MESUR: usage-based metrics of scholarly impact.

Johan Bollen, Marko A. Rodriguez, Herbert Van de Sompel
Digital Library Research and Prototyping Team
Research Library
Los Alamos National Laboratory
jbollen@lanl.gov, marko@lanl.gov, herbertv@lanl.gov

Introduction:

The assessment of scholarly impact is now largely a matter of expert opinion or metrics derived from citation data, e.g. Thomson's Scientific ISI Impact Factor. Usage data has the potential to provide a more complete picture of scholarly impact. However, usage-based metrics of scholarly impact have not yet made inroads as reliable and community-accepted means of assessing scholarly impact due to sampling and cross-validation problems associated with usage data.

Problem statement:

Sampling problems: usage data is generally collected for a particular information service and reflects its user community.
Metrics: usage-based metrics can express different facets of scholarly impact. Very little is known about the properties of the various possible usage-based metrics and how their outcomes can be interpreted

The MESUR project in a nutshell:

A 2-year **Andrew W. Mellon Foundation-funded** project to survey a wide range of usage-based metrics on the basis of a large-scale reference data set consisting of a semantic model of the scholarly communication process.
The MESUR project seeks to move the evaluation of scholarly impact from the present mono-culture of one-dimensional **rankings** to one in which a multitude of well-understood metrics are combined to produce multi-dimensional **assessments** which positions each scholarly communication item according to its true merits.

Four project phases:

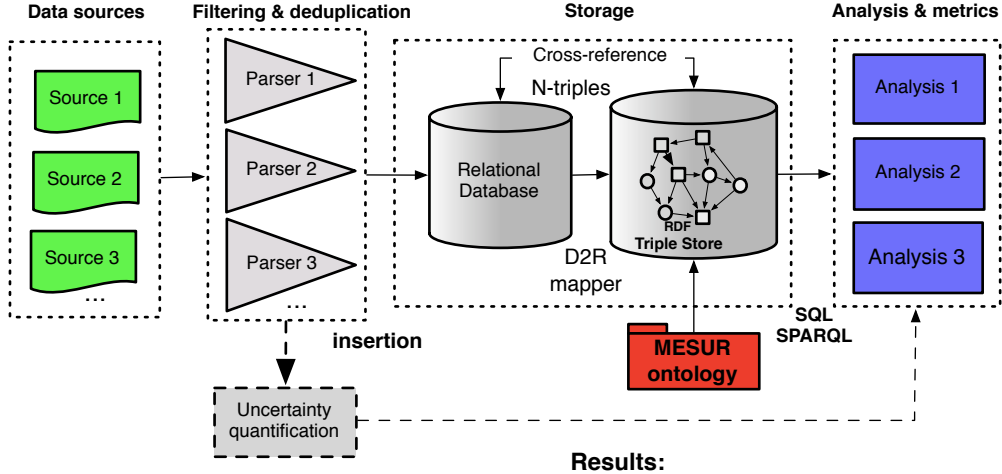
1) Definition of an OWL/RDF ontology: a model of the scholarly communication process that integrates usage with citation and bibliographic data.
2) Aggregation of usage, citation and bibliographic data from significant institutions, aggregators and publishers into a large-scale **semantic network** organized according to (1).
3) Topological characterization of the generated semantic network created in (2), e.g. the boundaries between various scholarly domains.
4) A survey of a wide range of usage-based metrics of scholarly impact on the basis of (2) and (3), examining their validity, reliability and scholarly correlates.

Status:

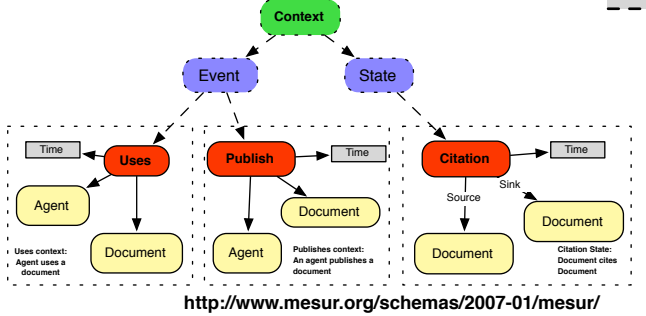
So far, 18 participating institutions:
- 4 major university consortia
- 3 major aggregators
- 5 major publishers
- Support of COUNTER project

50M documents
50K journals
500M citations
1B usage events
70M authors and users
Span: 10 years

Expected semantic network size: 10B triples



The MESUR ontology:



http://www.mesur.org/schemas/2007-01/mesur/

Integrative: Designed to seamlessly integrate the relations between the various actors, artifacts and contexts in the scholarly community (inspired by OntologyX - Rights.com).
Pragmatic: Designed for the real world. It does not attempt to exhaustively represent all facets of the scholarly communication process and its actors, but rather focuses on the usage, citation and bibliographic data that can pragmatically be obtained. The objective is to provide a scalable model of the scholarly communication process.
Notion of Context: an n-ary object which ties together the various agents and artifacts involved in usage, citation and bibliographic data.

