

Publishing Innovations: Peer Review and Linked Open Data for conference proceedings

Aliaksandr Birukou, Executive Editor
Computer Science

1 June 2017, Frankfurt



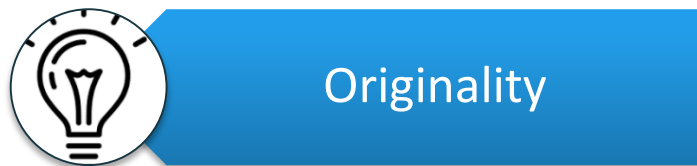
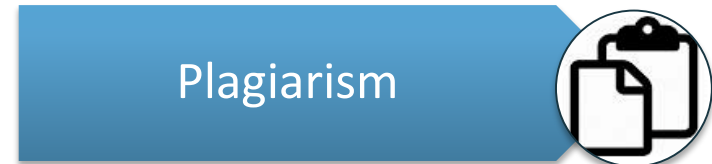
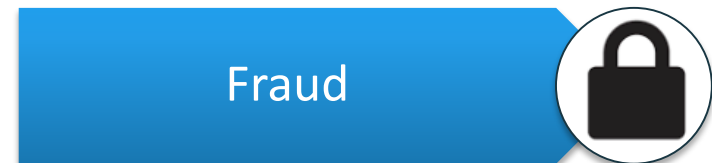
Outline

- Innovations in peer review
- The role of conferences and the linked open data (LOD) conference portal
- Applications of conference data
- Smart Topic Miner – semi-automated classification of conference proceedings

Peer review

1

Peer review is still the best way to determine:

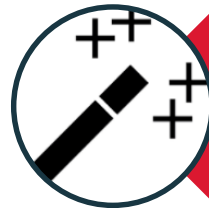


Benefits for all stakeholders



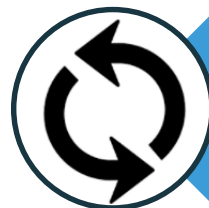
For Editor

- Decide *what* to publish and *where*



For Author

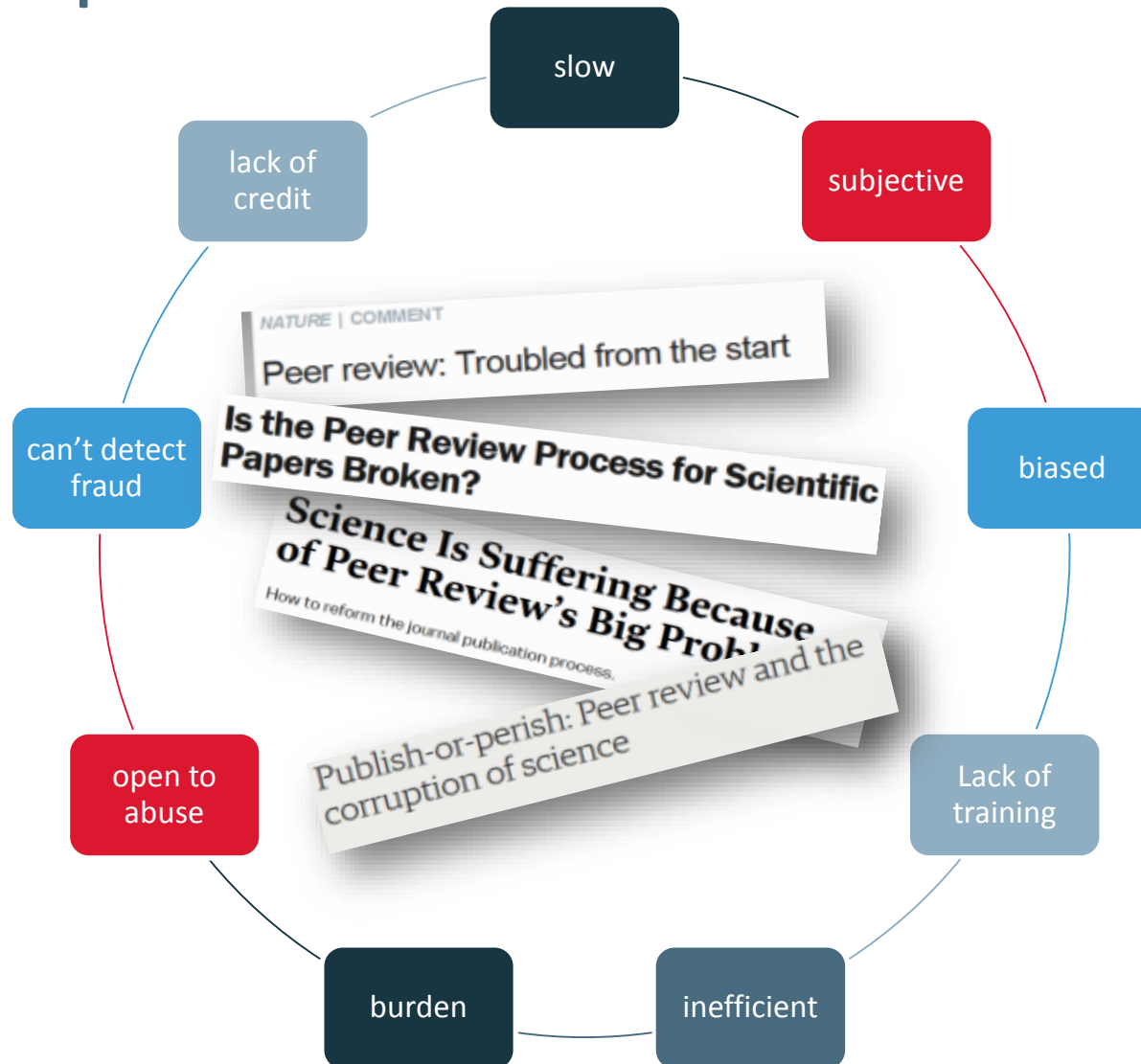
- Improves manuscript



For Peer Reviewer

- Be up to date, reputation, collaboration, “give back”

