Time Series Analysis 2018
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Time-Series project

The goal of this project is to apply the tools presented in this lecture on a real data set. You will need to chose your own data set, from many different databases freely available on the web. Chose preferably something which is of interest to you. You have to make a proposal, which is due on **30th April 2018, before 10:30 AM**. After submitting the proposal, you can start working on the data set after acceptance by M. Wilhelm.

Proposal:

In the proposal you have to:

- Provide the data in a `.RData` file. The data should have sufficiently many observations (a few hundred is alright).
- Briefly describe the data, where it comes from and what are the objectives of your analysis.
- Specify the pair, if you work in pair.

Data analysis project:

The structure of the report should be:

- **Introduction**: Briefly describe the aims of your project give an overview of the report. Describe (briefly) the methods you have used to analyze the data.
- **Description**: Describe the data and the context in which it has been gathered and explain. Give some general references about the data.
- **Modelling/Analysis**: Describe your models carefully, give references, justify your choices. You can use the guidelines provided below.
- **Discussion**: Discuss your results, the strengths and the limitations of your own analysis.
- **Conclusion**: Conclude the report. Sketch further analyses that you could carry out if you would have more time.

The following points could be used as guidelines for your analysis:

1. Do you transform the data? If yes, give the transformation you used and explain this choice.
2. Does the series show a trend and a seasonality? If yes, describe how you model them. Check the plot of the residuals.
3. Comment the autocorrelation and the partial autocorrelation of the residual series obtained after removing the trend and seasonality.

4. Model the residuals with an appropriate model. If you consider different models, explain the strengths and weaknesses of each model.
5. Comment the diagnostic plots of the model(s) you chose. You can plot the standardized residuals, the normal qq-plot, the ACF and PACF of the residuals, and the p-value of the Box-Ljung tests for different lags to assess stationarity, independence and normality of the residuals.
6. By means of your model, make some predictions and give confidence intervals for the prediction. You can illustrate it by showing some plots.

Be careful of the details! Any graph or plot should have a caption and must be mentioned in the text. The bibliography is **very** important. Do not consider it as optional. Use correctly the commands of LaTeXto cite the references in the text.

Important remarks:

- The project counts for 20% of the final mark and is mandatory.
- The project can be done alone or in pairs and it will be marked disregarding the number of students having worked on it (one or two).
- The project is to be handed by **21st May 2018**.

Marking criteria:

- You have to respect the deadlines (including the deadline for the proposal).
- You have to show clearly explain the nature of the data. You also have to provide some references about the data (e.g. some reference book in meteorology if you consider rainfall).
- You have to write it correctly (spelling, grammar etc.). **You are allowed to write it either in french or in english**.
- The structure of the project should be clear. It must comply with the academic standards in terms of citation[1].
- The maximum grade can be obtained only in case of an original treatment of the data.
- The report must not exceed 10 pages, bibliography, table of contents and title excluded, but plots included.
- The report must written in LaTeX and be submitted in a blinded version. It must be sent by email to Matthieu Wilhelm, with copy to Clément Chevalier, with the file name on the format `name_surname.pdf`. **The author(s) name should not appear in the text itself.**
- Be careful of how to cite books, and article. The references must appear in the text and must be precise. Use Bibtex to make a good and correct bibliography. Every figure of the document must be mentioned and commented in the text. **See an example.**

[1] http://www2.unine.ch/files/content/shared/files/General/Plagiat/Declaration_honneur_ang.pdf