



Peer Review
from WoS

V. Batagelj,
A. Ferligoj

Data

Distributions

Citations

Collaboration

References

To do

Analysis of Peer Review data from WoS

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PEERE

Split – June 16-18, 2015

Outline

Peer Review
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Distributions
Citations
Collaboration
References
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- 1 Data
- 2 Distributions
- 3 Citations
- 4 Collaboration
- 5 References
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"I know you've had over 100 articles published, but my question was 'Have you ever made a contribution to the literature?'"

Journal of Irreproducible Results, 32(1988)2, 24

Current version of slides:

<http://vlado.fmf.uni-lj.si/pub/slides/peere.pdf>



Goals

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The goal of this presentation is to study the publications on 'peer review' included in Web of Science till May 2015. The questions to be answered are:

- which publications and which authors are the most cited;
- which are the main journals publishing papers on 'peer review';
- which are the most influential publications in the field of 'peer review';
- which are the groups of researchers that collaborate the most, what are their topics.

For answering these questions several social network analysis approaches are applied on large citation and collaboration networks obtained from WoS. The most useful ones are the 'main path' analysis and the 'islands' procedure.



Collecting the data

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To the Web of Science (WoS) we put the query "peer review*". We got 17053 hits, and additional 2867 hits for the query refereeing (from Web of Science Core Collection, in May and June 2015).

The first analysis revealed many papers without WoS descriptions having large indegrees in the citation network. We manually searched for each of them (with indegree larger or equal to 20) and if found we added it into the data set.

After some iterations, we finally constructed the data set used in this analysis. Using the program WoS2Pajek we transformed it into a collection of networks: cite, *two-mode networks*: WA, WJ, WK; partitions DC (DC= a work w has (1) / has not (0) a WoS description), year (publication year); and CSV file titles with basic data about works with DC=1.



Record from Web of Science

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PT J
AU Dipple, H
Evans, B
TI The Leicestershire Huntington's disease support group: a social network analysis
SO HEALTH & SOCIAL CARE IN THE COMMUNITY
LA English
DT Article
C1 Rehabil Serv, Troon Way Business Ctr, Leicester LE4 9HA, Leics, England.
RP Dipple, H, Rehabil Serv, Troon Way Business Ctr, Sandringham Suite,Humberstone Lane, Leicester LE4 9HA, Leics, England.
CR BORGATTI SP, 1992, UCINET 4 VERSION 1 0
FOLSTEIN S, 1989, HUNTINGTONS DIS DISO
SCOTT J, 1991, SOCIAL NETWORK ANAL
NR 3
TC 3
PU BLACKWELL SCIENCE LTD
PI OXFORD
PA P O BOX 88, OSNEY MEAD, OXFORD OX2 ONE, OXON, ENGLAND
SN 0966-0410
J9 HEALTH SOC CARE COMMUNITY
JI Health Soc. Care Community
PD JUL
PY 1998
VL 6
IS 4
BP 286
EP 289
PG 4
SC Public, Environmental & Occupational Health; Social Work
GA 105UP
UT ISI:000075092200008
ER

Citation network structure

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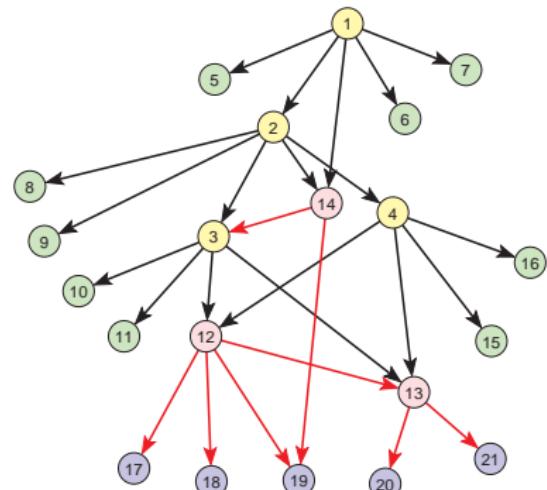
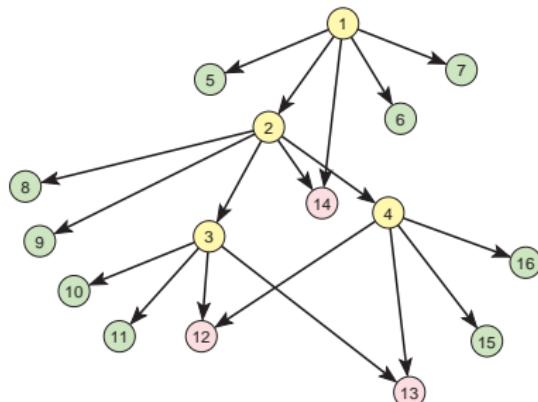
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yellow – hits for the query, DC = 1

red – manually added, DC = 1

green, blue – referenced only, DC = 0

Transforming WoS data into networks

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Identification problem: different names for the same unit (*synonyms*); same name for different units (*homonyms*). → loops and multiple links

The usual *ISI name* of a work (field CR), for example

LEFKOVITCH LP, 1985, THEOR APPL GENET, V70, P585

has the following structure (all its elements are in upper case):

AU + ' , ' + PY + ' , ' + SO[:20] + ' , V' + VL + ' , P' + BP

In WoS the same work can have different ISI names:

GRANOVET.MS, 1973, AM J SOCIOl, V78, P1360
GRANOVETTER M, 1983, SOCIOLOGICAL THEORY, V1, P203
BORGATTI SP, 2002, UGINET WINDOWS SOFTW
BORGATTI S, 1999, UCINET V USERS GUIDE
CANTAZARO M, 2005, PHYS REV E, V71, UNSP 027103
CANTAZARO M, 2005, PHYS REV E, V71, UNSP 056104
CATANZARO M, 2005, PHYS REV E 2, V71, ARTN 056104

To improve the precision the program WoS2Pajek supports also *short names*. They have the format:

LastNm[:8] + ' _ ' + FirstNm[0] + ' (' + PY + ')' + VL + ' : ' + BP

For example: LEFKOVIT_L(1985)70:585



WoS2Pajek report.

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```
>>> End of processing of WoS file
number of works      = 639407
number of authors    = 268258
number of journals   = 36646
number of keywords   = 33688
number of records    = 20131
number of duplicates = 256
works + titles : titles.csv
works index file: vtxIndex.txt

