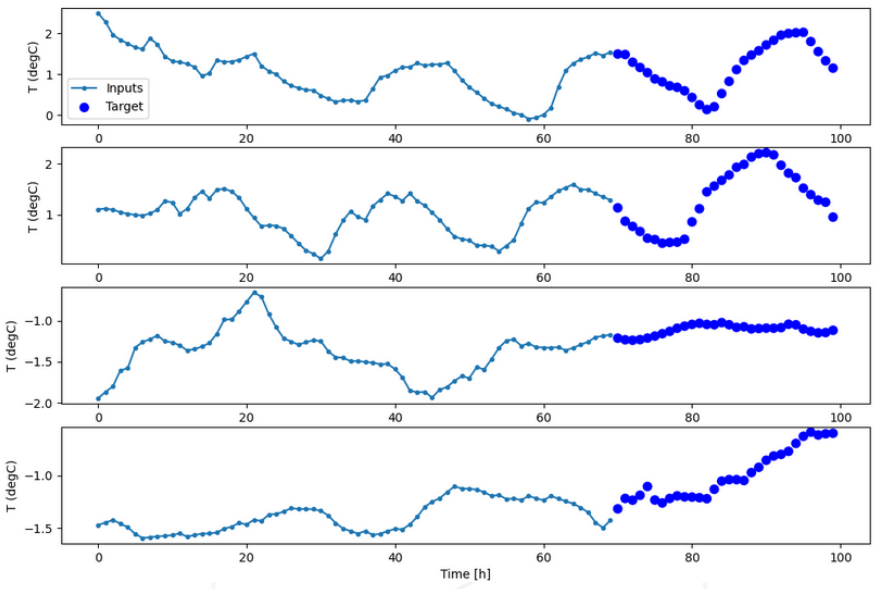

Wind Y [m/s]
Wind X [m/s]
6
4
2
0
−2
−4
−6
−8
−10.0
−7.5
−5.0
−2.5
0.0
2.5
5.0
7.5
400
350
300
250
200
150
100
50
0

Chapter V

Exercise 02

	Exercise 02
	Data Split
Turn-in directory : $ex02/$	
Files to turn in : `Advanced02.ipynb`	
Allowed functions : `All`	

You have to separate your climate.csv file into a training data set and a validation data set then display them.



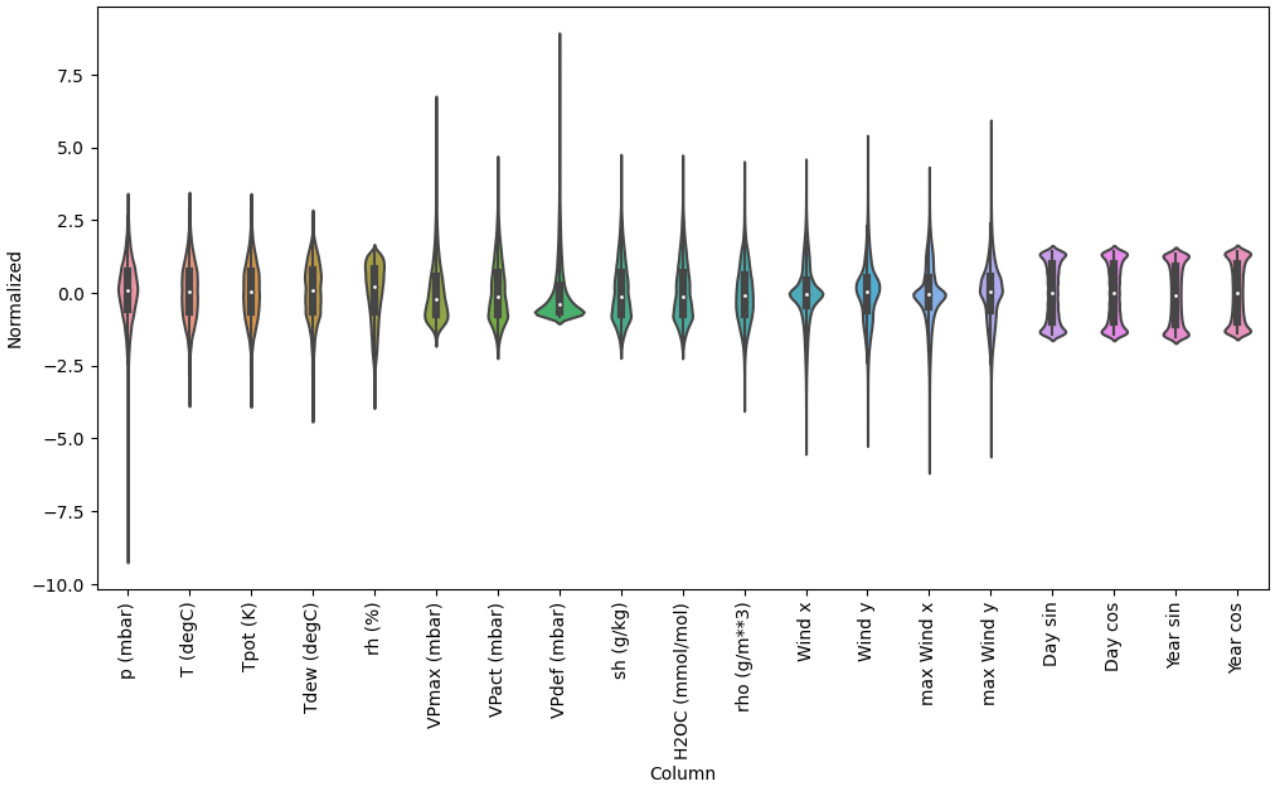
Be careful not to do this randomly, as it could break the time series.