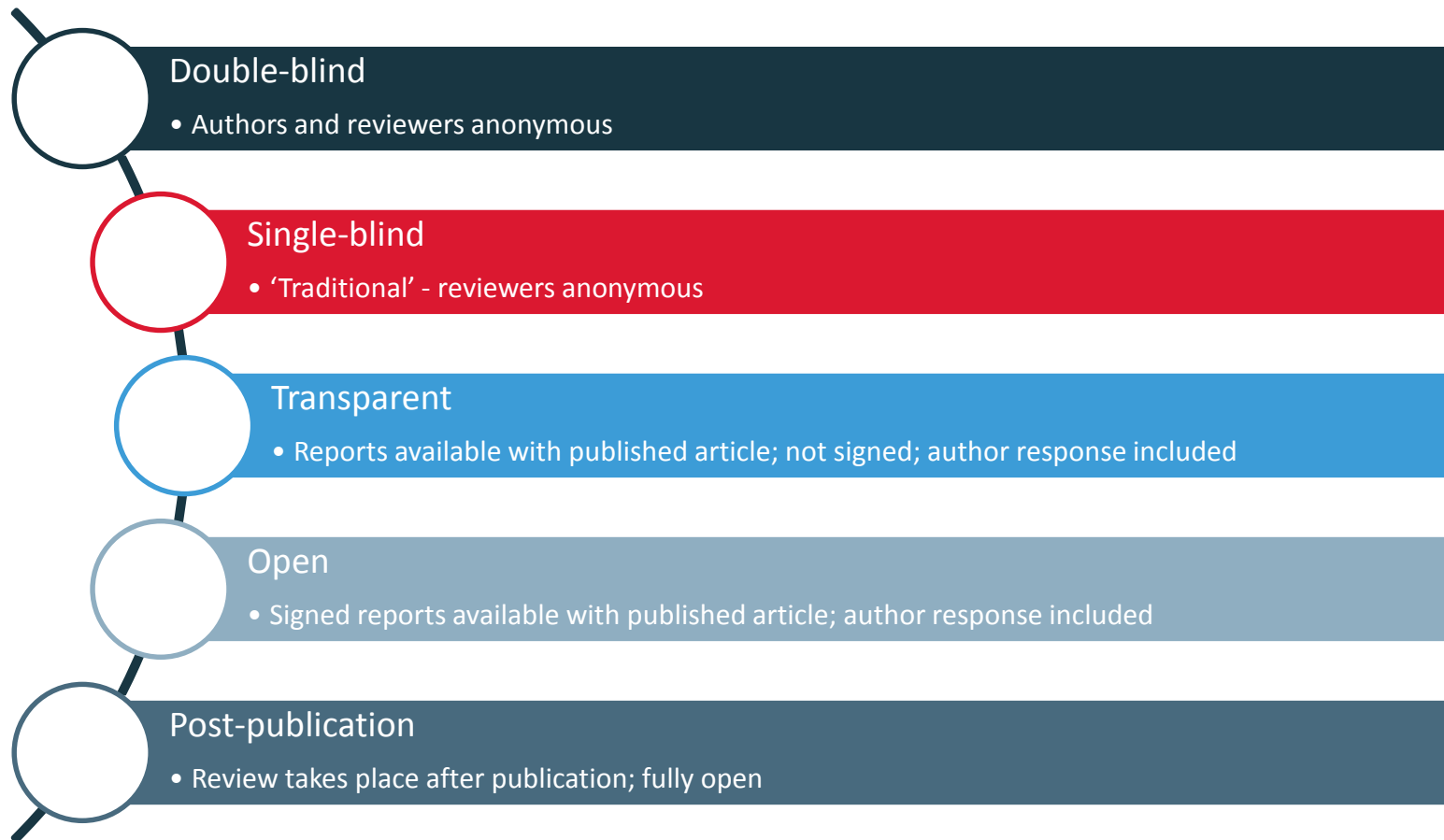
But it is not perfect..



How we are addressing these issues



Development in peer review models





[PEERE New frontiers of peer review](#) is a [COST Action](#) running from 12/05/2014 to 11/05/2018. It includes 30 countries and more than 80 participants (see the [Management Committee](#) page)



NEWS

STSMS

PUBLICATIONS

EVENTS

PHOTOS

VIDEOS

NEW FRONTIERS OF PEER REVIEW

BY CATEGORY
NEWS



PHILIPPE RAVAUD

PHILIPPE RAVAUD (UNIVERSITÉ PARIS DESCARTES) WILL GIVE A

BY CATEGORY
EVENTS



ATHENS

WORKSHOP ON "NEW MODELS OF PEER REVIEW", ATHENS, 16-18

BY CATEGORY
PHOTOGALLERY



ICCSS 2015

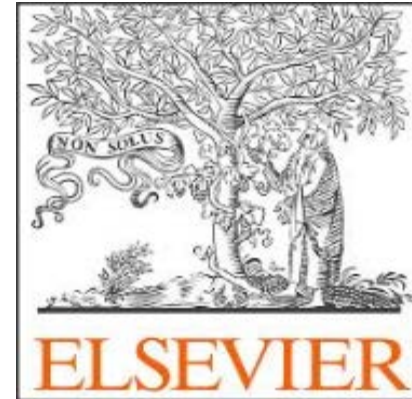
FLAMINIO SQUAZZONI PRESENTING PEERE AT

Analysis of peer review

- Three publishers involved
- A lot of researchers from: economics, CS, social simulations, cognitive sciences, medicine, ...
- Main goal – improve efficiency, transparency and accountability of peer review through a trans-disciplinary, cross-sectorial collaboration

HOW:

- large-scale analysis of peer review practices. Various disciplines and several publishers
- evaluate implications of different models of peer review and to explore new incentive structures to improve collaboration
- define collaboratively a joint research agenda that points to an evidence-based peer review reform



PUBLISHED: 23 MARCH 2017

Science publishers partner with a COST Action to share data and improve peer review

Press release

Elsevier, Springer Nature and Wiley have agreed on a protocol that enables peer review data sharing in a journal sample.



