

Lecture Notes in Artificial Intelligence

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Advanced Analytics and Learning on Temporal Data


5th ECML PKDD Workshop, AALTD 2020
Ghent, Belgium, September 18, 2020
Revised Selected Papers

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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 18 years of successful events and conferences held across Europe. This year, ECML-PKDD 2020, was planned to take place in Ghent, Belgium, during September 14–18, 2020, but due to the COVID-19 pandemic it was held in the same time period as a fully virtual event. The main conference was complemented by a workshop program, where each workshop was dedicated to specialized topics, cross-cutting issues, and upcoming research trends. This standalone LNAI volume includes the selected papers of the 5th Workshop on Advanced Analytics and Learning on Temporal Data (AALTD) held at ECML-PKDD 2020.

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 emerging applications such as motion analysis, 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 (i.e. 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 and it has been the subject of active research this last decade.

Workshop Topics – The aim of the workshop series on AALTD¹ was to bring together researchers and experts in machine learning, data mining, pattern analysis, and statistics to share their challenging issues and advance 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.

¹ <https://project.inria.fr/aaltd20/>.

For this fourth edition, 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
- 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 Challenge
- Bio-Informatics, Medical, Energy Consumption, on Temporal Data

Outcomes – AALTD 2020 was structured as a full-day workshop. We encouraged submissions of regular papers that were up to 16 pages of previously 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 2020 received 29 submissions, among which 15 papers were accepted for inclusion in the proceedings. The papers with the highest review rating were selected for oral presentation, and the others were given the opportunity to present a poster through a spotlight session and a discussion session. The workshop had an invited talk “Scalable Machine Learning on Large Sequence Collections”² given by Professor Themis Palpanas of the French University Institute (IUF) and University of Paris, France.

We thank all organizers, reviewers, and authors for the time and effort invested to make this workshop a success. We would also like to express our gratitude to the members of the Program Committee. We thank the Organizing Committee of ECML-PKDD 2020 and the technical staff who helped us to make the virtual AALTD a successful workshop. Sincere thanks are due to Springer for their help in publishing the proceedings. Lastly, we thank all participants and speakers at AALTD 2020 for their contributions, their collective support has made the workshop a really interesting and successful event, even under the challenging circumstances of a global pandemic.

November 2020

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² <https://project.inria.fr/aaltd20/invited-speaker/>.

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