## Time Series Analysis and Forecasting using ARIMA models

ANA ATANASOVA<sup>\*</sup>, LIMONKA KOCEVA LAZAROVA<sup>†</sup>, PETRE LAMESKI<sup>‡</sup> \*Goce Delcev University, Faculty of computer science, Stip and University of Aveiro, Aveiro <sup>†</sup>Goce Delcev University, Faculty of computer science, Stip

<sup>‡</sup>Ss. Cyril and Methodius, Faculty of computer science and engineering, Skopje

Time series analysis represents a set of methods that enable the exploration, understanding, and prediction of sequential data.

The exploratory data analysis includes checking if there are some patterns in the data, such as having trends, seasonality, irregular fluctuations and if the series is stationary or not. Understanding the characteristics of the time series is crucial for selecting appropriate analytical approaches. The essential steps in the time series analysis are the data processing techniques which transform the data in a way that allows modelling algorithms to train better models and converge faster. In the paper some basic analytical models such as autocorrelation and decomposition are used. We also give an overview of popular forecasting techniques such as ARIMA models, seasonal decomposition models or exponential smoothing models. These methods capture the underlying patterns and relationships within the data, allowing for reliable forecasting and anomaly detection.

The broader applications of time series analysis across diverse fields, including finance, economics, weather forecasting, energy demand prediction, and healthcare are considered also. The ability to uncover temporal patterns and predict future trends empowers decision-makers, risk management, and operational planning.