

# Preface

Collecting, processing, and analyzing data became important branches of computer science. Many areas of our existence generate a wealth of information that must be stored in a structured manner and processed appropriately in order to gain the knowledge from the inside. Databases have become a ubiquitous way of collecting and storing data. They are used to hold data describing many areas of human life and activity, and as a consequence, they are also present in almost every IT system. Today's databases have to face the problem of data proliferation and growing variety. More efficient methods for data processing are needed more than ever. New areas of interests that deliver data require innovative algorithms for data analysis.

Beyond Databases, Architectures and Structures (BDAS) is a series of conferences that intends to give the state of the art of the research that satisfies the needs of modern, widely understood database systems, architectures, models, structures, and algorithms focused on processing various types of data. The aim of the conference is to reflect the most recent developments of databases and allied techniques used for solving problems in a variety of areas related to database systems, or even go one step forward – beyond the horizon of existing databases, architectures, and data structures. The 11th International BDAS Scientific Conference was a continuation of the highly successful BDAS conference series started in 2005 in Ustroń, Poland. For many years BDAS has been attracting hundreds or even thousands of researchers and professionals working in the field of databases. Among attendees of our conference were scientists and representatives of IT companies. Several editions of BDAS were supported by our commercial, world-renowned partners, developing solutions for the database domain, such as IBM, Microsoft, Sybase, Oracle, and others. BDAS annual meetings have become an arena for exchanging information on the widely understood database systems and data processing algorithms.

BDAS 2015 was the 11th edition of the conference, organized under the technical cosponsorship of the IEEE Poland Section. We also continued our successful cooperation with Springer, which resulted in the publication of this book. The conference attracted more than a hundred participants from 15 countries, who made this conference a successful and memorable event. There were five keynote talks given by leading scientists: Prof. Bora İ. Kumova from Department of Computer Engineering, İzmir Institute of Technology (İYTE), İzmir, Turkey spoke on 'Fuzzy syllogistic reasoning over relational data.' Prof. Dirk Labudde from Bioinformatics group Mittweida (bigM) and Forensic Science Investigation Lab (FoSIL), University of Applied Sciences, Mittweida, Germany gave an excellent talk entitled 'Bioinformatics and Forensics - How today's Life Science technologies can shape the Crime Sciences of tomorrow.' Prof. Jean-Charles Lamirel from SYNALP team, LORIA, France gave a very enlightening speech on 'New metrics and related statistical approaches for efficient mining in very large and highly multidimensional databases,' Prof. Mikhail Moshkov from King Abdullah University for Science and Technology (KAUST), Saudi Arabia honored us with

a presentation on ‘Extensions of dynamic programming for design and analysis of decision trees,’ and Dr. Riccardo Rasconi from Institute of Cognitive Science and Technology, National Research Council, Rome, Italy spoke on ‘Surveying the versatility of constraint-based large neighborhood search for scheduling problems.’ The keynote speeches and plenary sessions gained insight into new areas.

BDAS is focused on all aspects of databases. It is intended to have a broad scope, including different kinds of data acquisition, processing, and storing, and this book reflects fairly well the large span of research presented at BDAS 2015. This volume consists of 53 carefully selected papers. The first three papers accompany the stunning keynote talks. The remainder of the papers are assigned to eight thematic groups:

- Database architectures and performance
- Data integration, storage, and data warehousing
- Ontologies and Semantic Web
- Artificial intelligence, data mining, and knowledge discovery
- Image analysis and multimedia mining
- Spatial data analysis
- Database systems development
- Applications of database systems

The first group is related to various database architectures, query optimization, and database performance. Papers gathered in this group discuss hot topics of query selectivity estimation, testing performance of various database systems, NoSQL and data consistency, temporal and probabilistic databases. The next group of papers concern issues related to data integration, data storage, and data warehousing. The group consists of seven papers presenting research devoted to the data mapping semantics while sharing and exchanging data, novel data integration architectures, efficiency of storage space configuration, new ETL concepts, and data warehouse modeling.

The third group consists of three papers devoted to ontologies and the Semantic Web. These papers discuss problems of automatic approaches for building ontology from relational data, data integration with ontology, and RDF graph partitioning. The research devoted to artificial intelligence and data mining is presented in eight papers gathered in the fourth group. These papers show a wide spectrum of applications of various exploration methods, like decision rules, knowledge-based systems, clustering, artificial immune systems and memetic algorithms, Dynamic Gaussian Bayesian Network models, to solve many real problems.

The next group of papers is focused on image analysis and multimedia mining. This group consists of six papers devoted to lossless compression of images, querying multimedia databases, real-time object detection from depth images, analysis of facial expressions, emotions, and medical images.

Some aspects of the spatial data collecting and processing are discussed in three successive papers. The next three papers show various aspects of database systems development. Finally, the last 10 papers present different usage of databases starting from mining and metallurgical industries, through different fuel and energy consumption related problems and ERP systems, ending with bioinformatics knowledgebase and databases storing affect-annotated data and faces.

We would like to thank all Program Committee members and additional reviewers for their effort in reviewing the papers. Special thanks to Piotr Kuźniacki - builder and for ten years administrator of our website [www.bdas.pl](http://www.bdas.pl). The conference organization would not have been possible without the technical staff: Dorota Huget and Jacek Pietraszuk.

We hope that the broad scope of topics related to databases covered in this proceedings volume will help the reader to understand that databases have become an important element of nearly every branch of computer science.

April 2015

Stanisław Kozielski  
Dariusz Mrozek  
Paweł Kasprowski  
Bożena Małysiak-Mrozek  
Daniel Kostrzewa

Beyond Databases, Architectures and Structures  
11th International Conference, BDAS 2015, Ustroń,  
Poland, May 26-29, 2015, Proceedings  
Kozielski, S.; Mrozek, D.; Kasprowski, P.;  
Malysiak-Mrozek, B.; Kostrzewa, D. (Eds.)  
2015, XVIII, 612 p. 184 illus., Softcover  
ISBN: 978-3-319-18421-0