UNIVERSITÀ
DEGLI STUDI DI MILANO-BICOCCA

SYLLABUS DEL CORSO

Statistica Economica M (blended)

2223-1-F8204B003

Learning objectives

The objective of this course is providing the students with the theory, methods and practice of unobserved component models (UCM). We will treat the foundamentals of prediction theory, the state space form and the related filtering and smoothing methods. The course is provided in "blended learning" with video-lessons and lessons in a computer lab. All the models are implemented in a computer lab using R with the package KFAS.

Contents

- Prediction theory
- Unobserved Component Models
- State space form
- Real world applications with R/KFAS

Detailed program

- Optimal predictor
- Optimal linear predictor
- Main components of UCM (trend, cycle, seasonal)
- Static regressors
- Dynamic regressors
- Regressors with time varying coefficients
- State space form
- ARIMA and UCM in state space form
- Kalman filter and maximum likelihood estimation

- State and disturbance smoothing
- Exercises and case studies using R/KFAS

Prerequisites

Foundamentals of time series analysis (stationary processes, integrated processes, ARIMA).

Foundamentals of R.

Teaching methods

The course is provided in "blended-learning": 50% of the course is in presence (in a computer lab), 50% is on-line through video-lessons, web-app, tests and exercises and question & answer forums.

Assessment methods

Written exam on the theory (1h) + practical exam using R (1h).

The result of each part concurs for 50% of the final grade.

The written part assesses the knowledge of the student in theoretical aspects of unobserved component models, the state space form and the filtering algorithms

For the practical part, the students are given a time series to analyse by unobserved component model techniques using R with the package KFAS.

Textbooks and Reading Materials

Pelagatti (2015) *Time Series Modelling with Unobserved Components*, Chapman and Hall/CRC (freely available under IP address of Bicocca)
Hyndman, R.J., & Athanasopoulos, G. (2018) Forecasting: principles and practice, 2nd edition, OTexts: Melbourne, Australia. OTexts.com/fpp2

Semester

Second half of second semester

Teaching language

Italian

Sustainable Development Goals