INDENG 250 Homework 1

Due on Monday 9/16/2024 11:59 pm

Submit your typed solution via bCourses - Assignment - HW1.

1 Problem 1 (10pt)

What is supply chain management?

2 Problem 2 (20pt)

Write out $D_t = \ldots$.

2.1 What's the model we assume for simple average model?

2.2 What's the model we assume for moving average model?

2.3 What's the model we assume for single exponential smoothing model?

2.4 What's the model we assume for double exponential smoothing model?

2.5 What's the model we assume for triple exponential smoothing model?

3 Problem 2 (70pt)

Setup a python environment on your local machine.

Read, understand, and run the codes provided in

- forcasting_expsmoothing.ipynb or
- forcasting_expsmoothing.py.

Once you are done, attach 5 plots generated by the code in your solution.

Notes:

- In the class we discuss 1-step-ahead forecast, and this example considers 36-step-ahead forecast. Basically, it plugs in the estimated coefficient $(\hat{I}, \hat{S}, \hat{c})$ to the model and derive the future estimations.
- You might need to install some packages by yourself, including pandas, matplotlib, sklearn statsmodels, ...
- You can choose any python IDEs per your reference, e.g., Jupyter (.jpynb), Spyder (.py), Pycharm (.py, .ipynb), Visual Studio, Sublime, IntelliJ, ... (Here is a good summary over python IDEs: https://realpython.com/python-ides-code-editors-guide/).

We will use python & Gurobi in the future, and this is a good practice for you to get started.

4 Problem 4 (optional, 10pt as bonus)

Recall the simple average approach on Page 12 in 2a lecture notes. Prove that simple average is the least square error minimizer of parameter I in $D_t = I + \epsilon_t$.