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Conferences and Linked Open Data portal

2

Role of conference proceedings in CS

- Computer science publishes a significant portion of its research outputs as conference proceedings
 - conference papers constitute 20-70% of references in journals
- More reviewers, faster publication
- Acceptance rate for top conferences is often 8-15%
- Higher visibility and greater impact – direct contact with your peers

Main publishers



Looking closer at LNCS

Celebrating 10,000 manuscripts

#LNCSMilestone



928,043
authors



314,549
papers



33,496
volume editors



2,097
conference series

Lecture Notes in Computer Science (LNCS)

Video: A trip through LNCS' history



Association for
Computing Machinery

Advancing Computing as a Science & Profession

ACM HONORS INTERNATIONAL LEADERS WHO HELPED ADVANCE
COMPUTER SCIENCE IN THE DIGITAL AGE

Recipients Contributed to Research Dissemination, ACM Infrastructure, and Curriculum
Changes

Gerhard Goos of Karlsruhe Institute of Technology, **Juris Hartmanis** of Cornell University, and **Jan van Leeuwen** of Utrecht University, recipients of the [ACM Distinguished Service Award](#) for their definitive role in establishing computer science as a vibrant subject. Their stewardship as series editors of the Springer Lecture Notes in Computer Science (LNCS), published since 1973, launched this series into a highly visible platform for disseminating research results from all areas of the nascent computing field. At a time when researchers often worked in isolation, they provided a widely read forum for exploring new areas, enabling dissemination of ideas, and offering initial exposure to young researchers.

Video: A trip through LNCS' history




Google Scholar citation ranking – IF for proceedings?

The screenshot shows the Google Scholar interface. At the top left is the Google Scholar logo. To its right is a search bar with a magnifying glass icon and a 'Search Scholar' button. Below the search bar, on the left, is a list of subject categories with a dropdown arrow next to 'English'. The 'Data Mining & Analysis' category is highlighted in red. To the right of the categories, the text 'Top publications - Data Mining & Analysis' is displayed with a 'Learn more' link. Below this is a table with three columns: 'Publication', 'h5-index', and 'h5-median'. The table lists 15 publications, with the top three being conference proceedings.

Publication	h5-index	h5-median
1. ACM SIGKDD International Conference on Knowledge discovery and data mining	67	98
2. IEEE Transactions on Knowledge and Data Engineering	66	111
3. ACM International Conference on Web Search and Data Mining	58	94
4. IEEE International Conference on Data Mining (ICDM)	39	64
5. Knowledge and Information Systems	38	52
6. ACM Transactions on Intelligent Systems and Technology (TIST)	37	68
7. ACM Conference on Recommender Systems	35	64
8. SIAM International Conference on Data Mining (SDM)	35	54
9. Data Mining and Knowledge Discovery	33	57
10. Wiley Interdisciplinary Reviews: Data Mining and Knowledge Discovery	30	56
11. European Conference on Machine Learning and Knowledge Discovery in Databases	30	36
12. Social Network Analysis and Mining	26	37
13. ACM Transactions on Knowledge Discovery from Data (TKDD)	23	39
14. International Conference on Artificial Intelligence and Statistics	23	29
15. Pacific-Asia Conference on Knowledge Discovery and Data Mining (PAKDD)	22	30

Acronyms are not unique

 dblp.uni-trier.de/db/conf/?prefix=Ee

- EELC - Emergence and Evolution of Linguistic Communication
- EEMMAS - Engineering Environment-Mediated Multi-Agent Systems
- EESSMod @ MoDELS - Experiences and Empirical Studies in Software Modeling
- EEWC - Enterprise Engineering Working Conference
- EEXTT - Efficiency and Effectiveness of XML Tools and Techniques

- EFDBS @ CAiSE - Engineering Federated Database Systems
- Efficiency and Effectiveness of XML Tools and Techniques (EEXTT)
- EFIS/EFDBS - Engineering Federated Information (Database) Systems
- EFTS @ FSE - Engineering Fault Tolerant Systems

- EG-ICE - Intelligent Computing in Engineering and Architecture
- EGC - European Grid Conference
- EGC - Extraction et Gestion des Connaissances
- EGC - Spanish Meeting on Computational Geometry
- EGCDMAS - Electronic Government and Commerce: Design, Modeling, Analysis and Security

Machines cannot read these!

LNCS - Forthcoming Proceedings 2013/2014 - © Springer - 25th November, 2013 - Page 2 of 15

January 2014

5 events

04-07	Coimbatore, Tamil Nadu, India	ICDCI 2014
08-10	Dublin, Ireland	MM 2014
13-15	Kolkata, India	ICAA 2014
20-21	San Diego, CA, USA	PADL 2014
25-30	Nový Smokovec, Hrubý Tatras, Slovakia	SOFSEM 2014

February 2014

9 events

06-09	Bhubaneswar, India	ICDCIT 2014
13-15	Chennai, India	WALCOM 2014
16-21	Gainesville, FL, USA	LION 8/2014
17-19	Camford, UK	EWSN 2014
24-26	Muscat, Oman	ICIS 2014
24-26	San Diego, CA, USA	TCC 2014
24-28	San Francisco, CA, USA	CT-RSA 2014 (E)
25-28	Lübeck, Germany	ARCS 2014
26-28	Munich, Germany	ESSoS 2014

LNCS - Conference Acronym Index 1973–2013 - Springer-Verlag Heidelberg - 25th November, 2013 - Page 1 of 89

LNCS - Conference Acronym Index

3

3DPH

3D Physiological Human Workshop
2009 LNCS 5903 Online Version available

A

AAAI Fall Symposium Series WS

AAAI (American Association for Artificial Intelligence) Fall Symposium Series Workshop
1995 LNAI 1458 Online Version available

AAAI-WS

National Conference on Artificial Intelligence Workshop
1995 LNAI 1458 Online Version available

AACC

Asian Applied Computing Conference
2004 LNCS 3285 Online Version available

AADEBUG

International Workshop on Automated and Algorithmic Debugging
1993 LNCS 749 Online Version available

AAECC

Int. Conference/Symposium on Applied Algebra, Algebraic Algorithms, and Error-Correcting Codes
2009 LNCS 5527 Online Version available
2007 LNCS 4851 Online Version available
2006 LNCS 3857 Online Version available
2003 LNCS 2643 Online Version available
2001 LNCS 2227 Online Version available

AA-WS

International Conference on Autonomous Agents and Workshops
2000 LNAI 2246 Online Version available
2000 LNAI 1887 Online Version available

