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Machine Learning and Knowledge Extraction

Third IFIP TC 5, TC 12, WG 8.4, WG 8.9, WG 12.9
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Proceedings

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Preface

The International Cross-Domain Conference for Machine Learning and Knowledge Extraction CD-MAKE, is a joint effort of IFIP TC 5, TC 12, IFIP WG 8.4, IFIP WG 8.9, and IFIP WG 12.9 and is held in conjunction with the International Conference on Availability, Reliability and Security (ARES). The third conference was organized at the University of Kent at Canterbury, UK. A few words about IFIP:

IFIP – the International Federation for Information Processing – is the leading multinational, non-governmental, apolitical organization in information and communications technologies and computer sciences, is recognized by the United Nations (UN), and was established in the year 1960 under the auspices of the UNESCO as an outcome of the first World Computer Congress held in Paris in 1959.

IFIP is incorporated in Austria by decree of the Austrian Foreign Ministry (20th September 1996, GZ 1055.170/120-I.2/96) granting IFIP the legal status of a non-governmental international organization under the Austrian Law on the Granting of Privileges to Non-Governmental International Organizations (Federal Law Gazette 1992/174).

IFIP brings together more than 3,500 scientists without boundaries from both academia and industry, organized in more than 100 Working Groups (WGs) and 13 Technical Committees (TCs).

CD stands for “cross-domain,” and means the integration and appraisal of different fields and application domains to provide an atmosphere to foster different perspectives and opinions. The conference fosters an integrative machine learning approach, taking into account the importance of data science and visualization for the algorithmic pipeline with a strong emphasis on privacy, data protection, safety, and security. It is dedicated to offering an international platform for novel ideas and a fresh look on methodologies to put crazy ideas into business for the benefit of humans. Serendipity is a desired effect and should lead to the cross-fertilize of methodologies and the transfer of algorithmic developments.

The acronym MAKE stands for “MACHINE Learning and Knowledge Extraction,” a field of Artificial Intelligence (AI) that, while quite old in its fundamentals, has just recently begun to thrive based on both novel developments in the algorithmic area and the availability of vast computing resources at a comparatively low cost.

Machine learning studies algorithms which can learn from data to gain knowledge from experience and to generate decisions and predictions. A grand goal is in understanding intelligence for the design and development of algorithms that work autonomously (ideally without a human-in-the-loop) and can improve their learning behavior over time. The challenge is to discover relevant structural and/or temporal patterns (“knowledge”) in data, which is often hidden in arbitrarily high dimensional spaces, and thus simply not accessible to humans. Knowledge extraction is one of the oldest fields in AI and sees a renaissance, particularly in the combination of statistical methods with classical ontological approaches. AI currently undergoes a kind of

Cambrian explosion and is the fastest growing field in computer science today thanks to the usable successes in machine learning. There are many application domains, e.g., in medicine, etc. with many use cases from our daily lives, e.g., recommender systems, speech recognition, autonomous driving, etc. The grand challenges lie in sense-making, in context understanding, and in decision-making under uncertainty. Our real world is full of uncertainties and probabilistic inference had an enormous influence on AI generally and machine learning specifically. Inverse probability allows to infer unknowns, to learn from data, and to make predictions to support decision-making. Whether in social networks, recommender systems, health applications or industrial applications, the increasingly complex data sets require a joint interdisciplinary effort, bringing the human-in-control to foster ethical and social issues, accountability, retractability, explainability, causability and privacy, as well as safety and security.

To acknowledge all those who contributed to the efforts and stimulating discussions is not possible in a preface with limited space like this one. Many people contributed to the development of this volume, either directly or indirectly, and it is impossible to list all of them here. We herewith thank all local, national and international colleagues, and friends for their positive and supportive encouragement. Finally, yet importantly, we thank the Springer management team and the Springer production team for their professional support.

Thank you to all! Let's MAKE it!

August 2019

Andreas Holzinger
Peter Kieseberg
A Min Tjoa
Edgar Weippl

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International Cross-Domain Conference for Machine Learning and Knowledge Extraction (CD-MAKE 2019)

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