Lecture Notes in Computer Science 13100

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Reasoning Web

Declarative Artificial Intelligence

17th International Summer School 2021
Leuven, Belgium, September 8–15, 2021
Tutorial Lectures

Springer

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ISSN 0302-9743 ISSN 1611-3349 (electronic)
Lecture Notes in Computer Science
ISBN 978-3-030-95480-2 ISBN 978-3-030-95481-9 (eBook)
https://doi.org/10.1007/978-3-030-95481-9

LNCS Sublibrary: SL3 – Information Systems and Applications, incl. Internet/Web, and HCI

This Springer imprint is published by the registered company Springer Nature Switzerland AG
The registered company address is: Gewerbestrasse 11, 6330 Cham, Switzerland

Preface

The Reasoning Web (RW) series of annual summer schools has become the prime educational event in reasoning techniques on the Web. Since its initiation in 2005 by the European Network of Excellence (REWERSE), RW has attracted both young and established researchers. As with the previous edition of RW, this year's school was part of Declarative AI (https://declarativeai2021.net), which brought together the 5th International Joint Conference on Rules and Reasoning (RuleML+RR 2021), DecisionCAMP 2021, and the 17th Reasoning Web Summer School (RW 2021). As a result of the COVID-19 pandemic, Declarative AI 2021 was held as an online event.

This year's school covered various aspects of ontological reasoning and related issues of particular interest to Semantic Web and Linked Data applications. The invitations to teach at the summer school as well as to submit lectures for publication were carefully vetted by the Scientific Advisory Board, consisting of six renowned experts of the area. The following eight lectures were presented during the school (further details can be found at https://declarativeai2021.net/reasoning-web):

1. Foundations of graph path query languages
   by Diego Figueira (CNRS, France)
2. On combining ontologies and rules
   by Matthias Knorr (Universidade Nova de Lisboa, Portugal)
3. Modelling symbolic knowledge using neural representations
   by Steven Schockaert and Victor G. Basulto (Cardiff University, UK)
4. Mining the Semantic Web with machine learning: main issues that need to be known
   by Claudia d'Amato (University of Bari, Italy)
5. Belief revision and ontology repair
   by Renata Wassermann (University of São Paulo, Brazil)
6. Temporal ASP: from logical foundations to practical use with telingo
   by Pedro Cabalar (University of A Coruña, Spain)
7. SHACL: from data validation to schema reasoning for RDF graphs
   by Paolo Pareti (University of Winchester, UK)
8. Explanations in data management and classification in machine learning via counterfactual interventions specified by answer-set programs
   by Leopoldo Bertossi (Adolfo Ibáñez University, Chile)

The present volume contains lecture notes complementing most of the above lectures. They are meant as accompanying material for the students of the summer school in order to deepen their understanding and serve as a reference for further detailed study. All articles are of high quality and have been peer-reviewed by members of the Scientific Advisory Board as well as additional reviewers.

We want to thank everybody who helped make this event possible. Since teaching is the main focus of a summer school, we first thank all the lecturers; their hard work and

commitment ensured a successful event. We are also thankful to all members of the Scientific Advisory Board; their timely feedback concerning the technical program and submitted lecture notes helped us organize a high-quality event. Finally, we want to express our gratitude to the organizers of Declarative AI 2021 and those of the previous edition of RW for their constant support. The work of Mantas Šimkus was supported by the Vienna Business Agency and the Austrian Science Fund (FWF) projects P30360 and P30873.

October 2021

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Contents