*** FILES:
year of publication partition: C:/Users/batagelj/work/Python/WoS/peere1\Year.clu
described / cited only partition: C:/Users/batagelj/work/Python/WoS/peere1\DC.clu
number of pages vector: C:/Users/batagelj/work/Python/WoS/peere1\NP.vec
citation network: C:/Users/batagelj/work/Python/WoS/peere1\Cite.net
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works X keywords network: C:/Users/batagelj/work/Python/WoS/peere1\WK.net
works X authors network: C:/Users/batagelj/work/Python/WoS/peere1\WA.net
finished: Thu Jun 11 04:09:09 2015
```

We removed multiple links and loops from networks. The cleaned citation network has $n = 639407$ nodes and $m = 764234$ arcs.

Degree distributions in citation network

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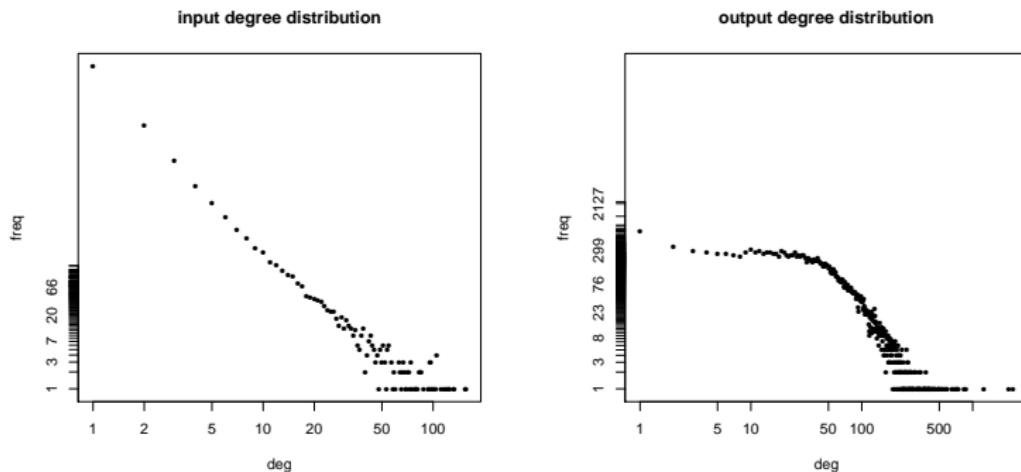
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There are 15107 nodes with $indeg = 0$, 621998 nodes with $outdeg = 0$, and 2466 nodes with $DC = 1$ and $outdeg = 0$.

The most cited works

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name	indeg	title	journal
PETERS_D(1982)5:187	156	PEER-REVIEW PRACTICES OF PSYCHOLOGICAL JOURNALS - THE FATE OF ACCEPTED, PUBLISHED ARTICLES, SUBMITTED AGAI BEHAV BRAIN SCI	
COHEN_J(1988):	149	Statistical Power Analysis for the Behavioral Sciences	book
STROUP_D(2000)283:2008	132	Meta-analysis of observational studies in epidemiology - A proposal for reporting	JAMA-J AM MED AS
ZUCKERMAN_H(1971)9:66	125	PATTERNS OF EVALUATION IN SCIENCE - INSTITUTIONALISATION, STRUCTURE AND FUNCTIONS OF REFEREE SYSTEM	MINERVA
DERSIMON_R(1986)7:177	122	METAANALYSIS IN CLINICAL-TRIALS	CONTROL CLIN TRIA
EGGER_M(1997)315:629	119	Bias in meta-analysis detected by a simple, graphical test	BRIT MED J
CICCHETTI_D(1991)14:119	116	THE RELIABILITY OF PEER-REVIEW FOR MANUSCRIPT AND GRANT SUBMISSIONS - A CROSS-DISCIPLINARY INVESTIGATION	BEHAV BRAIN SCI
EASTERBR_P(1991)337:867	111	PUBLICATION BIAS IN CLINICAL RESEARCH	LANCET
MAHONEY_H(1977)1:161	110	Publication prejudices: An experimental study of confirmatory bias in the peer review system	Cognitive Therapy a
HORROBIN_D(1990)263:1438	105	THE PHILOSOPHICAL BASIS OF PEER-REVIEW AND THE SUPPRESSION OF INNOVATION	JAMA-J AM MED AS
HIRSCH_J(2005)102:16569	105	An index to quantify an individual's scientific research output	P NATL ACAD SCI US
VANROOYE_S(1999)318:23	104	Effect of open peer review on quality of reviews and on reviewers' recommendations: a randomised trial	BRIT MED J
MCNUTT_R(1990)263:1371	99	THE EFFECTS OF BLINDING ON THE QUALITY OF PEER-REVIEW - A RANDOMIZED TRIAL	JAMA-J AM MED AS
GODLEE_F(1998)280:237	98	Effect on the quality of peer review of blinding reviewers and asking them to sign their reports - A randomized controlled tr	JAMA-J AM MED AS
HIGGINS_J(2003)327:557	97	Measuring inconsistency in meta-analyses	BRIT MED J
COLE_S(1981)214:881	97	CHANCE AND CONSENSUS IN PEER-REVIEW	SCIENCE
JADAD_A(1996)17:1	97	Assessing the quality of reports of randomized clinical trials: Is blinding necessary?	CONTROL CLIN TRIA
LOCK_S(1985):	96	A Difficult Balance: Editorial Peer Review in Medicine	book
LANDIS_J(1977)33:159	96	MEASUREMENT OF OBSERVER AGREEMENT FOR CATEGORICAL DATA	BIOMETRICS
MOHER_D(1999)354:1896	95	Improving the quality of reports of meta-analyses of randomised controlled trials: the QUOROM statement	LANCET
JUSTICE_A(1998)280:240	94	Does masking author identity improve peer review quality? - A randomized controlled trial	JAMA-J AM MED AS
VANROOYE_S(1998)280:234	88	Effect of blinding and unmasking on the quality of peer review - A randomized trial	JAMA-J AM MED AS
BLACK_N(1998)280:231	85	What makes a good reviewer and a good review for a general medical journal?	JAMA-J AM MED AS
SCHERER_R(1994)272:158	85	FULL PUBLICATION OF RESULTS INITIALLY PRESENTED IN ABSTRACTS - A METAANALYSIS	JAMA-J AM MED AS
HIGGINS_J(2011):	84	Cochrane Handbook for Systematic Reviews of Interventions	book
GOODMAN_S(1994)121:11	84	MANUSCRIPT QUALITY BEFORE AND AFTER PEER-REVIEW AND EDITING AT ANNALS OF INTERNAL-MEDICINE	ANN INTERN MED
CHUBIN_D(1990):	83	Peerless Science: Peer Review and U. S. Science Policy	book
MOHER_D(2009)6:1000097	83	Preferred Reporting Items for Systematic Reviews and Meta-Analyses: The PRISMA Statement	PLOS MED
KRONICK_D(1990)263:1321	78	PEER-REVIEW IN 18TH-CENTURY SCIENTIFIC JOURNALISM	JAMA-J AM MED AS
JEFFERSO_T(2002)287:2784	75	Effects of editorial peer review - A systematic review	JAMA-J AM MED AS

Works with names [ANONYMO(2011) :, . . . , WORLD_H(2009) :, . . . ,
U_S(2011) :, . . . , WHO(2008) :, . . . , were removed from the network.



The most cited works / ordered by pub-year
CiteAll indeg best

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Te de

The most cited books

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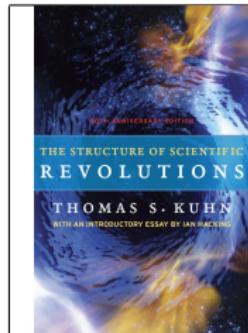
Distributions

Citations

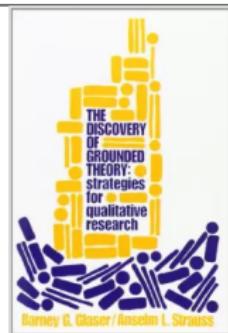
Collaboration

References

To do



1962 (49)



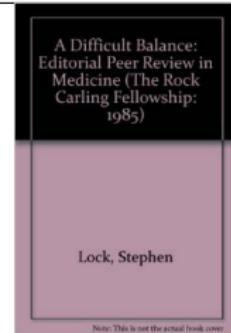
1967 (49)



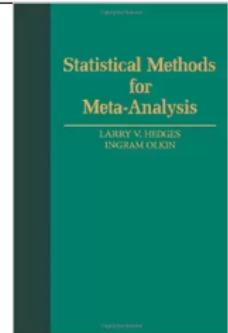
1973 (59)



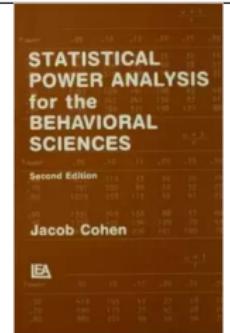
1978 (44)



1985 (96)



1985 (67)



1988 (149)



1990 (83)



The most cited books

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Data

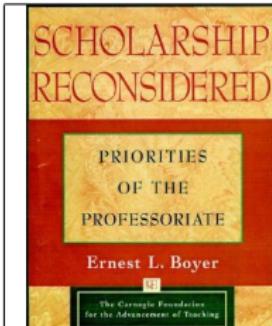
Distributions

Citations

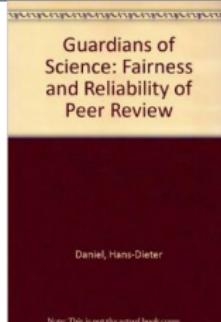