AB

Algebraic Biology
2008 LNCS 5147 Online Version available
2007 LNCS 4520 Online Version available

ABIALS

Anticipatory Behavior in Adaptive Learning Systems
2006 LNAI 5499 Online Version available
2006 LNAI 4520 Online Version available

Abstract Data Types

Workshop on the Specification of Abstract Data Types
1995 LNCS 1130 Online Version available
1994 LNCS 906 Online Version available
1992 LNCS 785 Online Version available
1991 LNCS 525 Online Version available
1990 LNCS 332 Online Version available
1987 LNCS 332 Online Version available

ABZ

International Conference on Abstract State Machines, B and Z
2012 LNCS 7316 Online Version available
2010 LNCS 5977 Online Version available
2008 LNCS 5238 Online Version available

AC

Agent Communication
2013 LNAI 8027 Online Version available
2011 LNCS 7218 Online Version available
2005 LNAI 3859 Online Version available
2004 LNAI 3396 Online Version available

Unique Conference Series ID – ORCID for conferences

Vitaliy Yakovyna · Heinrich C. Mayr
Mykola Nikitchenko · Grygoriy Zholtkevych
Aleksander Spivakovsky · Sotiris Batsakis (Eds.)

Communications in Computer and Information Science 594

Information and Communication
Technologies in Education,
Research, and Industrial Applications

11th International Conference, ICTERI 2015
Lviv, Ukraine, May 14–16, 2015
Revised Selected Papers



Edit Conference

Conference Acronym:

Conference Series Name:

DBLP:

Conference City:

Conference Country:

Conference State:

Conference Year:

Conference Start Date:

Conference End Date:

Conference Number:

Conference Id:

Validation Messages:

SPRINGER NATURE

Publishing

Search

Help

Conference Series

Search

Unique and persistent ConfSeriesID

Conference Series ID	Conference Acronym	DBLP	Conference Series Name
icteri	ICTERI	icteri	International Conference on Information and Communication Technologies in Education,



More info about the LOD portal – 25.04.2017

9,749 proceedings volumes

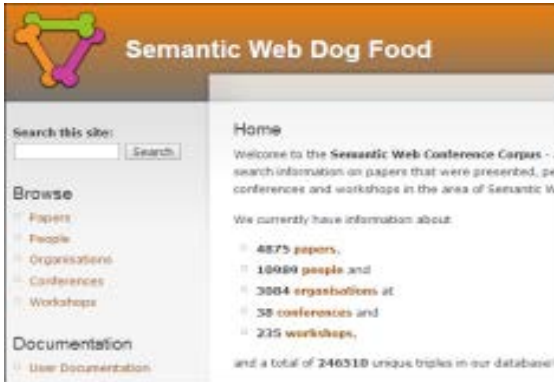
48
2001-now



8,702 conferences
1973-now



15,000
2003-2013



11th Extended Semantic Web Conference
10th Extended Semantic Web Conference
...

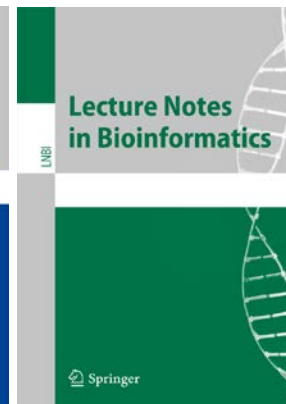
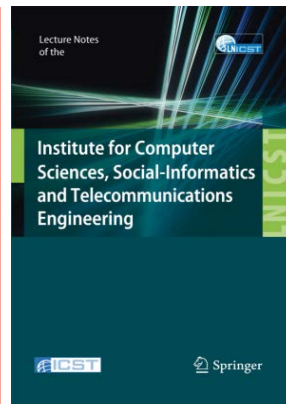
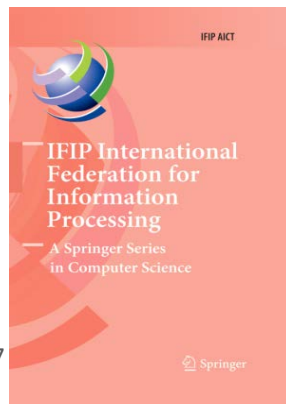
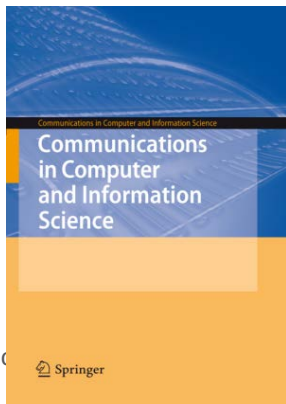


1,566 conference series

Extended Semantic Web Conference
International Semantic Web Conference
...

Published in:

since late 2016: not only CS!



LOD Portal

International Semantic Web Conference

URI: <http://lod.springer.com/data/confseries/semweb>

Property	Value
Conference series name	• International Semantic Web Conference (en)
Has DBLP ID	• < http://dblp.uni-leipzig.de/dblp/conf/semweb/ >
Type	• Conference series

Scopus

Indexed in Scopus

The Semantic Web – ISWC 2014

URI: <http://lod.springer.com/data/procvolume/978-3-319-11963-2>

Property	Value
Proceedings volume EISBN	• 978-3-319-11964-9 (rdfs:literal)
Proceedings volume ISBN	• 978-3-319-11963-2 (rdfs:literal)
Book DOI	• 10.1007/978-3-319-11964-9 (en)
Book series acronym	• LNCS (rdfs:literal)
Has conference	• < http://lod.springer.com/data/conference/semweb2014 >
Available at	• < http://link.springer.com/978-3-319-11963-2 >
Is indexed by Scopus	• true (xsd:boolean)
Scopus search date	• 2015-10-30T10:11 (xsd:dateTime)
Proceedings volume subtitle	• 13th International Semantic Web Conference, Riva del Garda, Italy, October 19-23, 2014. Proceedings, Part I (en)
Proceedings volume title	• The Semantic Web – ISWC 2014 (en)
Type	• Proceedings volume
Proceedings volume number	• 8796 (xsd:integer)

Each resource is identified via a **Persistent URI** (resolves to the resource and remains valid over years)

