Model-based clustering of time series data

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ABSTRACT

In the digital age, data streams have been produced at an increasing pace from different sources for instance from biometric devices (sensors) and stock market (high frequency) data to digital platforms (feeds, audio, video). This type of data, measured on one or more variables over time (or sequence), is called time series, panel, or more generally longitudinal data. Time-dependent modeling has been applied in many contexts not only forecasting, but also outlier detection, matching, clustering, indexing, etc. This talk discusses the use of finite mixture models in time series clustering. First, I present the overall finite mixture framework. Then, a second level of analysis is added to model sequences within each observation. An application to COVID time series data illustrates the main concepts. The talk concludes with a brief discussion in the context of cross-sectional, dynamic clustering, and biclustering with implications for density estimation, outlier detection, and measurement error modeling.

SPEAKER

José G. Dias is an associate professor at the Department of Quantitative Method for Management and Economics (DQMME), ISCTE Business School. He coordinates the Data Analytics Group within the BRU – Business Research Unit, the Specialization of Quantitative Methods Applied to Management of the PhD in Management (ISCTE-IUL), and is vice-Director of the Department (DQMME). He is a former President of CLAD - The Portuguese Association of Data Classification and Analysis. His main research interests are connected with the application of data science in Business and Management, namely latent variable and multilevel modeling. His research has been published in a variety of outlets, including: Applied Mathematics and Computation, Computational Statistics, European Journal of Finance, European Journal of Operational Research, Expert Systems with Applications, Journal of Business Research, PLoS ONE, and Statistics and Computing.