Collaboration

References

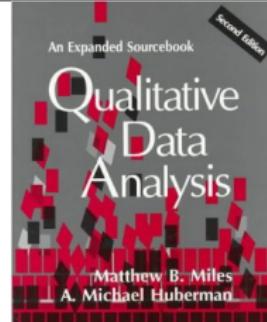
To do



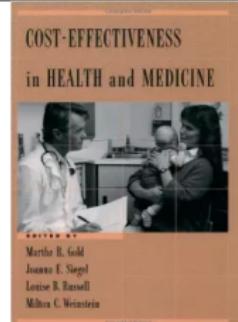
1990 (57)



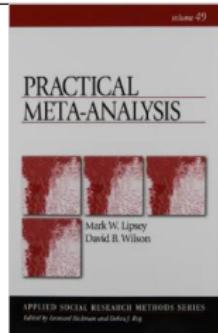
1993 (51)



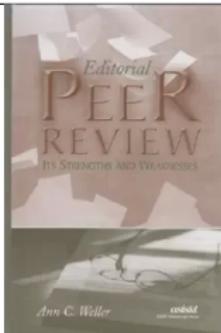
1994 (47)



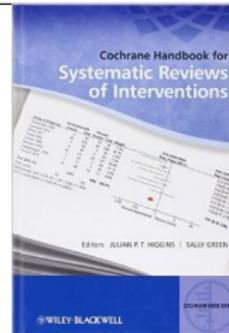
1996 (59)



2001 (44)



2001 (54)



2008 (57)

Cochrane Handbook for
Systematic Reviews of
Interventions



Version 5.1.0
(updated March 2011)

Editors: Julian PT Higgins and Sally Green

Published literature
Fast & Free
Protocol for Guidance needed
Data sharing
Additional material



The most citing works

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rank	node	outdeg	work	title
1	290441	2306	GOLDSTEI_R(2010)53:4343	Heat transfer-A review of 2004 literature
2	175921	2127	GOLDSTEI_R(2010)53:4397	Heat transfer-A review of 2005 literature
3	5541	1259	HILLIS_L(2011)58:E123	2011 ACCF/AHA Guideline for Coronary Artery Bypass Graft Surgery
4	6068	872	LEVINE_G(2011)58:E44	2011 ACCF/AHA/SCAI Guideline for Percutaneous Coronary Intervention
5	144022	837	DELEON_G(2007):1	Trematode parasites (Platyhelminthes) of wildlife vertebrates in Mexico
6	1585	747	ADAMS_H(2007)38:1655	Guidelines for the early management of adults with ischemic stroke - A guideline from the American Heart Association
7	4415	729	GOLDSTEI_U(2011)42:517	Guidelines for the Primary Prevention of Stroke A Guideline for Healthcare Professionals From the American Heart Association
8	525591	711	WILLHITE_C(2014)44:1	Systematic review of potential health risks posed by pharmaceutical, occupational and consumer exposures to metallic and nanoscale aluminum, ...
9	132542	710	SMITH_J(2012)17:510	Single-Case Experimental Designs: A Systematic Review of Published Research and Current Standards
10	211490	671	AKSUULU_A(2010)11:576	A Comprehensive Review and Synthesis of Open Source Research
11	492189	651	MILLER_C(1990)6:2:700	Groundwater - A review of the 1989 literature
12	3943	586	GOLDSTEI_U(2006)37:1583	Primary prevention of ischemic stroke - A guideline from the American Heart Association
13	313264	577	FLEGAL_A(2013)43:1869	All the Lead in China
14	15310	569	GOLDSTEI_U(2006)113:E873	Primary prevention of ischemic stroke - A guideline from the American heart Association
15	199315	538	EVANS_E(2004)19:775	Atomic spectrometry update. Advances in atomic emission, absorption and fluorescence spectrometry and related techniques
16	4714	533	ROACH_E(2008)39:2644	Management of stroke in infants and children - A scientific statement from a special writing group of the American Heart Association
17	23743	517	SANTEN_R(2010)95:57	Postmenopausal Hormone Therapy: An Endocrine Society Scientific Statement
18	6565	505	GORELUCK_P(2011)42:2672	Vascular Contributions to Cognitive Impairment and Dementia A Statement for Healthcare Professionals From the American Heart Association
19	285306	493	HILLIS_L(2011)58:2584	2011 ACCF/AHA Guideline for Coronary Artery Bypass Graft Surgery: Executive Summary A Report of the American College of Cardiology Foundation
20	115699	492	HILLIS_L(2012)143:4	2011 ACCF/AHA guideline for coronary artery bypass graft surgery: Executive summary

The most cited authors

WciA = Cite * WA weighted indegree

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	i	f	Id	i	f	Id	i	f	Id	i	f	Id
Data	1	976	ALTMAN_D	26	285	FLETCHER_S	51	171	THOMPSON_S	76	133	ZUCKERMA_H
Distributions	2	973	MOHER_D	27	251	GUYATT_G	52	168	EASTWOOD_S	77	132	BECKER_B
Citations	3	756	RENNIE_D	28	250	OXMAN_A	53	167	CICCHETT_D	78	132	SIPE_T
Collaboration	4	634	SMITH_R	29	241	D'OTTAVI_S	54	167	PETERS_D	79	132	MORTON_S
References	5	584	GODLEE_F	30	238	CHO_M	55	166	JADAD_A	80	129	WINKER_M
To do	6	523	BLACK_N	31	228	MULROW_C	56	165	MATTHEWS_D	81	128	WAECERL_J
	7	514	BERLIN_J	32	222	CHALMERS_T	57	155	EVANS_A	82	124	SCHNEIDE_M
	8	421	EVANS_S	33	221	MERTON_R	58	154	WEBER_E	83	121	CHALMERS_I
	9	417	BORNMANN_L	34	219	WEARS_R	59	154	MCNUTT_R	84	120	FLANAGIN_A
	10	386	CASTAGNA_C	35	215	DEVEREAU_P	60	149	JUSTICE_A	85	119	SMITH_G
	11	381	DANIEL_H	36	208	GARFIELD_E	61	146	VANRAAN_A	86	119	MINDER_C
	12	376	VANROOYE_S	37	201	WESTON_M	62	146	KRUSTRUP_P	87	119	SQUIRES_B
	13	368	SCHULZ_K	38	193	BERO_L	63	145	COLE_J	88	117	COHEN_J
	14	360	CALLAHAM_M	39	192	JEFFERSO_T	64	145	DERSIMON_R	89	116	BHANDARI_M
	15	351	DICKERSI_K	40	191	ABT_G	65	145	BEGG_C	90	113	GOODMAN_S
	16	348	HELSEN_W	41	190	WAGER_E	66	143	NEVILL_A	91	111	GOPALAN_R
	17	344	LIBERATI_A	42	190	HIGGINS_J	67	142	LUNDBERG_G	92	111	DAVIS_D
	18	333	COOK_D	43	189	LAIRD_N	68	140	SCHROTER_S	93	111	EASTERBR_P
	19	333	EGGER_M	44	183	MARSH_H	69	139	HAYNES_R	94	109	SMITH_H
	20	311	GOTZSCHE_P	45	180	HORROBIN_D	70	138	COLE_S	95	107	SCHERER_R
	21	307	TETZLAFF_J	46	178	IOANNIDI_J	71	136	THACKER_S	96	106	PLESSNER_H
	22	301	STROUP_D	47	178	GILIS_B	72	136	WILLIAMS_G	97	106	JAYASING_U
	23	300	OLKIN_I	48	178	CECI_S	73	136	CAMPANAR_J	98	105	HIRSCH_J
	24	298	DAVIDOFF_F	49	175	BANGSBO_J	74	133	ZUCKERMA_	99	105	WILSON_J
	25	285	FLETCHER_R	50	172	MARTYN_C	75	133	HORTON_R	100	104	CATTEEUW_P

Distribution of papers from WoS (DC=1) by year

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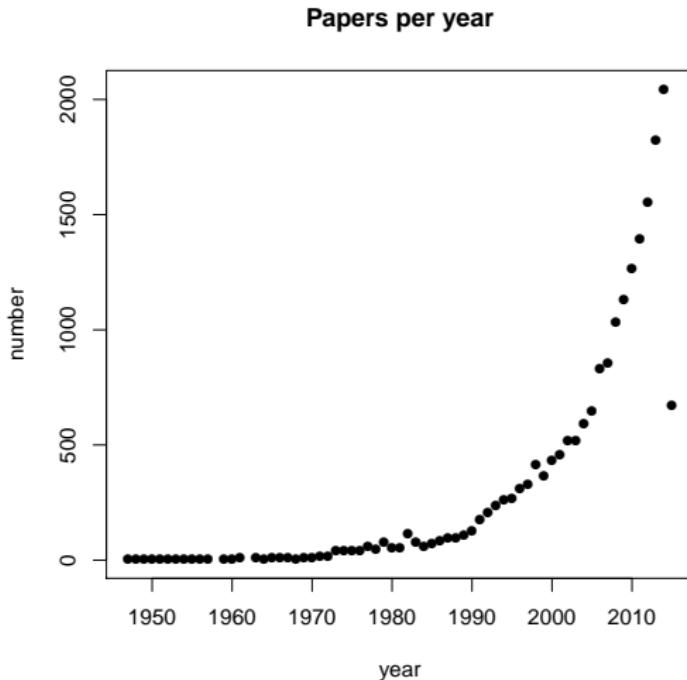
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Publication year distribution

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It can be fitted with lognormal distribution:

```
> setwd("C:\\\\Users\\\\batagelj\\\\work\\\\Python\\\\WoS\\\\peere1")
> years <- read.table(file="Year1.clu",header=FALSE,skip=2,
+   colClasses="character")$V1
> y <- as.numeric(years)
> t <- table(y[!is.na(y)])
> year <- as.integer(names(t))
> freq <- as.vector(t[1950<=year & year<=2015])
> y <- 1950:2015
> plot(y,freq,pch=16,cex=0.8)
> model <- nls(freq~c*dnorm(2016-y,a,b),start=list(c=350000,a=2,b=0.7))
> model
Nonlinear regression model
  model: freq ~ c * dlnorm(2016 - y, a, b)
  data: parent.frame()
      c          a          b
  6.415e+05 2.631e+00 6.762e-01
 residual sum-of-squares: 45256778

Number of iterations to convergence: 7
Achieved convergence tolerance: 8.714e-06
> lines(y,predict(model,list(x=2016-y)),col='red',lw=2)
```

$$\sum freq = 625557$$

Publication year distribution

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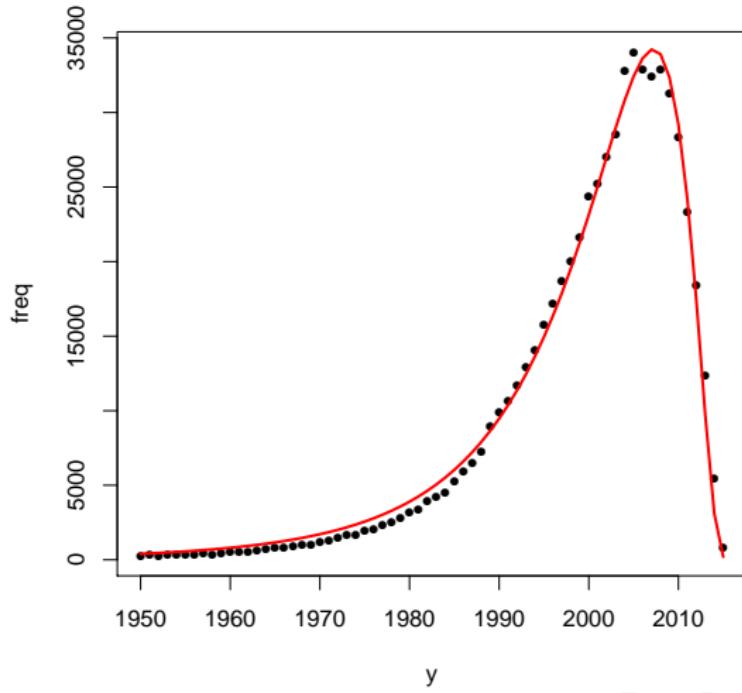
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Authors with the largest number of works

WAD indeg

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	Rank	Deg	Id		Rank	Deg	Id
	1	288	[ANONYMO_		23	27	SQUIRES_B
	2	98	BORNMANN_L		24	27	WANG_J
	3	62	SMITH_R		25	27	COHEN_J
	4	61	ALTMAN_D		26	25	WILLIAMS_A
	5	59	DANIEL_H		27	24	MAYER_A
	6	55	MOHER_D		28	24	MARSHALL_E
	7	51	LEE_J		29	23	LEE_M
	8	47	RENNIE_D		30	23	BROWN_C
	9	43	SMITH_J		31	23	SMITH_M
	10	40	REYES_H		32	22	ANDERSON_P
	11	37	BROWN_D		33	22	ZHANG_Y
	12	37	CURTIS_K		34	22	JONES_A
	13	35	CASTAGNA_C		35	22	ADAMS_J
	14	32	GARFIELD_E		36	22	CHENG_J
	15	32	LEE_S		37	21	ZHANG_L
	16	31	THOENNES_M		38	21	BJORK_B
	17	30	JOHNSON_J		39	21	KIM_Y
	18	29	WESTON_M		40	21	KIM_J
	19	29	WILLIAMS_J		41	21	CICCCHETT_D
	20	28	CALLAHAM_M		42	21	KIM_S
	21	28	JOHNSON_C		43	21	MARSH_H
	22	28	HELSSEN_W		44	20	SAPER_C

Authors with the largest contribution to the field

Weighted indegree of normalized WAD

Peer Review
from WoS

V. Batagelj,
A. Ferligoj

Data

Distributions

Citations

Collaboration

References

To do

	Rank	Value	Id		Rank	Value	Id
	1	280.0000	[ANONYMO_		23	9.8333	HARNAD_S
	2	30.7310	BORNMANN_L		24	9.8333	ROY_R
	3	17.6667	MARSHALL_E		25	9.7000	CURTIS_K
	4	17.6569	SMITH_R		26	9.5583	CALLAHAM_M
	5	17.2262	DANIEL_H		27	9.5333	ROUKIS_T
	6	16.0000	GARFIELD_E		28	9.1286	JONES_R
	7	15.3543	RENNIE_D		29	9.0484	MOHER_D
	8	15.2101	ALTMAN_D		30	9.0184	ANDERSON_M
	9	14.9762	SQUIRES_B		31	9.0000	KOSTOFF_R
	10	14.5333	CHENG_J		32	8.9167	LIESEGAN_T
	11	14.0179	REYES_H		33	8.8323	JOHNSON_J
	12	13.6286	THOENNES_M		34	8.6429	FONTANAR_P
	13	12.7796	SMITH_J		35	8.5000	CICCHETT_D
	14	12.5167	COHEN_J		36	8.3792	WILLIAMS_A
	15	11.7466	LEE_J		37	8.3274	CASTAGNA_C
	16	10.9091	BROWN_C		38	8.2500	DONOVAN_S
	17	10.8333	WELLER_A		39	8.1667	CHUBIN_D
	18	10.8314	BROWN_D		40	8.0354	JONES_A
	19	10.7102	JOHNSON_C		41	8.0000	REINDOLL_W
	20	10.5833	BJORK_B		42	7.5180	WILLIAMS_J
	21	10.5000	MERVIS_J		43	7.4787	MARTIN_B
	22	10.0000	BEREZIN_A		44	7.3333	WALSH_J

Main journals in which PR papers were published

WJD indeg

Peer Review
from WoS

V. Batagelj,
A. Ferligoj

Data

Distributions

Citations

Collaboration

References

To do

	Rank	Freq	Id		Rank	Freq	Id
	1	286	JAMA-J AM MED ASSOC		26	57	PEDIATRICS
	2	286	BMJ OPEN		27	55	CHEM ENG NEWS
	3	175	NATURE		28	53	J NANOSCI NANOTECHNO
	4	174	BRIT MED J		29	50	J SEX MED
	5	165	SCIENCE		30	50	J GEN INTERN MED
	6	163	SCIENTOMETRICS		31	49	J SPORT SCI
	7	133	PLOS ONE		32	48	J SCHOLARLY PUBL
	8	96	ACAD MED		33	48	MED EDUC
	9	96	LANCET		34	47	*****
	10	92	SCIENTIST		35	46	RES EVALUAT
	11	88	LEARN PUBL		36	46	AM J PREV MED
	12	80	PHYS TODAY		37	45	ENVIRON HEALTH PERSP
	13	75	J ASSOC OFF AGR CHEM		38	44	J AM DENT ASSOC
	14	73	J UROLOGY		39	44	BRIT J SPORT MED
	15	72	CAN MED ASSOC J		40	43	CLIN THER
	16	70	ARCH PATHOL LAB MED		41	42	ANN EMERG MED
	17	67	ABSTR PAP AM CHEM S		42	42	AM J ROENTGENOL
	18	66	ANN PHARMACOTHER		43	42	NUCLEIC ACIDS RES
	19	66	ANN INTERN MED		44	41	BMC PUBLIC HEALTH
	20	65	J AM COLL RADIOL		45	41	CLIN ORTHOP RELAT R
	21	62	CUTIS		46	41	CURR MED RES OPIN
	22	62	NEW ENGL J MED		47	41	J MED INTERNET RES
	23	59	BEHAV BRAIN SCI		48	40	PLAST RECONSTR SURG
	24	58	ANN ALLERG ASTHMA IM		49	39	J PROSTHET DENT
	25	57	MED J AUSTRALIA		50	37	BMC HEALTH SERV RES