Provides useful info, understandable for machines using open standards (RDF and SPARQL)

Can be linked to other resources in the LOD cloud (DBLP, ACM, IEEE)

Provided by LOD Portal
<http://lod.springer.com/data/rdf/conference/semweb2014>

URI: <http://lod.springer.com/data/rdf/conference/semweb2014>

New feature: chapters (papers) and books

The Semantic Web – ISWC 2014

URI: <http://lod.springer.com/data/book/978-3-319-11915-1>

Property	Value
eISBN	<ul style="list-style-type: none"> 978-3-319-11915-1 (rdfs:literal)
ISBN	<ul style="list-style-type: none"> 978-3-319-11914-4 (rdfs:literal)
Conference Series Electronic ISSN	<ul style="list-style-type: none"> 1611-3349 (en)

is Book of

<http://lod.springer.com/data/bookchapter/978-3-319-11915-1_1>

<http://lod.springer.com/data/bookchapter/978-3-319-11915-1_10>

<http://lod.springer.com/data/bookchapter/978-3-319-11915-1_11>

Effective Computation of Maximal Sound Approximations of Description Logic Ontologies

URI: http://lod.springer.com/data/bookchapter/978-3-319-11915-1_11

Property	Value
Abstract Rights	<ul style="list-style-type: none"> OpenAccess (en)
Authors	<ul style="list-style-type: none"> Marco Console; Jose Mora; Riccardo Rosati; Valerio Santarelli; Fabio Savo (en)
Bibliography Rights	<ul style="list-style-type: none"> Restricted (en)
Body HTML Rights	<ul style="list-style-type: none"> Restricted (en)
Body PDF Rights	<ul style="list-style-type: none"> Restricted (en)
DOI	<ul style="list-style-type: none"> 10.1007/978-3-319-11915-1_11
Book	<ul style="list-style-type: none"> <http://lod.springer.com/data/book/978-3-319-11915-1>
Copyright Holder	<ul style="list-style-type: none"> Springer International Publishing Switzerland (xsd:integer)
Copyright year	<ul style="list-style-type: none"> 2014 (xsd:integer)
ESM Rights	<ul style="list-style-type: none"> Restricted (en)
First page	<ul style="list-style-type: none"> 164 (xsd:integer)
Last page	<ul style="list-style-type: none"> 179 (xsd:integer)
Metadata Rights	<ul style="list-style-type: none"> OpenAccess (en)
Title	<ul style="list-style-type: none"> Effective Computation of Maximal Sound Approximations of Description Logic Ontologies (en)
Type	<ul style="list-style-type: none"> Book chapter

Main principles

- High-quality data provided directly by the publisher, integral part of existing workflows
- Uniqueness and persistence of conference ID is guaranteed by design
- The data is open – provided under CC0 1.0 (Public Domain dedication)
 - researchers are welcome to analyze, link to, etc.
- Providing conference info as Linked Data, as a part of the Web of Data enables:
 - easier access for indexing services, libraries, conf. management systems, research evaluation agencies
- SpringerNature is the first publisher providing metadata about conferences in a structured way

**Can we make science more
accessible and transparent?**

What's next?

CrossRef starts a working group on conference and project IDs

- Scope of the group:
 - (1) Unique Conference IDs
 - (2) Metadata on peer review process
 - (3) machine-processable data about PCs?



Home > Blog > Taking the "con" out of conferences

🕒 5 minute read.

Taking the "con" out of conferences



[Geoffrey Bilder](#) – 2017 February 15
In [DOIs](#), [Identifiers](#)

TL;DR

Crossref and DataCite are forming a working group to explore conference identifiers and project identifiers. If you are interested in joining this working group *and* in doing some actual work for it, please contact us at community@crossref.org and include the text `conference identifiers WG` in the subject heading.

Using LOD about conferences

3

Indexing in Scopus, EI COMPENDEX, Clarivate Analytics CPCI

Euro-Par 2015: Parallel Processing

URI of this Resource Map: <http://lod.springer.com/data/book/978-3-662-48096-0>

ELSEVIER

Indexed in Scopus

Indexed in Compendex

Euro-Par 2015: Parallel Processing

URI: <http://lod.springer.com/data/book/978-3-662-48096-0>

Property	Value
eISBN	• 978-3-662-48096-0 (rdfs:literal)
ISBN	• 978-3-662-48095-3 (rdfs:literal)
Conference Series Electronic ISSN	• 1611-3349 (en)
Conference Series Print ISSN	• 0302-9743 (en)
DOI	• 10.1007/978-3-662-48096-0 (en)
Book series acronym	• LNCS (rdfs:literal)
Compendex search date	• 2016-11-27T08:34 (xsd:dateTime)
Copyright year	• 2015 (xsd:gYear)
Editors	• Jesper Larsson Träff; Sascha Hunold; Fra...
Available at	• < http://link.springer.com/978-3-662-48096-0 >
Is indexed by Compendex	• true (xsd:boolean)
Is indexed by Scopus	• true (xsd:boolean)
Proceedings of	• < http://lod.springer.com/data/conference/ >
Scopus search date	• 2015-10-30T10:14 (xsd:dateTime)
Subtitle	• 21st International Conference on Parallel Proceedings (en)
Title	• Euro-Par 2015: Parallel Processing (en)
Type	• Book
Volume number	• 9233 (rdfs:literal)

Advances in Cryptology – ASIACRYPT 2016

URI of this Resource Map: <http://lod.springer.com/data/book/978-3-662-53890-6>

ELSEVIER

Not indexed in Scopus

Not indexed in Compendex

Not checked yet in WOS LAMR

Advances in Cryptology – ASIACRYPT 2016

URI: <http://lod.springer.com/data/book/978-3-662-53890-6>

Property	Value
eISBN	• 978-3-662-53890-6 (rdfs:literal)
ISBN	• 978-3-662-53889-0 (rdfs:literal)
Conference Series Electronic ISSN	• 1611-3349 (en)
Conference Series Print ISSN	• 0302-9743 (en)
DOI	• 10.1007/978-3-662-53890-6 (en)
Book series acronym	• LNCS (rdfs:literal)
Compendex search date	• 2016-12-31T08:32 (xsd:dateTime)
Copyright year	• 2016 (xsd:gYear)
Editors	• Jung Hee Cheon; Tsuyoshi Takagi (en)
Available at	• < http://link.springer.com/978-3-662-53889-0 >
Is indexed by Compendex	• false (xsd:boolean)
Is indexed by Scopus	• false (xsd:boolean)
Proceedings of	• < http://lod.springer.com/data/conference/asiacrypt2016/ >
Scopus search date	• 2017-01-05T08:35 (xsd:dateTime)
Subtitle	• 22nd International Conference on the Theory and Application of Cryptology and Information Security, Hanoi, Vietnam, December 4-8, 2016, Proceedings, Part II (en)
Title	• Advances in Cryptology – ASIACRYPT 2016 (en)
Type	• Book
Volume number	• 10032 (rdfs:literal)

