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Vincent Lemaire · Simon Malinowski ·
Anthony Bagnall · Alexis Bondu ·
Thomas Guyet · Romain Tavenard (Eds.)

Advanced Analytics and Learning on Temporal Data

4th ECML PKDD Workshop, AALTD 2019
Würzburg, Germany, September 20, 2019
Revised Selected Papers

Lecture Notes in Artificial Intelligence

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Preface

Workshop Description

The European Conference on Machine Learning and Principles and Practice of Knowledge Discovery in Databases (ECML PKDD) is the premier European machine learning and data mining conference and builds upon over 17 years of successful events and conferences held across Europe. This year, ECML PKDD 2019, was held in Würzburg, Germany, during September 16–20. It was complemented by a workshop program, where each workshop was dedicated to specialized topics, to cross-cutting issues, and to upcoming trends. This stand-alone LNAI volume includes the selected papers of the Advanced Analytics and Learning on Temporal Data (AALTD 2019) Workshop.

Motivation - Temporal data are frequently encountered in a wide range of domains such as bio-informatics, medicine, finance, and engineering, among many others. They are naturally present in applications motion and vision analysis, or more emerging ones such as energy efficient building, smart cities, dynamic social media, or sensor networks. Contrary to static data, temporal data are of complex nature, they are generally noisy, of high dimensionality, they may be non stationary (i.e. first order statistics vary with time) and irregular (involving several time granularities), and they may have several invariant domain-dependent factors such as time delay, translation, scale, or tendency effects. These temporal peculiarities limit the majority of standard statistical models and machine learning approaches, that mainly assume i.i.d data, homoscedasticity, normality of residuals, etc. To tackle such challenging temporal data, one appeals for new advanced approaches at the bridge of statistics, time series analysis, signal processing, and machine learning. Defining new approaches that transcend boundaries between several domains to extract valuable information from temporal data is undeniably a hot topic in the for near future, that has been the subject of active research this last decade.

Workshop Topics - The aim of this fourth edition of the workshop, AALTD 2019¹, held in conjunction with ECML PKDD 2019, was to bring together researchers and experts in machine learning, data mining, pattern analysis, and statistics to share their challenging issues and advances in temporal data analysis. Analysis and learning from temporal data covers a wide scope of tasks including learning metrics, learning representations, unsupervised feature extraction, clustering, and classification.

The proposed workshop received papers that cover one or several of the following topics:

- Temporal Data Clustering
- Classification of Univariate and Multivariate Time Series
- Early Classification of Temporal Data

¹ <https://project.inria.fr/aaltd19/>.

- Deep Learning and Learning Representations for Temporal Data
- Modeling Temporal Dependencies
- Advanced Forecasting and Prediction Models
- Space-Temporal Statistical Analysis
- Functional Data Analysis Methods
- Temporal Data Streams
- Interpretable Time-Series Analysis Methods
- Dimensionality Reduction, Sparsity, Algorithmic Complexity, and Big Data Challenges
- Bio-Informatics, Medical, Energy Consumption, and Temporal Data

Outcomes - AALTD 2019 was structured as a full-day workshop. We encouraged submissions of regular papers that were up to 16 pages of unpublished work. All submitted papers were peer reviewed (double-blind) by two or three reviewers from the Program Committee, and selected on the basis of these reviews. AALTD 2019 received 31 submissions, among which 16 papers were accepted for inclusion in the proceedings. The papers with higher review ratings were selected for an oral presentation, and the others were given the opportunity to present a poster through a spotlight session and a discussion session. The workshop started with an invited talk “Time Series Classification at Scale”² given by Francois Petitjean from the Monash University, Australia.

We thank all organizers and reviewers for the time and effort invested. We would also like to express our gratitude to the members of the Program Committee. We also thank the ECML, the Organizing Committee (particularly Peggy and Kurt, the workshop and tutorial chairs), and the local staff who helped us. Sincere thanks are due to Springer for their help in publishing the proceedings. Lastly, we thank all participants and invited speaker of the ECML PKDD 2019 workshops for their contributions that made the workshop really interesting.

November 2019

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² <https://www.francois-petitjean.com/Research/Petitjean-AALTD2019.pdf>.

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