Main keywords

WKD indeg

Peer Review
from WoS

V. Batagelj,
A. Ferligoj

Data

Distributions

Citations

Collaboration

References

To do

	Rank	Freq	Id		Rank	Freq	Id
	1	6635	review		26	1003	treatment
	2	3700	peer		27	996	assessment
	3	2279	research		28	992	risk
	4	1978	quality		29	967	outcome
	5	1748	health		30	878	model
	6	1610	journal		31	876	performance
	7	1575	systematic		32	832	program
	8	1456	referee		33	829	education
	9	1449	peer-review		34	818	evaluation
	10	1399	management		35	810	intervention
	11	1344	care		36	808	scientific
	12	1274	publication		37	802	cancer
	13	1262	trial		38	799	practice
	14	1222	analysis		39	787	control
	15	1220	study		40	772	child
	16	1188	science		41	725	process
	17	1171	use		42	707	effect
	18	1163	impact		43	690	report
	19	1142	therapy		44	688	medicine
	20	1125	patient		45	679	guideline
	21	1092	clinical		46	658	factor
	22	1054	randomize		47	627	controlled-trial
	23	1043	literature		48	619	disorder
	24	1032	disease		49	607	surgery
	25	1009	medical		50	601	development



Citation networks

Peer Review
from WoS

V. Batagelj,
A. Ferligoj

Data

Distributions

Citations

Collaboration

References

To do

To solve the boundary problem we manually added some “missing” works and removed nodes with $DC = 0$ and $\text{indeg} < 3$ – obtainig the network CiteB.

The bounded citation network (21513 nodes) has one large component (8927 nodes), 66 small components, and 11783 isolated nodes (not cited and citing only unimportant works).

The SPC method used for its analysis requires that the citation network is acyclic. Determining strong components in CiteB we see that our network is not acyclic. We transform it into an acyclic network, CiteAcy, using the Preprint transformation. It has $n = 21533$ nodes and $m = 24031$ arcs.

Weak components in the bounded citation network

Peer Review
from WoS

V. Batagelj,
A. Ferligoj

Data

Distributions

Citations

Collaboration

References

To do

	Cluster	Freq	Freq%	CumFreq%	Representative
	0	11783	54.7715	54.7715	BABILONI_F(2000)8:186
	1	8927	41.4958	96.2674	CHALMERS_I(1989):
	2	83	0.3858	96.6532	AUDI_G(2003)729:3
	3	81	0.3765	97.0297	MCKENDRY_P(2002)83:37
	4	62	0.2882	97.3179	SUMMERS_R(1994)15:702
	5	39	0.1813	97.4992	AWLIYA_W(1998)56:9
	6	39	0.1813	97.6805	FRENCH_S(1997)97:1008
	7	31	0.1441	97.8246	MCMAHON_C(2004)1:58
	8	24	0.1116	97.9361	BLANCO_I(2001)95:109
	9	22	0.1023	98.0384	ALFARAO_C(2005)33:D418
	10	20	0.0930	98.1314	MOURITZE_U(2003)62:332
	11	19	0.0883	98.2197	DEMUNCK_J(2003)82:136
	12	18	0.0837	98.3034	ABRAMS_P(1988)114:5
	14	17	0.0790	98.4660	WARD_J(1995)23:226
	15	16	0.0744	98.5404	DELBEKE_D(1997)38:1196
	16	14	0.0651	98.6055	BRUNEKRE_B(1989)140:1363
	18	13	0.0604	98.7310	YOVINE_A(2004)22:890
	20	12	0.0558	98.8472	WHITEHEA_M(1984)81:487
	22	11	0.0511	98.9541	GRAHAM_J(1995):
	27	10	0.0465	99.2051	BARRIOS_L(2004)41:72
	28	9	0.0418	99.2470	HAMOSH_A(2005)33:D514
	32	7	0.0325	99.3911	MCCANN_J(1989)13:179
	34	6	0.0279	99.4515	JEMAL_A(2009)59:225
	38	5	0.0232	99.5584	HAN_Y(2005)116:1506
	46	4	0.0186	99.7397	LOBBEZOO_F(2006)33:293
	50	3	0.0139	99.8094	BRADLEY_J(1994):
	58	2	0.0093	99.9163	YAGER_R(1988)18:183
	67	2	0.0093	100.0000	REYES_H(2004)132:7

Sum 21513 100.0000



SPC – short cycles

Peer Review
from WoS

V. Batagelj,
A. Ferligoj

Data

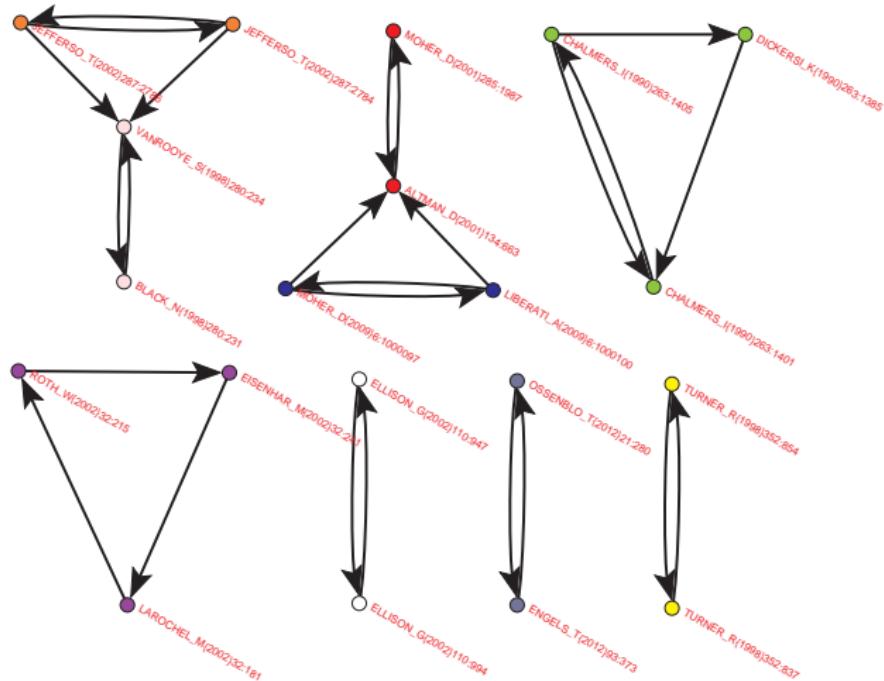
Distributions

Citations

Collaboration

References

To do



SPC – Search path count method

Peer Review
from WoS

V. Batagelj,
A. Ferligoj

Data

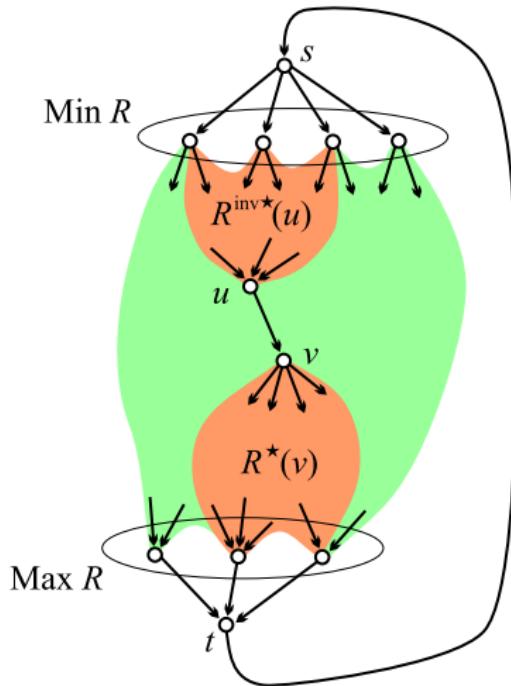
Distributions

Citations

Collaboration

References

To do



The **search path count** (SPC) method is based on counters $n(u, v)$ that count the number of different paths from s to t through the arc (u, v) .

[arXiv](#), [Wiley book](#)

The **Main path** starts in a link with the largest SPC weight and expands in both directions following the adjacent link with the largest SPC weight.

The **CPM path** is determined using the Critical Path Method from Operations Research.

Citation networks – SPC weights analysis

Peer Review
from WoS

V. Batagelj,
A. Ferligoj

Data

Distributions

Citations

Collaboration

References

To do