Changes in Scopus coverage

25 April 2017

86% indexed

30 November 2015

69% indexed

22 February 2016

80% indexed

Statistics

We have 1313 conference series

We have 7686 conferences

We have 8590 proceedings volumes

Scopus indexed: 5982 ([download as CSV](#))

Scopus not indexed: 2608 ([download as CSV](#))

Powered by [Pubby](#). Best viewed with a [CSS3](#) capable browser.

Statistics

We have 1349 conference series

We have 7854 conferences

We have 8782 proceedings volumes

Scopus indexed: 7005 ([download as CSV](#))

Scopus not indexed: 1777 ([download as CSV](#))

Google Scholar and SpringerLink use our data

<https://link.springer.com/conference/eccv>

ECCV
European Conference on Computer Vision

Search within this conference

2016

ECCV 2016
8-16 October Amsterdam

Computer Vision – ECCV 2016

Computer Vision – ECCV 2016

2014

ECCV 2014
6-12 September Zurich, S

Computer Vision – ECCV 2014

Computer Vision - ECCV 2014 Workshops

147 Papers

3 Volumes

Google Scholar

Search Scholar

Top publications - Data Mining & Analysis [Learn more](#)

Publication	h5-index	h5-median
1. ACM SIGKDD International Conference on Knowledge discovery and data mining	67	98
2. IEEE Transactions on Knowledge and Data Engineering	66	111
3. ACM International Conference on Web Search and Data Mining	58	94
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5. Knowledge and Information Systems	38	52
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13. ACM Transactions on Knowledge Discovery from Data (TKDD)	23	39
14. International Conference on Artificial Intelligence and Statistics	23	29
15. Pacific-Asia Conference on Knowledge Discovery and Data Mining (PAKDD)	22	30


English

- Business, Economics & Management
- Chemical & Material Sciences
- Engineering & Computer Science
 - Data Mining & Analysis
- Health & Medical Sciences
- Humanities, Literature & Arts
- Life Sciences & Earth Sciences
- Physics & Mathematics
- Social Sciences
- Chinese
- Portuguese
- Spanish
- German
- Russian

SPRINGER NATURE

SpringerLink proceedings pages

Springer Link Search



Computer Vision
14th European Conference, Amster...

Editors ([view affiliations](#))
Bastian Leibe, Jiri Matas, Nicu Sebe, M...

Conference proceedings
ECCV 2016
DOI: 10.1007/978-3-319-46448-0

Part of the [Lecture Notes in Computer Science](#) book series (LNCS, volume 9912)

[Table of contents \(51 papers\)](#)

page of 3 ▶

Front Matter
Pages I-XXIX

Detection, Recognition and Tracking

Front Matter
Pages 1-1

[CNN Image Retrieval Learning from Hard Examples](#)
Filip Radenović, Giorgos Tolias, Christos S. Gkanas, Christos S. Gkanas
Pages 3-20

[ECCV: European Conference on Computer Vision](#)

Computer Vision – ECCV 2016
14th European Conference, Amsterdam, The Netherlands, October 11–14, 2016

Editors ([view affiliations](#))
Bastian Leibe, Jiri Matas, Nicu Sebe, Max Welling

Conference proceedings

27

112

2.6k

269k

Citations Mentions Readers Downloads

ECCV 2016
DOI: 10.1007/978-3-319-46448-0

Part of the [Lecture Notes in Computer Science](#) book series (LNCS, volume 9912)

[Table of contents \(51 papers\)](#) [Other volumes](#) [About these proceedings](#)

1. [Computer Vision – ECCV 2016](#)
14th European Conference, Amsterdam, The Netherlands, October 11–14, 2016
2. [Computer Vision – ECCV 2016](#)
14th European Conference, Amsterdam, The Netherlands, October 11–14, 2016
3. [Computer Vision – ECCV 2016](#)
14th European Conference, Amsterdam, The Netherlands, October 11–14, 2016
4. [Computer Vision – ECCV 2016](#)
14th European Conference, Amsterdam, The Netherlands, October 11–14, 2016
5. [Computer Vision – ECCV 2016](#)
14th European Conference, Amsterdam, The Netherlands, October 11–14, 2016
6. [Computer Vision – ECCV 2016](#)
14th European Conference, Amsterdam, The Netherlands, October 11–14, 2016
7. [Computer Vision – ECCV 2016](#)
14th European Conference, Amsterdam, The Netherlands, October 11–14, 2016, Proceedings, Part VII

[Table of contents \(51 papers\)](#) [Other volumes](#) [About these proceedings](#)

Introduction

The eight-volume set comprising LNCS volumes 9905–9912 constitutes the refereed proceedings of the 14th European Conference on Computer Vision, ECCV 2016, held in Amsterdam, The Netherlands, in October 2016.

The 415 revised papers presented were carefully reviewed and selected from 1480 submissions. The papers cover all aspects of computer vision and pattern recognition such as 3D computer vision; computational photography, sensing and display; face and gesture; low-level vision and image processing; motion and tracking; optimization methods; physics-based vision; photometry and shape-from-X; recognition: detection, categorization, indexing, matching; segmentation, grouping and shape representation; statistical methods and learning; video: events, activities and surveillance; applications. They are organized in topical sections on detection, recognition and retrieval; scene understanding; optimization; image and video processing; learning; action, activity and tracking; 3D; and 9 poster sessions.

