BIG DATA & ARTIFICIAL INTELLIGENCE

IN OPERATIONS MANAGEMENT

Session 2 (Forum)

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This week we have the first online forum in which we will practice with all the concepts we have seen so far.

Please **read this document carefully** as it contains all the information necessary to address the forum.

We will analyze **6 simulated time series and 1 real one** (Brent Dated daily spot prices and its corresponding returns). We will assume that the first five simulated series have annual granularity and the sixth simulated series, and the real one, have daily granularity.

We are going to analyze in all of them, firstly in a visual way, whether they are or not Covariance-Stationary (CS), White Noise (WN), Strict White Noise (SWN) or Gaussian White Noise (GWN), and will identify the transformations to be taken to achieve stationarity in the mean and in the variance. Also, we will discuss whether the data needs a linear model to predict the future mean and a nonlinear model to predict the future variance.

As stated before, we will use graphical tools and basic statistics to test whether the simulated and real time series data fulfil any of the processes listed above.

Additionally, we can find in the literature formal tests we will define during the session to check our hypotheses out. The most relevant tools will be introduced along the examples to check if our previous conclusions are the correct ones.

The time series to be analyzed can be found in the attached CSV files Session2sim.csv and Session2real.csv

We will follow the following format for the answers:

ORIGINAL DATA	
Stationary	YES/NO + WHY
Marginal Normal distribution	YES/NO + WHY
WN (uncorrelated)	YES/NO + WHY
SWN (independent)	YES/NO/DO NOT KNOW + WHY
GWN	YES/NO + WHY
Linear model (mean)	YES/NO + WHY
Nonlinear model (variance)	YES/NO + WHY
Transformations	YES/NO + WHY
TRANSFORMED DATA	Only if any transformation is taken
Stationary	IDEM
Marginal Normal distribution	IDEM
WN (uncorrelated)	IDEM
SWN (independent)	IDEM
GWN	IDEM
Linear model (mean)	IDEM
Nonlinear model (variance)	IDEM
Transformations	IDEM

ORGANIZATION OF THE DAYS

1. I have prepared a recording in which I explain step by step the first six time series. On the corresponding day for each series (see below), every student will ask all the questions necessary to clarify any doubts that may arise.
2. I will ask additional questions during the week, which can be answered individually by any of you.
3. Once all the concepts are understood, all groups will thoroughly analyze series 7 and submit a group solution, which I will review in detail. Please, use the format above.
4. Order in which we will analyze the seven time series

   a. On Monday we will analyze series 1 and 2.

   b. On Tuesday we will analyze series 3 and 4.

   c. On Wednesday we will analyze series 5 and 6.

   d. On Thursday we will analyze series 7 and summarize the conclusions.

I hope you enjoy this forum!!!!