**PhD program in Statistics**
# DSS Statistics Seminar
# May 26, 2023, 12:00
**In person** **Room 34 (CU002 building, 4th floor)**
**Webinar** **https://uniroma1.zoom.us/j/86881977368?pwd=SWRFc VFjMDZTa0IXZk05TE1zNm5adz09**
**Passcode: 432940**

# Time series segmentation by non-homogeneous hidden semi-Markov models

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Motivated by classification issues in environmental studies, a class of hidden semi-Markov models is introduced to segment multivariate time series according to a finite number of latent regimes. The observed data are modelled by a mixture of multivariate densities, whose parameters evolve according to a latent multinomial process. The multinomial process is modelled as a semi-Markov chain where the time spent in a state and the chances of a regime-switching event are separately modeled by a battery of regression models that depend on time-varying covariates. Maximum likelihood parameter estimation is carried out by integrating an EM algorithm with a suitable data augmentation. While the proposal extends previous approaches that rely on mixtures models and hidden Markov models, it keeps a parsimonious structure that facilitates results interpretation. It is illustrated on a case study of a bivariate time series of wind and wave directions, observed by a buoy in the Adriatic sea.

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