Keywords

computational photography image classification particle swarm optimization
pattern mining semantic clustering 3D action detection autonomous driving
background subtraction compression artifacts reduction computer aided diagnosis
deep neural networks face recognition hierarchical modeling natural language
neural networks social media statistical modeling stereo vision video processing

Editors and affiliations

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Bibliographic information

Copyright Information Springer International Publishing AG 2016	Publisher Name Springer, Cham	eBook Packages Computer Science
Print ISBN 978-3-319-46447-3	Online ISBN 978-3-319-46448-0	Series Print ISSN 0302-9743
Series Online ISSN 1611-3349		

Conference paper on SpringerLink



European Conference on Computer Vision
ECCV 2016: Computer Vision – ECCV 2016 pp 3-20

CNN Image Retrieval Learns from BoW: Unsupervised Fine-Tuning with Hard Examples

Authors [Authors and affiliations](#)

Filip Radenović , Giorgos Tolias, Ondřej Chum

Conference paper

First Online: 17 September 2016

DOI: 10.1007/978-3-319-46448-0_1

Part of the [Lecture Notes in Computer Science](#) book series (LNCS, volume 9905)

Cite this paper as:

Radenović F., Tolias G., Chum O. (2016) CNN Image Retrieval Learns from BoW: Unsupervised Fine-Tuning with Hard Examples. In: Leibe B., Matas J., Sebe N., Welling M. (eds) Computer Vision – ECCV 2016. ECCV 2016 Computer Science, vol 9905. Springer, Cham

Abstract

Convolutional Neural Networks (CNNs) achieve state-of-the-art performance on many computer vision tasks. However, this achievement is preceded by extreme manual effort in order to perform either training from scratch or fine-tuning for the target task. In this paper, we propose to fine-tune CNN for image retrieval from a large collection of unlabeled images in a fully automated manner. We employ state-of-the-art retrieval and Structure from Motion (SfM) methods to obtain 3D models, which are used to guide the selection of training examples for CNN fine-tuning. We show that both hard positive and hard negative examples are necessary for final performance in particular object retrieval with compact codes.

Keywords

CNN fine-tuning Unsupervised learning Image retrieval

1 Introduction

Image retrieval has received a lot of attention since the advent of invariant local features, such

Figure 6 shows some qualitative results. We have chosen five frames that best represent the object density differences in the dataset. The last two frames correspond with the maximal error produced by our CCNN model. In the supplementary material, we provide videos with all the qualitative results.

Table 3.

MAE comparison of our Hydra 2s and Hydra 3s models trained without perspective information in the UCSD dataset.

Method	'maximal'	'downscale'	'upscale'	'minimal'
Hydra 2s	2.22	1.93	1.37	2.38
Hydra 3s	2.17	2.99	1.44	1.92



We now proceed to analyze the results obtained by the Hydra CNN models in this benchmark. Even though this dataset offers images of a fixed scene, providing its perspective map, where the objects appear at similar scales, we have decided to conduct this extra experiment with the Hydra CNN approach, to evaluate its performance with the state-of-the-art models. Table 3 shows the MAE results for our Hydra with two and three heads. Recall that we do not use the

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Abstract

1 Introduction

2 Related Work

3 Deep Learning to Count ...

4 Experiments

5 Conclusions

Acknowledgements

Supplementary material

References

Copyright information

About this paper

Smart Topic Miner – semi-automated classification of conference proceedings

4



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Osborne, F., Salatino, A., Birukou, A. and Motta, E.: Automatic Classification of Springer Nature Proceedings with Smart Topic Miner. In *International Semantic Web Conference* (pp. 383-399). Springer International Publishing. (2016)



Classifying Scholarly publications

It is a crucial task to enable **scholars, students, companies** and other stakeholders to discover and access this knowledge.

Traditionally, **editors choose a list of related keywords** and **categories** in relevant taxonomies according to:

- their own experience of similar conferences;
- a visual exploration of titles and abstracts;
- a list of terms given by the curators or derived by calls for papers.

There are several challenges

- It a complex process that **require expert editors**
- It is a **time-consuming** process which can **hardly scale** (780 proceedings with **~27,000** papers/year)
- It is easy to **miss the emergence of a new topic**

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The Smart Topic Miner

The **Smart Topic Miner (STM)** is a semantic application designed to support the **Springer Nature Computer Science editorial team** in classifying scholarly publications.

SMART TOPIC MINER

Order

Publications ▾

- Use tree-list
- Show explanation
- Show input keyword distribution
- Advanced analytics

File input

Choose File ISWC2016_full.zip

Accepting only .zip and .xml

Additional keywords

Add here your additional keywords separated by comma.

Topic Granularity: 3



[+] Example Springer Nature Proceedings

Book Title: The Semantic Web – ISWC 2016 (vn:)

SIGNIFICANT TOPICS:

Tree List:

- (1) Computer Science [39]
 - (2) Internet [39]
 - (3) World wide web [39]
 - (4) Semantic web [39]
 - (5) Linked data [20]
 - (5) Rdf [17]
 - (5) Semantic technologies [5]
 - (4) Search engines [12]
 - (5) Query processing [7]
 - (6) Query answering [3]
 - (5) Information need [3]
 - (2) Artificial intelligence [27]
 - (3) Knowledge based systems [13]
 - (2) Semantics [39]
 - (3) Ontology [30]
 - (4) *Semantic technologies* [5]
 - (3) *Semantic web* [39]
 - (4) Data communication systems [4]
 - (5) Engines [6]

Springer Nature Classi

I00001 : computer science

I21009 : computing

I21017 : artificial intelligence (incl. robotics) (p:39) | {artificial intelligence, semantic web}

I18008 : information systems and communication service (p:39) | {internet, query processing, query answering}



http://rexplore.kmi.open.ac.uk/STM_demo

Why we cannot use existing solutions?

Standard research areas taxonomies/classifications/ontologies such as ACM are not apt to the task.