In the network we compute the SPC weights and on their basis determine the Main path, the CPM path and link islands [20 200].
Islands labels:

12(1):199	11(2):89	4(3):83	1:81
6:62	10(4):46	9:39	2(5):39
3:31	7:24	5(6):22	8:20

picture (extract): size

SPC – Main Path and CPM path

Peer Review
from WoS

V. Batagelj,
A. Ferligoj

Data

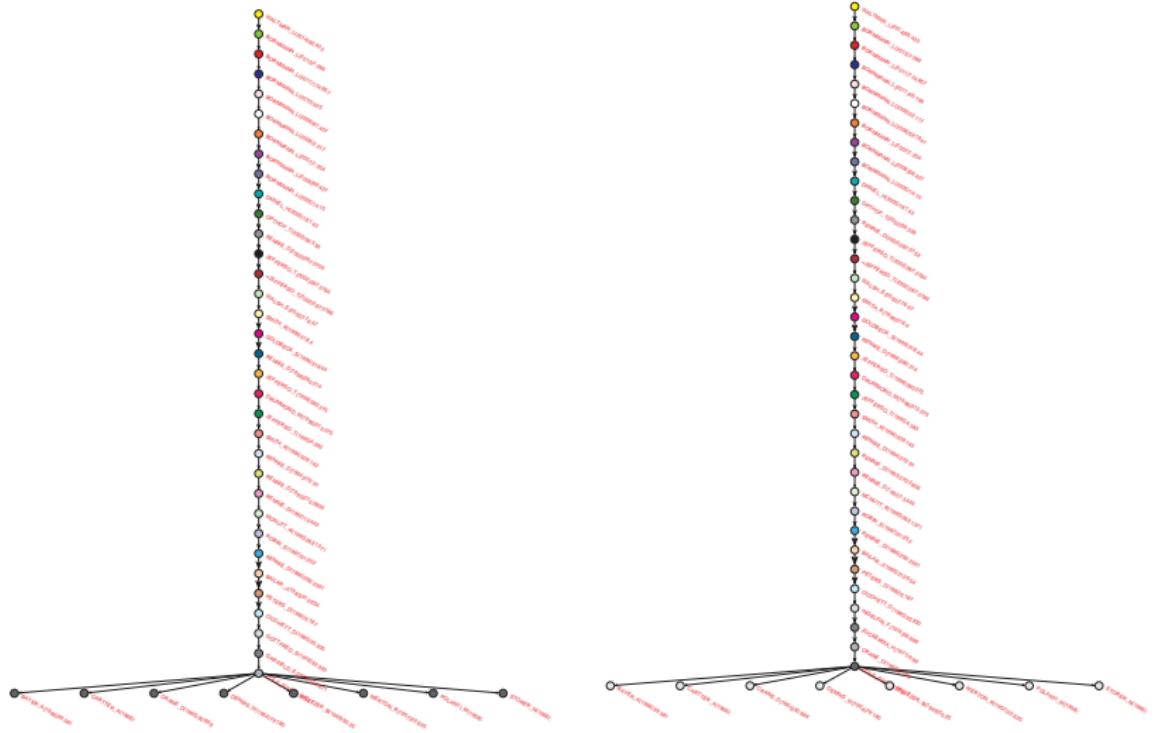
Distributions

Citations

Collaboration

References

To do





Main path and CPM path list of titles

Peer Review from WoS

V. Batagelj,
A. Ferligoj

Data

Distributions

Citations

Collaboration

References

五



The main path publications till 1982

Peer Review
from WoS

V. Batagelj,
A. Ferligoj

Data

Distributions

Citations

Collaboration

References

To do

Journals: social science journals (sociological, psychological, educational,...).

The most **influential authors:** Cole and Cole (1967), Zuckerman and Merton (1971), Garfield (1972), Gottfredson (1978), and Peters and Ceci (1982).

Topics: scientific productivity, citation measures as measures of scientific accomplishment, scientific output and recognition, evaluation in science, referee system, journal evaluation, peer-evaluation system, review process, peer review practices.



The main path publications from 1983 to 2002

Peer Review
from WoS

V. Batagelj,
A. Ferligoj

Data

Distributions

Citations

Collaboration

References

To do

Journals: biomedical journals, mainly in JAMA. From 1986 the International Congress on Peer Review and Biomedical Publication is organized every four years.

The most **influential authors:** Rennie (1986, 1992, 1993, 1994, 2002), Smith (1994, 1999), Jefferson (1995, 1998, 2002), and their collaborators.

Topics: the effects of blinding on review quality, research into peer review, guidelines for peer reviewing, monitoring the peer review performance, open peer review, bias in peer review system, measuring the quality of editorial peer review. Development of meta-analysis and systematic reviews approaches.



The main path publications from 2003 on

Peer Review
from WoS

V. Batagelj,
A. Ferligoj

Data

Distributions

Citations

Collaboration

References

To do

Journals: specialized journals on science studies: Scientometrics, Research Evaluation, Journal of Informetrics, JASIST.

The most **influential authors:** Bornmann and Daniel (2005, 2006, 2007, 2008, 2009, 2010, 2011). The last paper on the main path is Waltman and Costas (2014).

Topics: Bornmann and Daniel studied the validity of committee peer review process for awarding long-term fellowship to post-graduate researchers, the use of h-index and pre-screening of applications at Boehringer Ingelheim Fonds. They also analysed citations of accepted and rejected papers at a prime chemistry journal (*Angewandte Chemie International Edition - AC-IE*), the effect of exchanging reviews, the peer review process in this journal, the validity of its editorial decisions. The last two papers (Bornmann and Leydesdorff, 2013; Waltman and Costas, 2014) use F1000 (a post-publication peer review system) recommendations as a source of research evaluation.

Cuts, islands, cores

Peer Review
from WoS

V. Batagelj,
A. Ferligoj

Data

Distributions

Citations

Collaboration

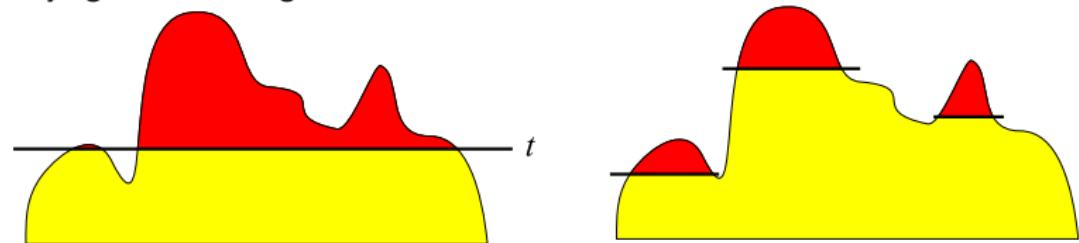
References

To do

The **node-cut** of a network $\mathcal{N} = (\mathcal{V}, \mathcal{L}, p)$, $p : \mathcal{V} \rightarrow \mathbb{R}$, at level t is a subnetwork $\mathcal{N}(t) = (\mathcal{V}', \mathcal{L}(\mathcal{V}'), p)$, determined by the set $\mathcal{V}' = \{v \in \mathcal{V} : p(v) \geq t\}$ and $\mathcal{L}(\mathcal{V}')$ is the set of links from \mathcal{L} that have both endnodes in \mathcal{V}' .

The **link-cut** of a network $\mathcal{N} = (\mathcal{V}, \mathcal{L}, w)$, $w : \mathcal{L} \rightarrow \mathbb{R}$, at level t is a subnetwork $\mathcal{N}(t) = (\mathcal{V}(\mathcal{L}'), \mathcal{L}', w)$, determined by the set $\mathcal{L}' = \{e \in \mathcal{L} : w(e) \geq t\}$ and $\mathcal{V}(\mathcal{L}')$ is the set of all endnodes of the links from \mathcal{L}' .

If we represent a given or computed value of nodes / links as a height of nodes / links and we immerse the network into a water up to selected level we get **islands**. Varying the level we get different islands.



