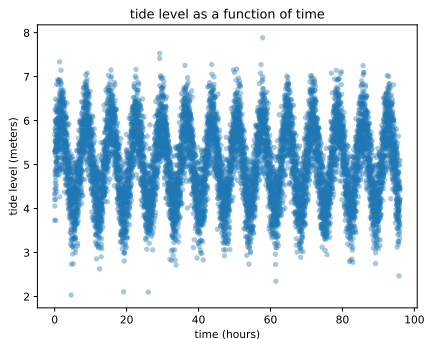


Machine learning I, supervised learning: nonlinear regression



Content

In this example, we will study a **time series** (série temporelle). The dataset contains the tide level (in meters) as a function of the time (in hours).



Tide Level

We have a dataset containing the tide level in meters as a function of time in hours.

Our goal will be to **predict** the tide level as a function of time.

Tide level

Exercice 1 : Finding a function

We would like to **model** the tide level as a function f of the time.

Tide level

Exercise 1 : Finding a function

We would like to **model** the tide level as a function f of the time.
What would you suggest ?

We could use a sine function. What would the **parameters** be ?

Tide level

Exercise 1 : Finding a function We would like to model the tide level as a function f of the time.

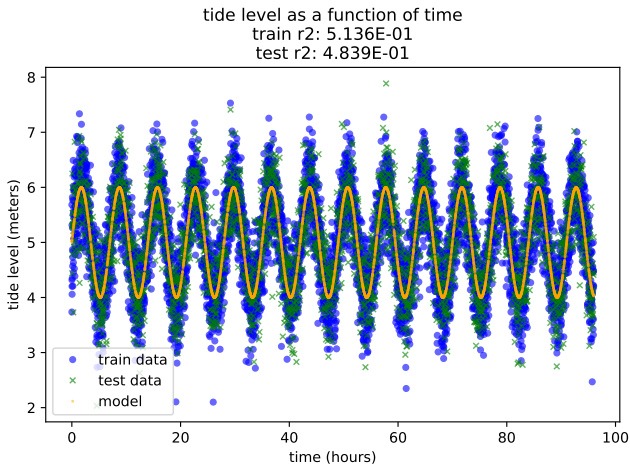
We could use a sine function. The parameters are :

- ▶ Amplitude
- ▶ pulsation (analog of frequency)
- ▶ phase
- ▶ offset

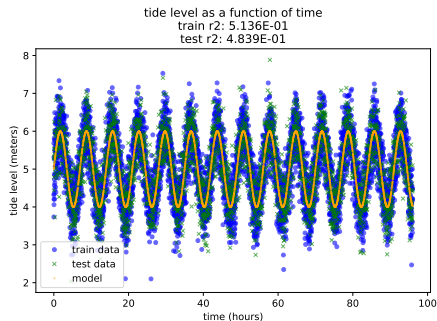
$$\tilde{f}(t) = A \sin(\omega t + \phi) + B \quad (1)$$

In `nonlinear_regression.py`, we have a file `main_learn_estimator.py` that learns a function of the previous form, based on the dataset.

Tide level



Tide level



The inaccuracy comes from the **variance** in the data, which comes from **random noise**, due to the existence of a large number of variables playing a role in the measurements. By constraining the function shape, we avoid overfitting.