Web data description languages

Semantic web description languages

ACM 2012

Resource Description Framework (RDF)

Web Ontology Language (OWL)

- **Not fine-grained enough.**
 - E.g., only 2 topics are classified under Semantic Web
- **Static, manually defined, hence prone to get obsolete very quickly.**

Ad-hoc CS taxonomy mined by Klink-2 algorithm

- We automatically generated a large-scale ontology with about **15,000 topics** linked by about **70,000 semantic relationships**.
- It included **very granular** and low level research areas, e.g., Linked open data, Probabilistic packet marking, Synthetic aperture radar imaging
- It can be **regularly updated** by running Klink-2 on a new set of publications.
- It allows for a **research topic to have multiple super-areas** – i.e., the taxonomic structure is a graph rather than a tree, e.g., Inductive Logic Programming is a sub-area of both Machine Learning and Logic Programming.



STM Approach – *Topic extraction*

The initial keywords are **enriched** with terms **extracted from the publications** and then **mapped** to a list of research areas in the CSO ontology;

Initial Keywords

(from authors and editors)

linked data:3, relational constraints:1, semantical regularizations:1, question answering:1, graph traversal:1, non-aggregation questions:1, implicit information:1, knowledge base completion:1, dbpedia:1, recommender system:1, relation extraction:1, weakly supervised:1, baidu encyclopedia:1, svm:1, path ranking:1, medical events:1, competitor mining:1, description logics:1, multi-strategy learning:1, distant supervision:1, relation reasoning:1, non-standard reasoning services:1, concept similarity measures:1, semantic data:1, medical guidelines:1, rdf:1, prolog preference profile:1, similarity measure:1, ontological development:1, knowledge representation:1, graph simplification:1, rdf visualization:1, triple ranking:1, sparql-rank:1, rank-join operator:1, “shaowei” (稍微 ‘a little’):1, minimal degree adverb:1, a little:1, rdf native storage:1, news analysis:1, meta-data extraction:1, database integration:1, elderly nursing care:1 [...]

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Enriched Keywords

(extracted from abstract, titles, etc)

semantic:24, rdf:7, applications:5, semantic web:5, knowledge base:4, linked data:4, ontology:4, ontologies:4, language:3, knowledge bases:3, algorithms:2, integration:2, architecture:2, semantics:2, knowledge management:2, query answering:2, recommendation:2, question answering system:2, semantic similarity:2, question answering:2, vocabulary:2, svm:1, graph traversal:1, information needs:1, path ranking:1, baidu encyclopedia:1, non-aggregation questions:1, support vector machine:1, implicit information:1, construction:1, knowledge base completion:1, relational constraints:1, semantical regularizations:1, support vector machine (svm):1, machine learning:1, support vector:1, facts:1, logic programming:1, multi-strategy learning:1, distant supervision:1, competitor mining:1, lossy compression:1, comprehensive evaluation:1, relation reasoning:1, websites:1, competition:1, decision support:1, learning algorithm:1 [...]

CSO Ontology topics

(1) Computer Science [21]
 --- (2) Internet [18]
 ----- (3) World wide web [16]
 ----- (4) Semantic web [16]
 ----- (5) Rdf [7]
 ----- (5) Linked data [5]
 ----- (3) NLP systems [3]
 ----- (4) Question answering [2]
 ----- (3) Recommender systems [2]
 ----- (2) Artificial intelligence [12]
 ----- (3) Knowledge based systems [8]
 ----- (4) Knowledge representation [4]
 ----- (5) Description logic [3]
 ----- (3) Machine learning [4]
 (1) Semantics [24]
 --- (2) Ontology [10]
 --- (2) Metadata [7]
 ----- (3) Rdf [7]
 --- (2) Semantic web [16]
 (1) Language [5]
 --- (2) Vocabulary [2] [...]

SPRINGER NATURE

STM provides explanations

Book Title: **Semantics, Analytics, Visualization. Enhancing Scholarly Data** (vn: 9792)

SIGNIFICANT TOPICS:

Tree List:

- (1) **Computer Science** [10] | {*rdf(2), text mining(2), open access(2), natural language processing(2), natural language(2), network structure(1), clustering(1), hierarchical clustering(1), clustering techniques(1), indexing(1), reusability(1), linked data(1), web pages(1), semantic web(1), user profiles(1), knowledge base(1), knowledge discovery(1), user interface(1), semantic search(1), software framework(1), information extraction(1), html5(1), xml(1), javascript(1), text summarization(1)*}
- (2) **Artificial intelligence** [5] | {*text mining(2), natural language processing(2), network structure(1), knowledge base(1), knowledge discovery(1), information extraction(1), text summarization(1)*}
- (2) **Semantics** [11] | {*semantic(8), rdf(2), ontology(2), natural language processing(2), natural language(2), metadata(2), reusability(1), linked data(1), ontologies(1), semantic relations(1), semantic web(1), user profiles(1), semantic search(1), information extraction(1), html5(1), xml(1), javascript(1), text summarization(1)*}
- (3) **Ontology** [5] | {*ontology(2), ontologies(1), semantic relations(1), user profiles(1), semantic search(1), information extraction(1)*}
- (3) **Semantic web** [5] | {*rdf(2), linked data(1), semantic web(1), semantic search(1)*}
- (3) **Natural language processing** [4] | {*natural language processing(2), text summarization(1)*}
- (3) **Xml** [3] | {*rdf(2), html5(1), xml(1)*}
- (3) **World wide web** [7] | {*rdf(2), open access(2), linked data(1), web pages(1), semantic web(1), user profiles(1), semantic search(1), html5(1), xml(1), javascript(1)*}
- (4) **Semantic web** [5] | {*rdf(2), linked data(1), semantic web(1), semantic search(1)*}
- (4) **Search engines** [3] | {*web pages(1), user profiles(1), semantic search(1)*}
- (4) **Xml** [3] | {*rdf(2), html5(1), xml(1)*}
- (3) **Computational linguistics** [3] | {*text mining(2), natural language processing(2), information extraction(1), text summarization(1)*}
- (4) **Natural language processing** [4] | {*natural language processing(2), text summarization(1)*}
- (k) **Language** [3] | {*language(3), language processing(1)*}

Thank you

Special thanks for slides to

Michele Pasin, Francesco Osborne, Mario Malicki

LOD project team

Project
sponsors



Alfred Hofmann



Henning
Schoenenberger

Volha Bryl Kai Eckert



Andrey Gromyko



UNIVERSITY OF
MANNHEIM

Mirjam Kessler



Markus Kaindl



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