

# Capgemini test: forecasting water levels

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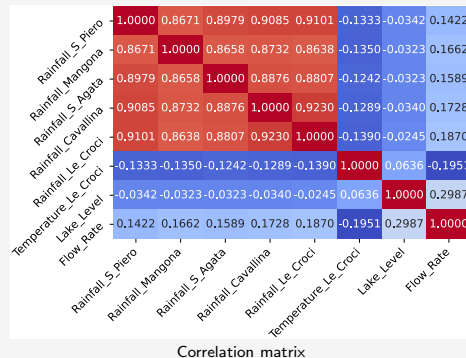
- 1 Software
- 2 Data set
- 3 Strategy
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# Software

- Written in Python and available on [GitHub](#)
- Used standard libraries:
  - Pandas
  - Seaborn
  - Statsmodels
- One class for the data set (with methods for plotting and split data into train/test)
- Some functions for the statistical models
- Everything is documented within the code (it should be Doxygen friendly as well)

# Data set

- Chosen *Lake\_Bilancino*
- Two target variables:
  - Lake level
  - Flow rate
- Most variables missing before 01/01/2004  
⇒ removed ( $\sim 8\%$  of the total)
- Missing data not replaced<sup>a</sup>

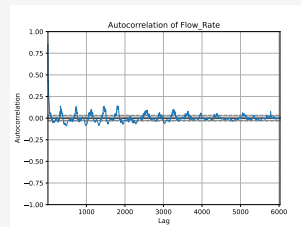


<sup>a</sup>Applied an interpolation only when computing the autocorrelation.

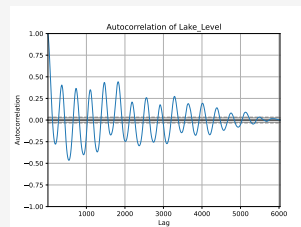
# Forecasting strategy

- 1 Simple AutoRegressive (AR) model
- 2 More complex AutoRegressive Integrated Moving Average (ARIMA) model
- 3 Multivariate analysis (not implemented)

Both models used in this project require to setup the lag.  
⇒ chosen from autocorrelation plots.



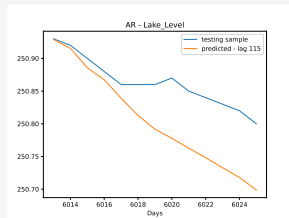
Flow rate - autocorrelation



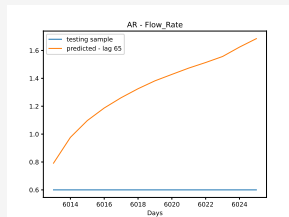
Lake level - autocorrelation

# Predictions - 13 samples

## AutoRegressive model

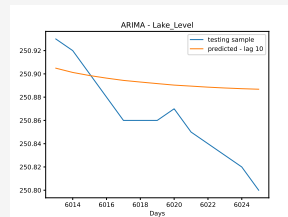


Lake level

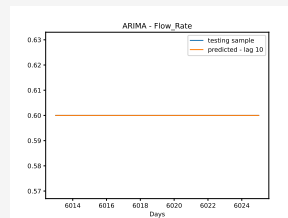


Flow rate

## ARIMA model



Lake level



Flow rate

# Conclusions

- Implemented a toy script to compute AR and ARIMA algorithms
- Both algorithms showed better performance on `Lake_level`
- The behavior of `Flow_rate` requires additional investigation  
Optimizing ARIMA's parameters might improve performance

Thank you for your attention