The subgraph $\mathcal{H} = (C, \mathcal{E}|_C)$ induced by the set $C \subseteq \mathcal{V}$ is a ***p*-core at level** $t \in \mathbb{R}$ iff $\forall v \in C : t \leq p(v, C)$ and C is a maximal such set.

Ordinary **core**: $p(v, C) = \deg_H(v)$

***p*s-core**: $p(v, C) = \sum_{u \in C} w(v, u)$, $w(v, u)$ is the weight of link (v, u)

SPC islands [20 200]

Peer Review
from WoS

V. Batagelj,
A. Ferligoj

Data

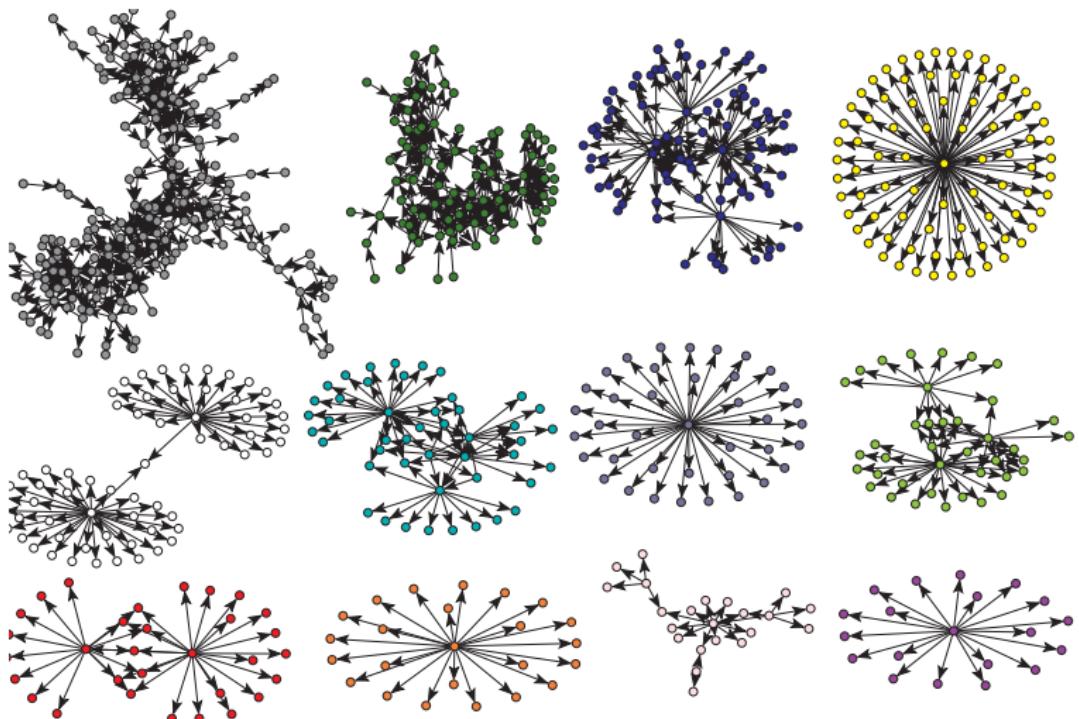
Distributions

Citations

Collaboration

References

To do



SPC – Island1 [100]/[200]

$$w_{max} = 2.936 \cdot 10^{-1}$$

Peer Review
from WoS

V. Batagelj,
A. Ferligoj

Data

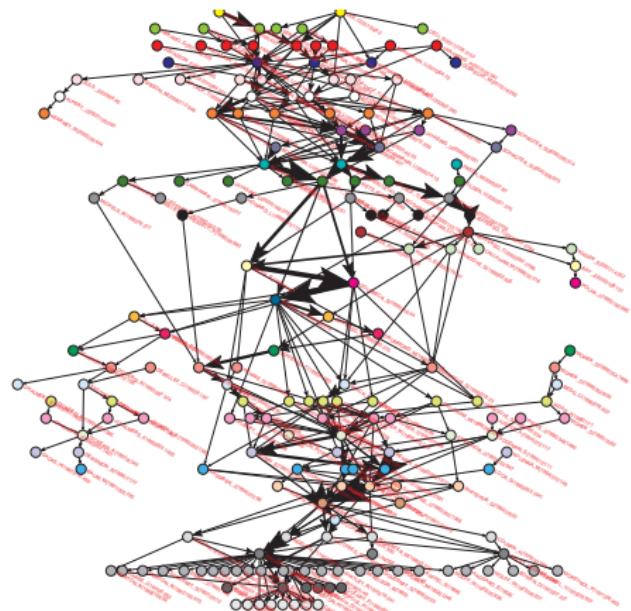
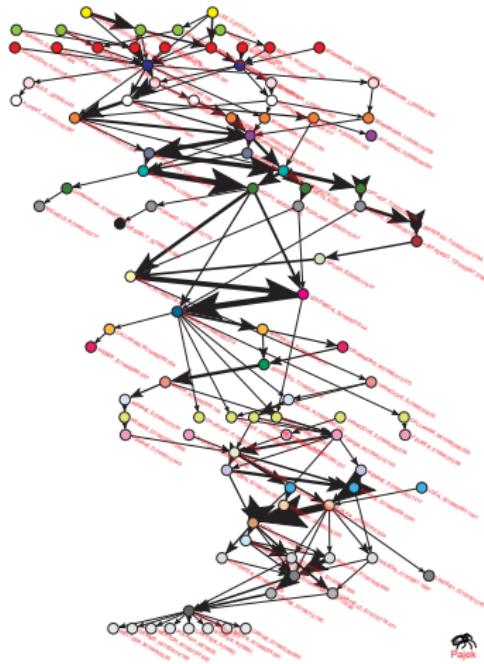
Distributions

Citations

Collaboration

References

To do





SPC – island1 / list of titles

Peer Review
from WoS

V. Batagelj,
A. Ferligoj

Data

Distributions

Citations

Collaboration

References

二

$$w_{max} = 7.715 \cdot 10^{-5}$$

Peer Review
from WoS

V. Batagelj,
A. Ferligoj

Data

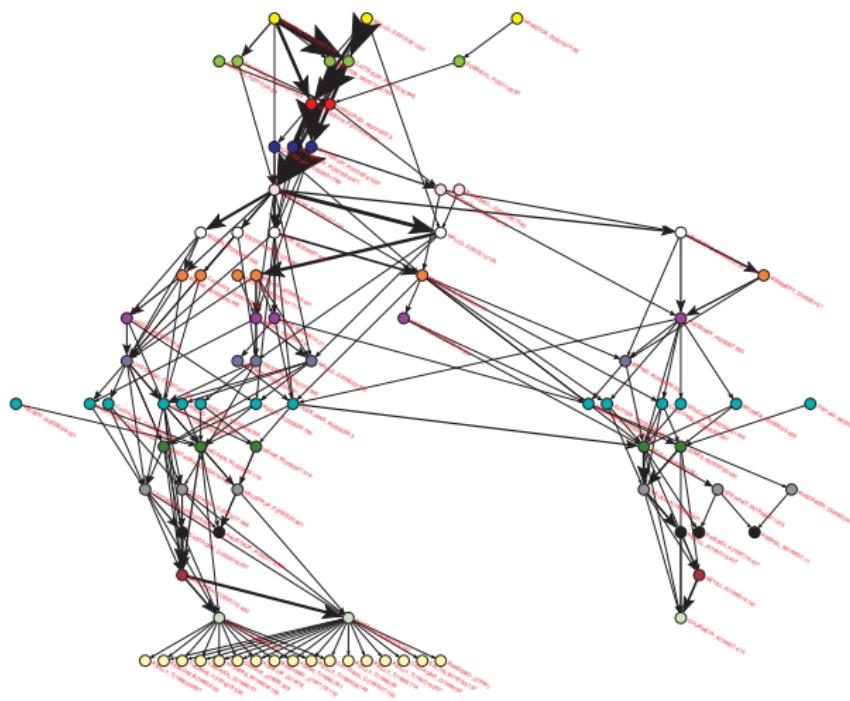
Distributions

Citations

Collaboration

References

To do



Island2 – Refereeing in sport.

SPC – Island3 and Island4

$$w_{max} = 1.415 \cdot 10^{-8} \text{ and } w_{max} = 1.132 \cdot 10^{-8}$$

Peer Review
from WoS

V. Batagelj,
A. Ferligoj

Data

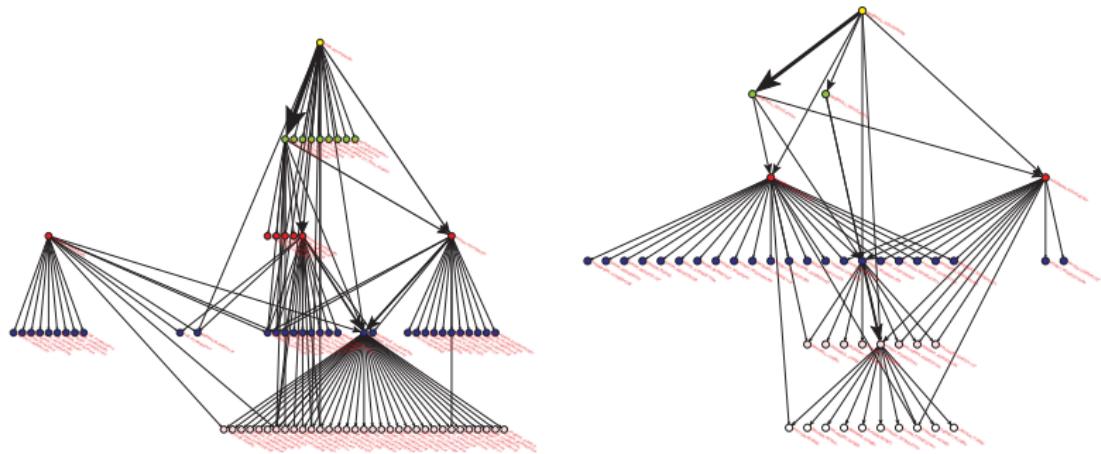
Distributions

Citations

Collaboration

References

To do



Island3 – isotopes / nuclear physics;
Island4 – athletic training.

SPC – Island5 and Island6

$$w_{max} = 1.516 \cdot 10^{-9} \text{ and } w_{max} = 1.112 \cdot 10^{-9}$$

Peer Review
from WoS

V. Batagelj,
A. Ferligoj

Data

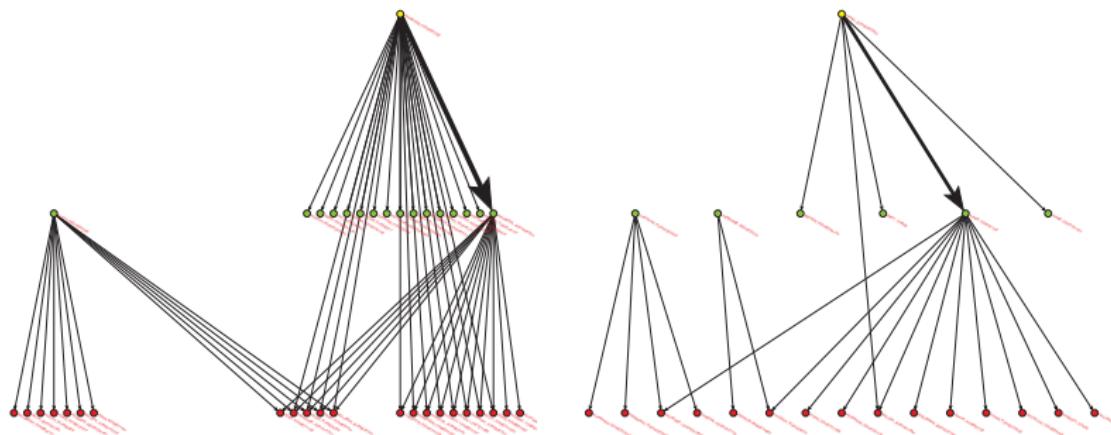
Distributions

Citations

Collaboration

References

To do



Island5 – dentures;
Island6 – genome.



Derived networks

Peer Review
from WoS

V. Batagelj,
A. Ferligoj

Data

Distributions

Citations

Collaboration

References

To do

Collaboration network: $Co = WA^T * WA$

Network normalization: $N = n(WA) = \text{diag}(\frac{1}{\max(1, \text{outdeg}_{WA}(v))})_{v \in W} * A$

Normalized collaboration: $Cn = N^T * N$

Authors using keywords: $AK = WA^T * WK$

Authors publishing in journals: $AJ = WA^T * WJ$

Works citing authors: $WciA = Cite * WA$

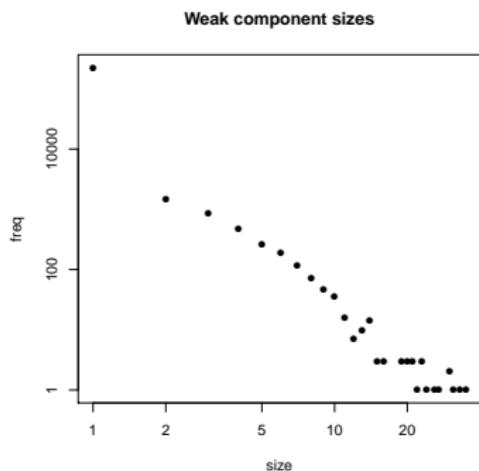
Authors citing authors: $Aci = WA^T * Cite * WA$

Distribution of the size of weak components in the collaboration network

Peer Review
from WoS

V. Batagelj,
A. Ferligoj

Data
Distributions
Citations
Collaboration
References
To do



The 268258 authors form 228584 weak components. The “giant” component contains 30047 authors.

1	224968	2	1488	3	860	4	470	5	264	6	187	7	116	8	73	9	47	10	36
11	16	12	7	13	10	14	14	15	3	16	3	19	3	20	3	21	3	22	1
23	3	24	1	26	1	27	1	30	2	31	1	33	1	35	1	30047	1		

Collaboration count/ link cut at level 10

Peer Review
from WoS

V. Batagelj,
A. Ferligoj

Data

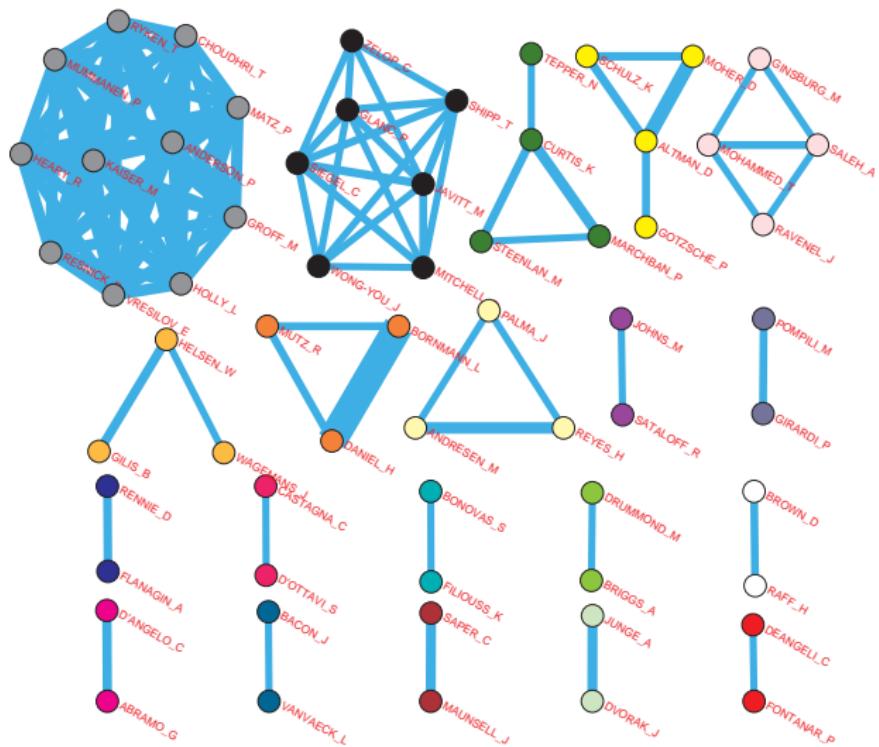
Distributions

Citations

Collaboration

References

To do



Normalized collaboration / link cut at level 2

Peer Review
from WoS

V. Batagelj,
A. Ferligoj

Data

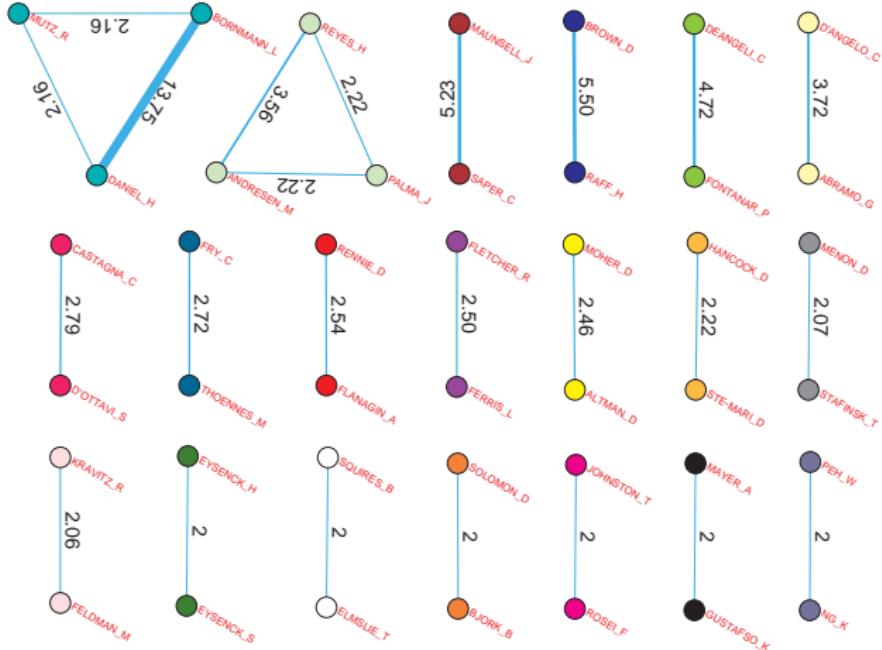
Distributions

Citations

Collaboration

References

To do



Normalized collaboration / islands 14, 21, 19, 1
[5,50]: 1767, [20,50]: 135, [40:50]: 21

Peer Review
from WoS

V. Batagelj,
A. Ferligoj

Data

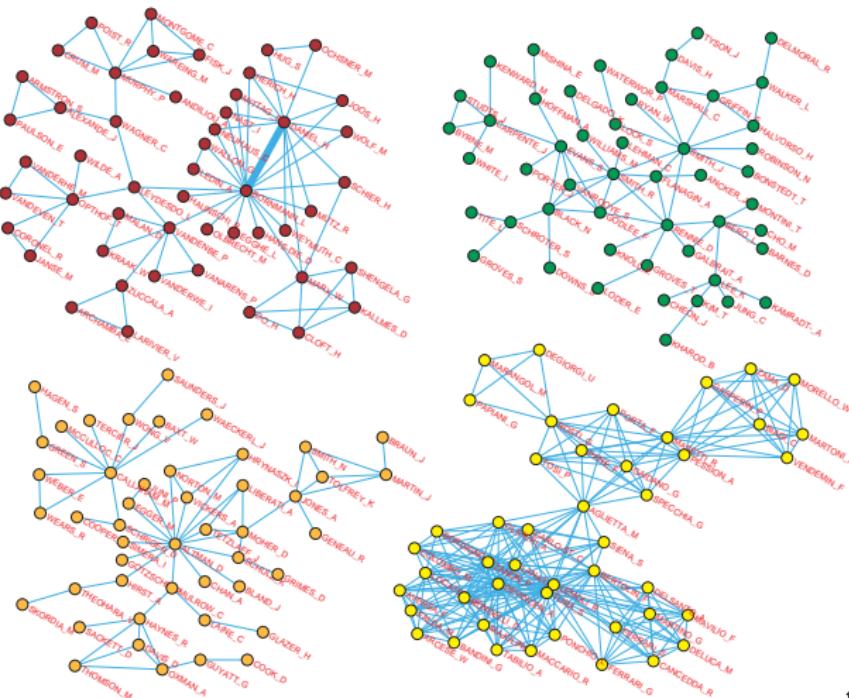
Distributions

Citations

Collaboration

References

To do



AK indeg

Main keywords for selected islands

Peer Review
from WoSV. Batagelj,
A. Ferligoj

Data

Distributions

Citations

Collaboration

References

To do

	i	f Island14	f Island21	f Island19	f Island1
	1	163 review	150 review	180 quality	65 cell
	2	136 peer	118 peer	165 trial	59 leukemia
	3	78 journal	106 quality	143 review	58 colony-stimulating
	4	72 science	90 publication	129 randomize	58 factor
	5	62 citation	85 trial	104 statement	51 chronic
	6	60 analysis	63 research	102 report	51 myelogenous
	7	58 research	58 recommendation	101 peer	48 transplantation
	8	55 publication	56 report	92 journal	47 stem
	9	55 manuscript	54 journal	85 publication	40 myeloid-leukemia
Data	10	50 study	52 biomedical	81 bias	36 hematopoietic