Results:

IF (2005)	TITLE (ABBRV)
49.794	CA A CANCER
47.400	ANN REV IMMUNOL
44.016	NEJM
33.456	ANN REV BIOCHEM
31.694	NAT REV CANCER
30.458	NAT REV IMMUNOL
30.254	REV MOD PHYS
29.852	NAT REV MOL CELL BIOL
29.431	CELL
29.273	NATURE

CPR05	IF	TITLE (ABBRV)
0.010	5.854	J BIOL CHEM
0.009	29.273	NATURE
0.009	10.231	PNAS
0.006	7.489	PHYS REV LETT
0.005	44.016	NEJM
0.004	7.419	JACS
0.004	23.332	JAMA
0.004	2.784	J GEOPHYS RES
0.003	7.506	J NEUROSCIENCE
0.003	1.131	BLOOD

UIF06	IF	TITLE (ABBRV)
4.611	0.444	CONTEMP SOCIOL
2.346	9.885	BEHAV & BRAIN SCI
2.264	0.735	J MUSIC THERAPY
1.980	1.578	SOCIAL FORCES
1.889	0.422	SOCIOL SPECTRUM
1.736	1.623	AM HIST REV
1.672	3.262	AM J SOCIOL
1.632	0.204	WOMEN AND THERAPY
1.626	0.664	CHILD & YOUTH SERV REV
1.522	1.957	THE FUTURE OF CHILDREN

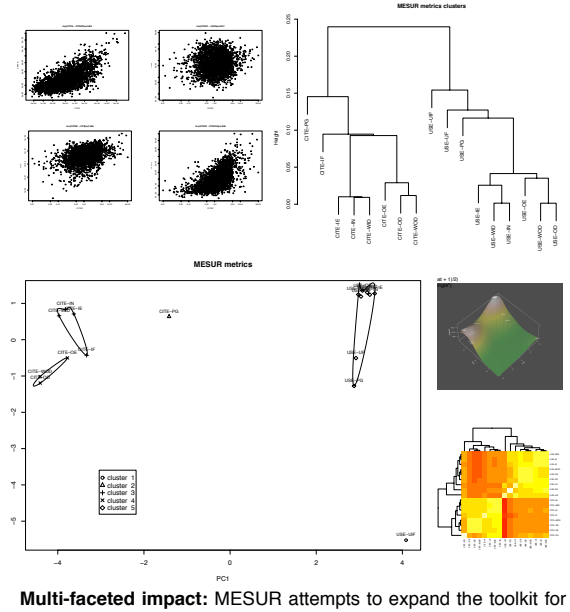
UPR05	IF	TITLE (ABBRV)
0.0034	29.273	NATURE
0.0022	23.332	JAMA
0.0021	44.016	NEJM
0.0017	7.419	JACS
0.0016	10.231	PNAS
0.0012	7.489	PHYS REV LETT
0.0011	1.350	J MARR & FAM
0.0011	4.113	J AM ACAD CHILD ADOLESC
0.0010	4.211	J PERS SOC PSYCH
0.0009	2.784	J OF GEOPHYS RES

IDE	IF	TITLE (ABBRV)
217.103	29.273	NATURE
162.039	23.332	JAMA
155.234	44.016	NEJM
104.73	10.231	PNAS
102.557	7.419	JACS
82.246	7.489	PHYS REV LETT
71.752	2.619	SOC SCI & MED
68.707	4.113	J AM ACAD CHILD ADOLESC
66.982	5.635	ANAL CHEM
66.482	5.853	AM J CLIN NUTRITION

UIF06	IF	TITLE (ABBRV)
0.006	0.875	NUCL PHYS B
0.006	5.944	J HIGH ENERG PHYS
0.008	0.579	J MATH ANAL APPL
0.009	4.852	PHYS REV D
0.0010	0.777	ACTA CRYSTALLOGR C
0.0012	0.459	J ALGEBRA
0.0013	0.59	LINEAR ALGEBRA APPL
0.0013	0.581	ACTA CRYSTALLOGR E
0.0014	0.569	J COMPUT APPL MATH
0.0014	0.469	CR MATH

Multi-faceted impact: These tables list a few rankings calculated for the U. Texas usage data of 2005-2006. Metrics include Citation PageRank (CPR), Usage Impact Factor (UIF06) top and bottom rankings, Usage PageRank (UPR05), and In-Degree Entropy (IDE). The red lines indicate a divergence between the particular metric and the ISI Impact Factor. Some metrics express institution-particular impact whereas others correlate more strongly to the ISI Impact Factor.

Results:



Multi-faceted impact: MESUR attempts to expand the toolkit for scholarly assessment, so that scholarly communication items, and their producers, can be evaluated along a multitude of different dimensions. MESUR therefore surveys a multitude of usage, citation and bibliographic indicators.
Survey: Many possible indicators of scholarly impact can be defined. Some may indicate overlapping facets of impact, some are more valid and reliable than others, etc. MESUR therefore investigates the structure of metric-correlations to determine overlaps, deviations and clusters of related metrics. Comparisons to the ISI IF and COUNTER statistics are crucial means of cross-validation.

Digital Library Research and Prototyping Team

Los Alamos NATIONAL LABORATORY EST.1943

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JCDL07, Vancouver, Canada