Project on Time Series

February 19, 2020

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DEPARTAMENTO
DE MATEMÁTICA
TÉCNICO LISBOA

- Assignment 1:
  The file "2014-2018 PM10 LisAvLib" contains a time series of **hourly-levels** of PM_{10} particles (in micrograms per cubic meter), collected at Avenida da Liberdade monitoring station in Lisbon from 01/01/2014 to 31/12/2018.

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1. Fit a SARIMA-type model to the time series representing **24-h average levels** of PM_{10} particles. Discuss your model fitting in a step-by-step fashion, presenting your (a) initial examination of the data, (b) transformations (if necessary) (c) initial identification of the dependence orders and degree of differencing, (d) parameter estimation, (e) residual diagnostics and model choice.
2. After deciding on an appropriate model, forecast the data into the future up to 5 time periods ahead and calculate 95% prediction intervals for each of the 5 forecasts.

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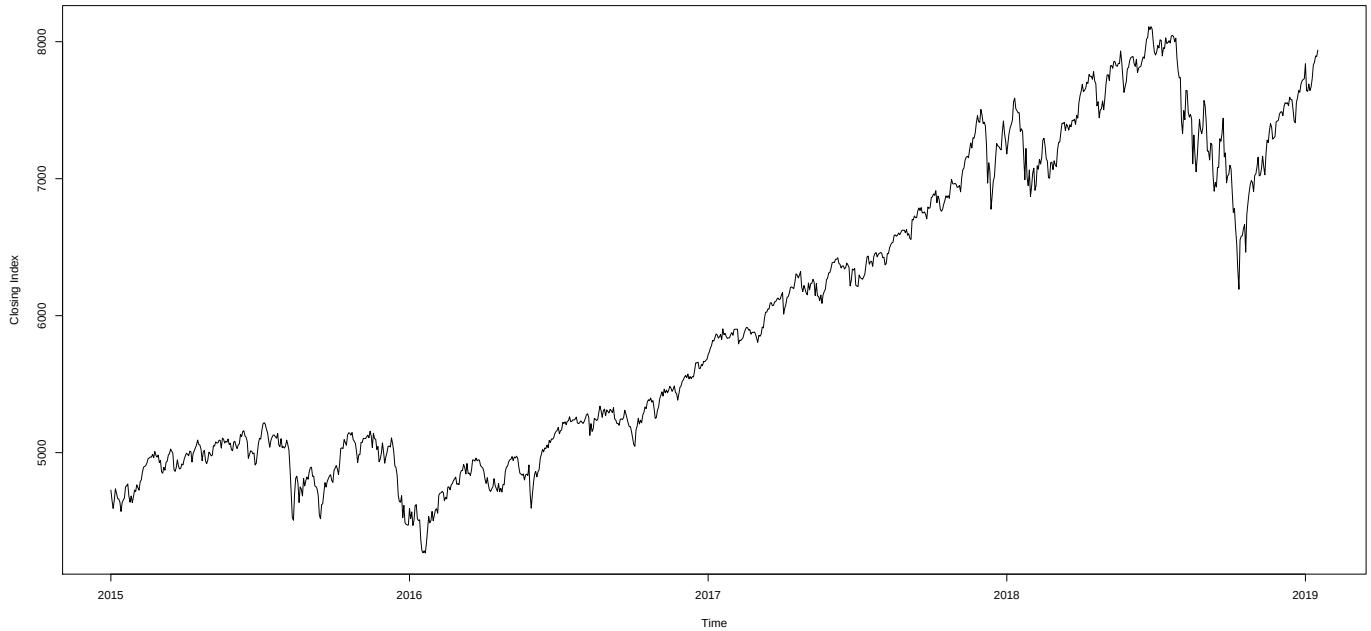
- Assignment 2:

  The file "2015-2019 Nasdaq.txt" contains the date, open, high, low, closing, adjusted close and volume values of the Nasdaq composite index from 02/01/2015 to 30/12/2019. The figure below displays the daily closing values of the Nasdaq composite index.



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1. Calculate the time series of log-returns associated to the daily closing values of the Nasdaq composite index.
2. Fit the best GARCH-type model to the time series of log-returns. Discuss your model fitting in a step-by-step fashion.