Distributions	11	47 grant	43 randomize	77 clinical-trials	33 disease
Citations	12	46 quality	39 control	74 research	32 peripheral
Collaboration	13	46 validity	37 bias	73 guideline	32 blood
References	14	45 selection	37 referee	69 systematic	32 cord
	15	42 bias	35 effect	68 medical	32 marrow
	16	41 angewandte-chemie	35 reviewer	63 control	32 bone
	17	41 impact	33 health	59 consort	32 allogeneic
	18	41 scientific	32 congress	57 controlled-trials	30 use
	19	38 decision	31 peer-review	54 recommendation	29 clinical
To do	20	36 indicator	30 risk	53 health	28 t-lymphocytes
	21	36 performance	30 international	50 reviewer	28 human
	22	36 index	25 standard	50 analysis	28 dendritic
	23	31 committee	24 medical	50 clinical	28 cytotoxic
	24	30 effect	24 clinical	49 article	26 bone-marrow
	25	29 chemistry	22 therapy	47 outcome	22 source
	26	28 referee	22 manuscript	46 editor	22 versus-host
	27	28 predictive-validity	22 intervention	45 elaboration	22 peripheral-blood
	28	28 process	22 subcommittee-a	45 study	22 umbilical-cord-blood
	29	28 reliability	21 cancer	44 explanation	22 graft-versus-host
	30	25 use	21 impact	42 metaanalysis	21 natural-killer-cells
	31	25 reviewer	21 woman	42 intervention	21 long-term
	32	23 predictive	20 surgery	38 improve	21 graft-versus-leukemia
	33	23 case	20 improve	38 protocol	20 progenitor
	34	23 evaluation	20 analysis	37 randomise	18 tumor-necrosis-factor
	35	22 count	20 author	37 author	17 antigen-presenting
	36	22 editor	19 peer-reviewed	36 manuscript	16 chemotherapy
	37	21 physics	19 article	35 meta-analyses	15 therapy
	38	21 approach	19 science	34 care	15 high-dose

AJ indeg

Main journals for selected islands

Peer Review
from WoS

V. Batagelj,
A. Ferligoj

Data

Distributions

Citations

Collaboration

References

To do

	i	f Island14	f Island21	f Island19	f Island1
	1	19 SCIENTOMETRICS	80 JAMA-J AM MED ASSOC	47 JAMA-J AM MED ASSOC	65 HAEMATOLOGICA
	2	12 RES EVALUAT	39 BRIT MED J	39 *****	17 ADV THER
	3	7 J INFORMATR	32 J ASSOC OFF AGR CHEM	31 BRIT MED J	
	4	6 J AM SOC INF SCI TEC	8 ANN INTERN MED	28 ANN EMERG MED	
	5	5 J R STAT SOC A STAT	7 J GEN INTERN MED	26 ANN INTERN MED	
	6	5 PLOS ONE	7 J ROY SOC MED	23 PLOS MED	
	7	4 NETH HEART J	6 MATORITAS	19 BMJ-BRIT MED J	
	8	4 ACAD MED	5 TOB CONTROL	18 J CLIN EPIDEMIOL	
	9	4 NEUROPSYCHOBIOLOGY	5 LANCET	15 LANCET	
	10	4 HUM PSYCHOPHARM CLIN	4 J EPIDEMIOL COMMUN H	14 TRIALS	
	11	4 AM J NEURORADIOL	4 BMJ-BRIT MED J	8 BMJ OPEN	
	12	3 J DOC	4 CLIN TRIALS	7 BMC MED	
	13	3 Z ERZIEHWISS	4 CONTROL CLIN TRIALS	7 PLOS ONE	
	14	3 HIGH EDUC	4 BMJ OPEN	6 CAN MED ASSOC J	
	15	3 TRANSPORT J	3 PUBLIC HEALTH REP	5 ANASTH INTENSIVMED	
	16	3 EUR HEART J	3 BMC MED	5 STAT MED	
	17	3 CARDIOVASC RES	3 HEAD NECK-J SCI SPEC	4 ERGONOMICS	
	18	3 Z PSYCHOL	3 J NATL COMPR CANC NE	4 MED CLIN-BARCELONA	
	19	3 RES TEACH ENGL	3 J AM COLL RADIOL	4 JAMA	
	20	3 REV EDUC RES	3 J CLIN EPIDEMIOL	4 J BONE JOINT SURG AM	
	21	3 INT J PERF ANAL SPOR	3 NEW ENGL J MED	4 J SPORT SCI	
	22	2 INT J SELECT ASSESS	3 STAT METHODS MED RES	4 J HUM MOVEMENT STUD	
	23	2 LEARN PUBL	2 SCI ENG ETHICS	4 FORENSIC SCI INT	
	24	2 AM J EVAL	2 VALUE HEALTH	4 CLEFT PALATE-CRAN J	
	25	2 J MIDWIFERY WOM HEAL	2 J ASSOC OFF ANA CHEM	3 REGION ANESTH	
	26	2 LIBR INFORM SCI RES	2 ONCOL NURS FORUM	3 MED J AUSTRALIA	
	27	2 ANGEW CHEM INT EDIT	2 J AM ACAD NURSE PRAC	2 VALUE HEALTH	
	28	2 CHIMIA	2 MED J AUSTRALIA	2 INT J CLIN PRACT	
	29	2 EDUC RES REV-NETH	2 AUST LIBR J	2 MARKET LETT	
	30	2 HIGH EDUC POLICY	2 J NANOSCI NANOTECHNO	2 MED KLIN-INTENSIVMED	
	31	1 ANNU REV INFORM SCI	2 PREV SCI	2 COCHRANE DB SYST REV	
	32	1 THEOR MED BIOETH	2 ENVIRON ENG SCI	2 APPL PSYCHOPHYS BIOF	
	33	1 QUAL SAF HEALTH CARE	2 B MED LIBR ASSOC	2 GLOBAL HEALTH ACTION	
	34	1 OSTEOPOROSIS INT	2 APPL VEG SCI	2 ANAESTHESIST	
	35	1 EUR J OBSTET GYN R B	2 SCHOLARLY PUBL	2 CHEST	

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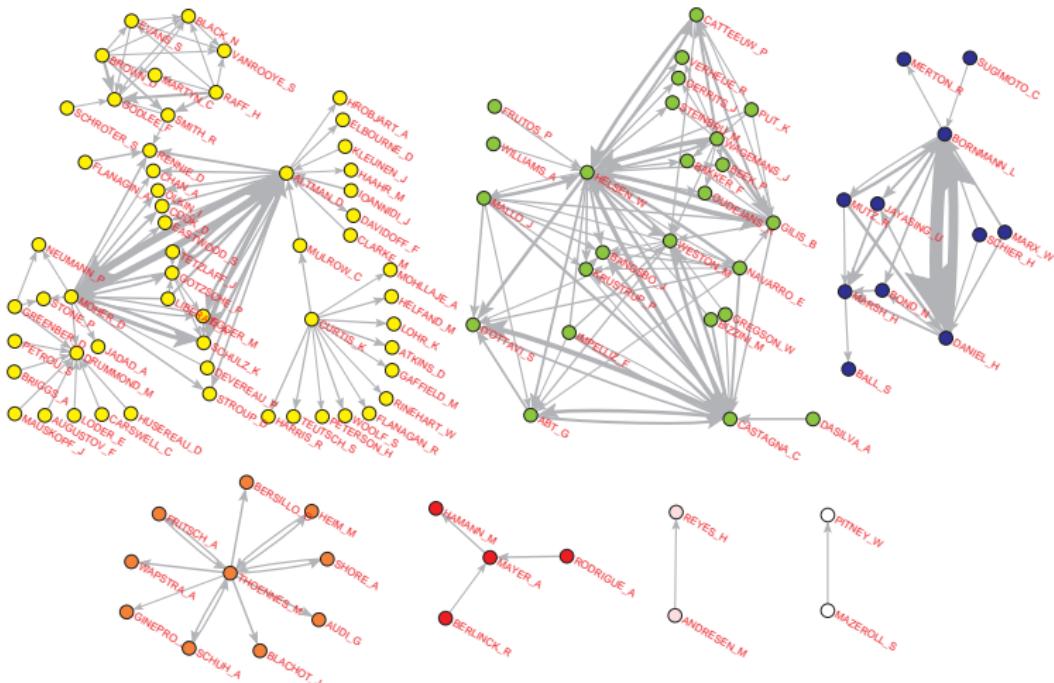
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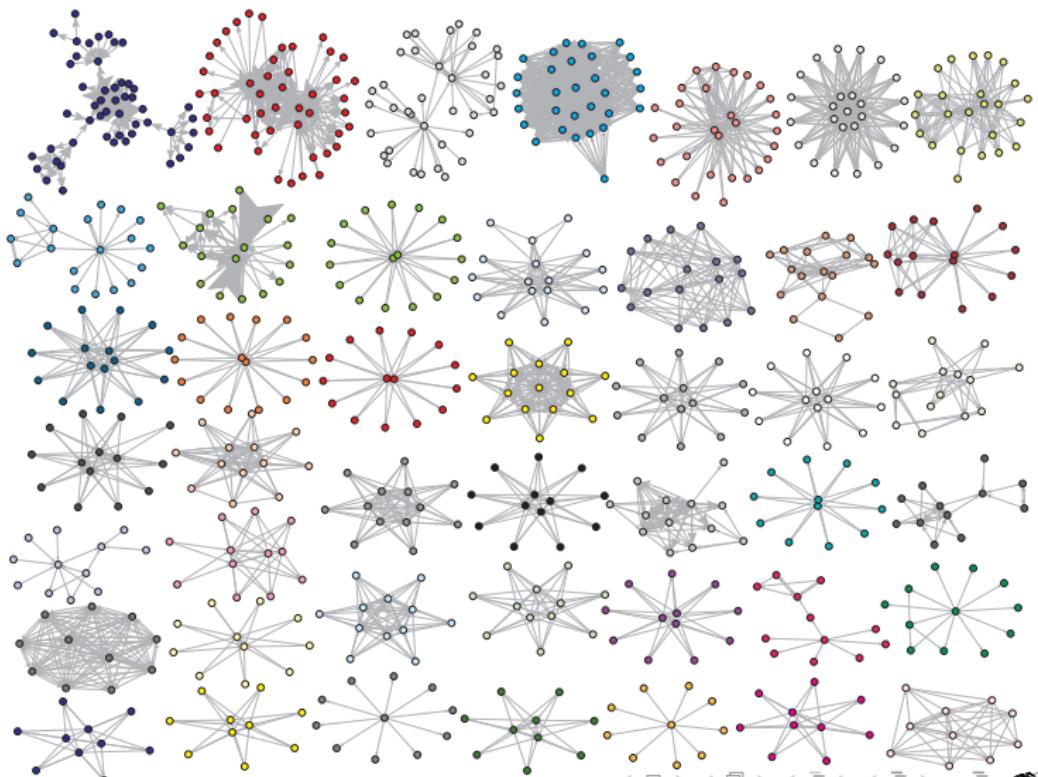
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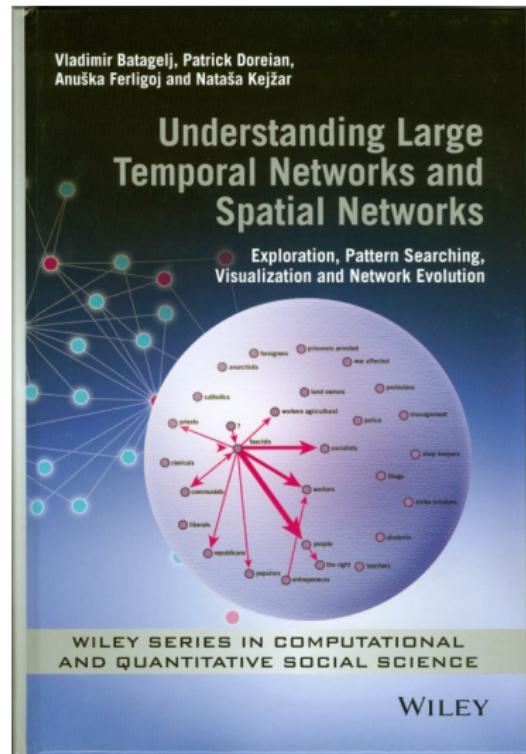
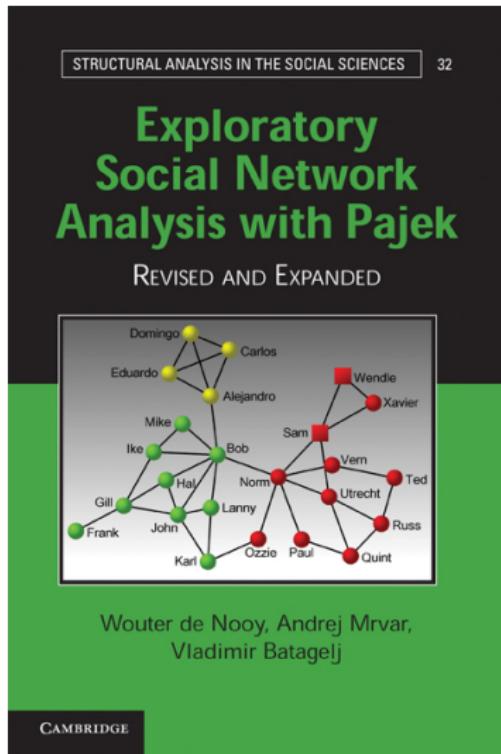
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