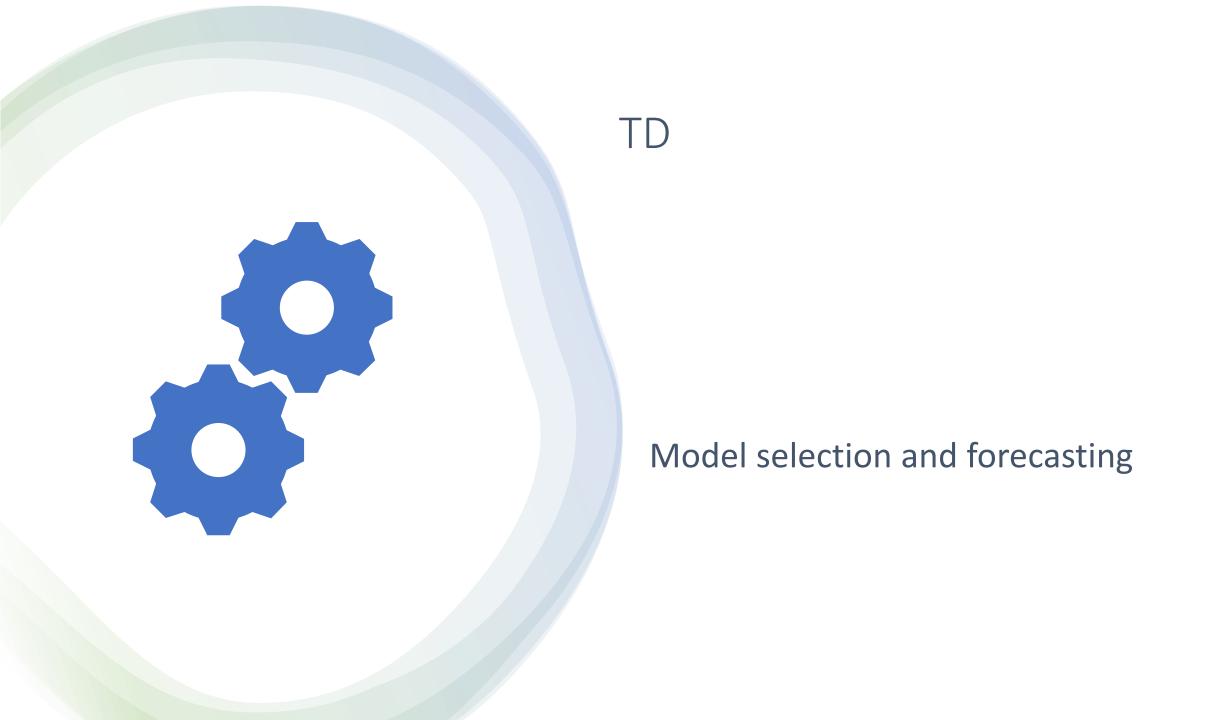


Time Series Management

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TS Analysis in Python

- SciPy
- NumPy;
- Matplotlib;
- Pandas;

statsmodels

https://www.statsmodels.org/stable/index.htmlhttps://github.com/statsmodels/statsmodels/)

```
modifier_ob.
  mirror object to mirror
mirror_mod.mirror_object
peration == "MIRROR_X":
__mod.use_x = True
urror_mod.use_y = False
irror_mod.use_z = False
 _operation == "MIRROR_Y"
irror_mod.use_x = False
lrror_mod.use_y = True
 "Irror_mod.use_z = False
  _operation == "MIRROR_Z"
  _rror_mod.use_x = False
  _rror_mod.use_y = False
 lrror_mod.use_z = True
 selection at the end -add
  ob.select= 1
  er ob.select=1
   ntext.scene.objects.action
   "Selected" + str(modified
   irror ob.select = 0
  bpy.context.selected_obj
   lata.objects[one.name].se
 int("please select exactle
  --- OPERATOR CLASSES ----
    vpes.Operator):
     X mirror to the selected
   ject.mirror_mirror_x"
  ext.active_object is not
```

ACF and PACF



Import the data in a Pandas DataFrame

- from pandas import read_excel
- series = read_excel([filename], sheet_name='MAdata',)

https://pandas.pydata.org/docs/reference/api/pandas.read_excel.html

ACF and PACF



Import functions to plot ACF and PACF

- from statsmodels.graphics.tsaplots import plot_acf, plot_pacf
- from statsmodels.tsa.tsatools import detrend
- plot_acf([series], title=", lags=xx)
- plot_pacf([series], title=", lags=xx)

https://www.statsmodels.org/stable/generated/statsmodels.graphics.tsaplots.plot_acf.html#statsmodels.graphics.tsaplots.plot_acf



Compute ARIMA MODEL

from statsmodels.tsa.arima.model import ARIMA. model = ARIMA([series], order=(p, d, q)),

where p, d, and q represent the parameters of the model

https://www.statsmodels.org/stable/generated/statsmodels.tsa.arima.model.ARIMA.html

https://www.statsmodels.org/stable/dev/generated/statsmodels.base.model.GenericLikelihoodModelResults.a ic.html#statsmodels.base.model.GenericLikelihoodModelResults.aic

TD - Consignes

- Givent the file priceData.xlsx
- Write a Python program to compute the ACF and PACF (test several lags) of the time series
 contained in priceData.xlsx. Pay attention to TS trend. Try to use the detrend function to remove
 TS trend (statsmodels.tsa.tsatools) What you can say? What is the difference compared to
 simple integration?
- Write a Python program to estimate and compute the best ARIMA model of the time series in priceData.xlsx, based on AIC criterion.
- Which kind of model is choosen (ARIMA orders) ?

You can write your solution directly in Colab. Here an example, where to start: https://colab.research.google.com/drive/182kwm9aT2Wn179Dil1nPMJ8qEEj0vLq4?usp=sharing

References

- Andrew V. Metcalfe, Paul S.P. Cowpertwait, Introductory Time Series with R (2009).
- Aileen Nielsen, Practical Time Series Analysis: Prediction with Statistics and Machine Learning (2019).
- Changquan Huang, Alla Petukhina, Applied Time Series Analysis and Forecasting with Python (2022)
- Peter J. Brockwell, Richard A. Davis, Introduction to Time Series and Forecasting (2022)