Chapter VI

Exercise 03

	Exercise 03
	standardization
Turn-in directory : $ex03/$	
Files to turn in : `Advanced02.ipynb`	
Allowed functions : `All`	

Normalize the DataFrame and create a violin plot for visualization.

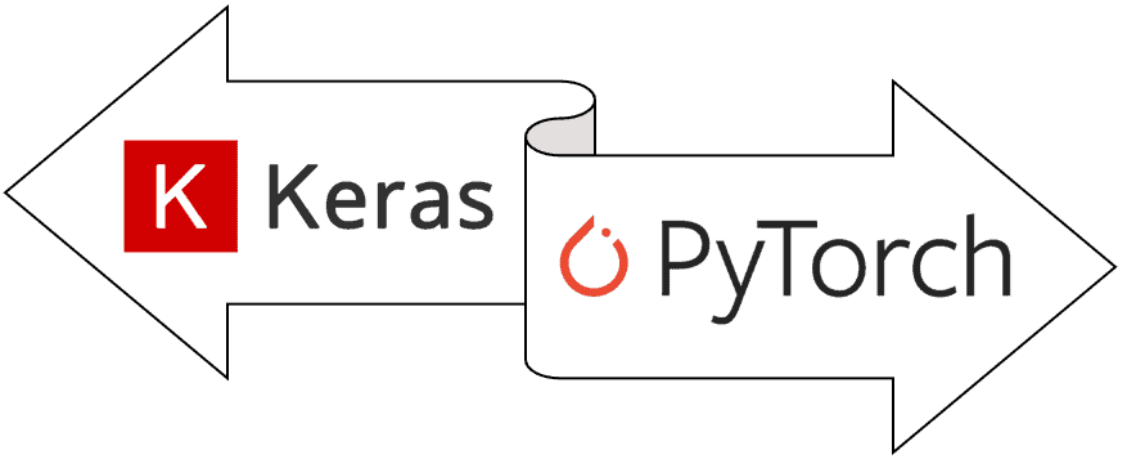


Chapter VII

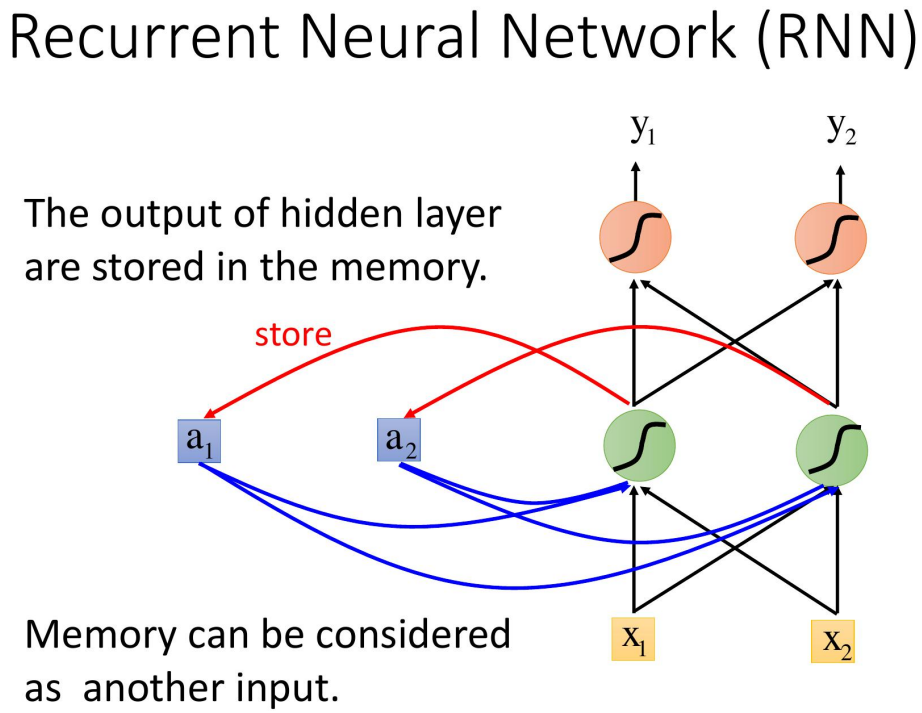
Exercise 04

	Exercise 04
	Models
Turn-in directory : *ex*04/	
Files to turn in : `Advanced02.ipynb`	
Allowed functions : `All`	

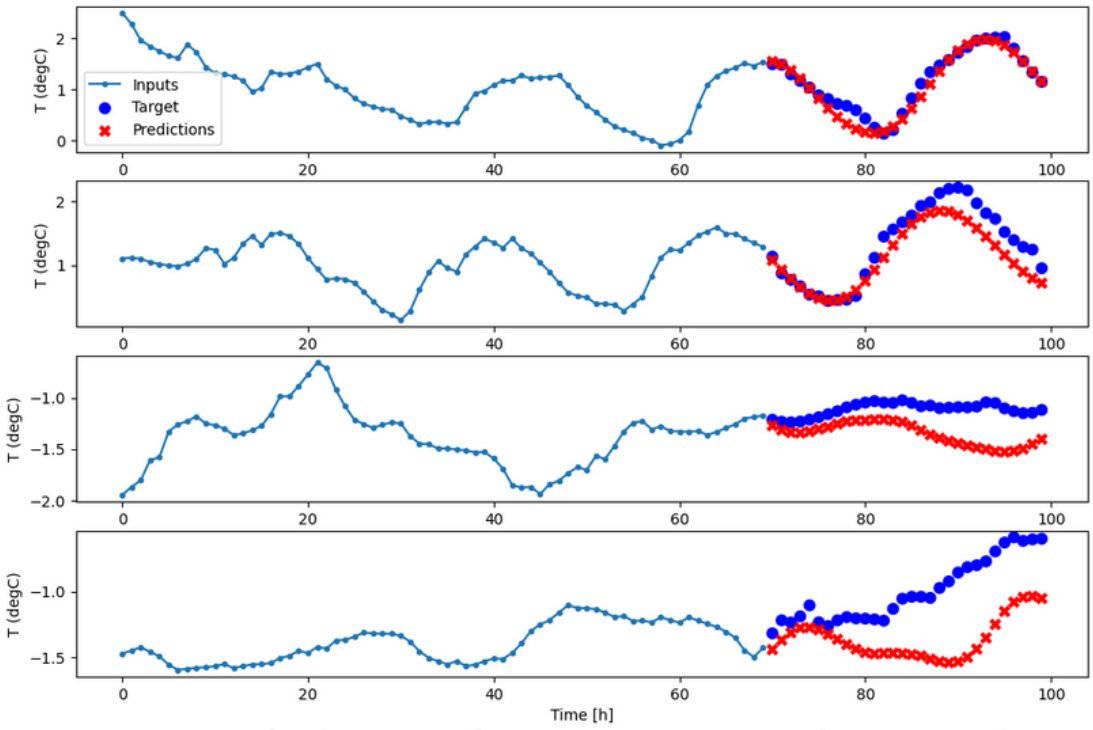
In this exercise, you will create a neural network using Keras or PyTorch (you can complete the exercise with both libraries if you want/have time; Keras is simpler for beginners).



Create your own neural network with the requested layers.



Display your predictions in relation to the target



Chapter VIII

Bonus part

If you have some time, you can try to validate this little bonus. It is not mandatory, so don't waste too much time doing it.

Denormalize the data to obtain an estimate of the current temperature.

The bonus part will only be assessed if the mandatory part is PERFECT. Perfect means the mandatory part has been integrally done and works without malfunctioning. If you have not passed ALL the mandatory requirements, your bonus part will not be evaluated at all.

Chapter IX

Submission and peer-evaluation

- Create a `professional_training_Advanced` folder at the root of your home, and move around in it.
- Create a new `module01` folder and navigate to it.

`Please note, during your defense anything that is not present in the folder for the day will not be checked.`