Ignasi Cos & Josep Vives
Facultat de Matemàtiques i Informàtica
Universitat de Barcelona

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State Space Practical

To start with, upload the bitcoin closing prices from 2023 (see the csv file attached next).

1. Plot the bitcoin closing prices and familiarize yourselves with its shape.

2. Fit AR models of orders 3 and/or 4 to this data, and assess the quality of the fit via the determination coefficient.

   a. How well does the model fit the data?

   b. Is there a real improvement when moving from order 3 to 4?

3. Repeat the same operation with ARMA Models, and again, assess the quality of the fit.

4. Design a system space model of the above bets fitting models (AR and ARMA) describing the trendline of this model in a step by step fashion. Proceed in a step-by-step fashion.

   a. What is a reasonable F State transition matrix?

   b. What is a reasonable H State transition matrix?

   c. What is the state covariance matrix?

   d. What is the process noise covariance matrix?

5. Plot the filter prediction of the price.