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A reference-based Hirschian similarity measure for journals

Schubert András

schuba@helka.iif.hu

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A reference-based Hirschian similarity measure for journals

ANDRÁS SCHUBERT
Institute for Research Policy Studies, Hungarian Academy of Sciences, Budapest, Hungary

Abstract

Hirsch's concept of h-index was used to define a similarity measure for journals. The h-similarity is easy to calculate from the publicly available data of the Journal Citation Reports, and allows for plausible interpretation. On the basis of h-similarity, a relative eminence indicator of journals was determined: the ratio of the JCR impact factor to the weighted average of that of similar journals. This standardization allows journals from disciplines with lower average citation level (mathematics, engineering, etc.) to get into the top lists.

All journals are similar, but some journals are more similar than others.

Introduction

In principle, similarity of journals can be interpreted in various ways. Similarity of cover design, similarity of circulation or similarity of price might be valid aspects of comparison in certain situations. Yet, in library and information science and technology circles, similarity is almost exclusively meant in the sense of similarity in topics. This kind of similarity can be measured, among others, with the co-occurrence of authors, keywords, users (subscribers, readers), citations or references.

On the basis of similarity, the thematic environment of journals can be delimited, journals can be classified into groups or clusters, or existing classifications (e.g., field/subfield categories of bibliographic databases) can be validated. A measure of relatedness between journals based on mutual citedness has been conceived by Pudovkin & Fuseler (1995) and further developed by Pudovkin & Garfield (2002). Vinkler (1999) suggested a similarity measure based on shared references. Klavans & Boyack (2006) gave a critical comparison of 10 intercitation- and co-citation-based journal relatedness measures. A pioneering example of citation-based journal clustering was given by Carpenter & Narin (1973). The potential of co-citation technique in journal clustering was utilized by McCain (1991; 1998). The analysis of the cross-journal citation matrix (mainly with factor analysis) led Leydesdorff (2004a, b; 2006; forthcoming) to implement a spectacular visualization of journal–journal relations. Chen (2008) used a reference-based similarity concept to validate and improve the Journal Citation Reports classification scheme. The most recent literature (e.g., Janssens & al., 2009; Zhang & al., 2009) emphasize the advantages of hybrid techniques combining the benefits of semantic, bibliometric and other methods.

In the present paper, a simple and fairly robust similarity measure is advised with the aim of constructing a reference standard for the citation impact of journals. The measure relies upon shared references to other journals and uses the h-index concept of Hirsch (2005). The possibility of using this measure for journal clustering might be the target of future research.

Methodology

In this paper, similarity of journals is defined in the sense of shared references to other journals, i.e., two journals are considered similar if their cited journal lists are similar. This similarity concept bears close resemblance to the bibliographic coupling of documents (Kessler, 1963).

It is not easy to select a suitable measure for this kind of similarity. The lists of cited journals are usually of rather different size and the reference frequency distributions are very skew. Self-reference is predominant in the great majority of journals and, in a significant number of cases, “kindred” citation links (e.g., among Series A and B of the same family of journals) further distort the picture. It seemed, therefore, reasonable to use rank-based measures instead of frequency-based ones (like the cosine-measure used by Chen (2008)). The most obvious choices of rank-correlation measures, Kendall’s tau and Spearman’s footrule, do not perform well for lists of different size with a large number of ties. It is also obvious that differences in the long tails of the distributions are practically irrelevant as similarity is concerned.

Fagin & al. (2003) modified the Kendall and Spearman measures to compare truncated lists of exactly k elements (such as top 20 or top 50 lists). Considering this approach, two problems were encountered. (1) For any reasonable choice of k, in more cases than not, k hits into the middle of a tie, and we have either to abandon the fixed length of the list by completing it to the end of the tie (shaking the keystone of the method of Fagin & al.), or to arbitrarily cut the list (causing an uncontrollable distortion of the result). (2) In the extreme case, when the top k cited journal lists of two journals contain exactly the same titles in opposite order, the method of Fagin & al. indicates extreme dissimilarity, while actually the two journals should be qualified as rather similar, since both have the same k journals from among several thousands in the top k positions.

In the search for a feasible alternative, a simple but effective option emerged.

Let us define the h-core of a ranked cited journal list (like the ones found in the Citing Journal Package of the Journal Citation Reports) as the largest top h-element list with each item having at least h citations. Then we can define the h-similarity of two journals as the number of joint titles in their h-core divided by the total number of different titles in the union of the two h-cores:

$$h_{A,B} = |H_A \cap H_B| / |H_A \cup H_B| ,$$

where $h_{A,B}$ is the h-similarity between journals A and B, the sets H_A and H_B are the h-cores of A and B, respectively, $\cap$ denotes the intersection, $\cup$ denotes the union and $|\,|$ denotes the cardinality of sets.

The h-similarity is a Jaccard-type similarity measure with a range [0,1] that has value 0 if and only if the two h-cores have no common elements and has value 1 if and only if the two h-cores contain identical elements in whatever order.

Without claiming any superiority of the h-similarity over the great variety of other similarity measures in general use, it was found that it successfully suited the challenges mentioned above, and it is a promising candidate to characterize journal similarity.

Results

Properties of the h-similarity measure

Data were taken from the 2006 Science Citation Index Journal Citation Reports (SCI JCR 2006) database. Figure 1 shows the frequency distribution of the h-core size of the 6164 journals covered by the SCI JCR 2006 database. It can be seen that except for 170 journals (white column) with a h-core of size 1 (which in practically all cases consists of the journal itself), the middle 80% of the journals (black columns) has a h-core size in the range of 8–36, which is quite a reasonable size to consider it a characteristic cited journal set.

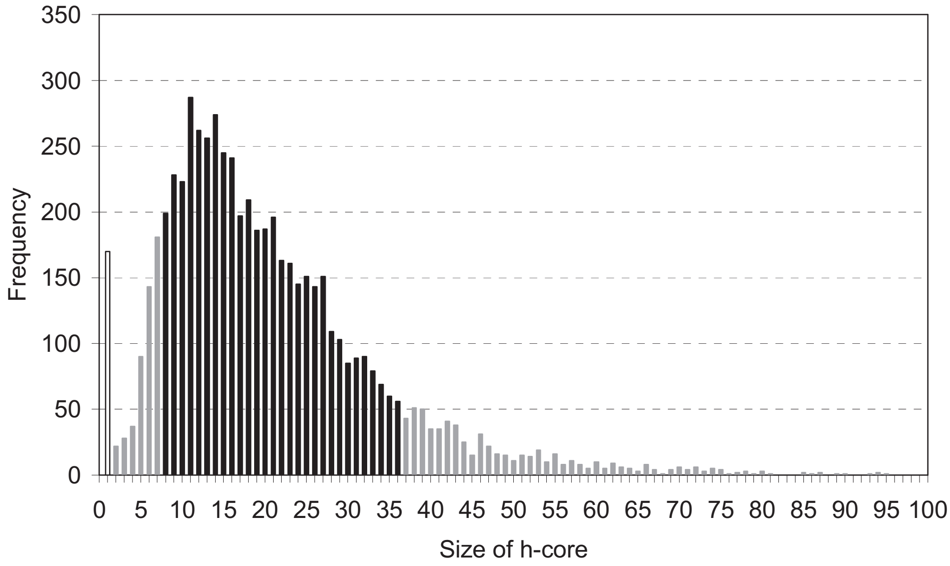

Figure 1. Frequency distribution of the h-core size of the journals in the SCI JCR 2006

From the 18,994,366 possible pairs of journals 228,332 (about 1.2%) pairs had non-zero h-similarity. Just for curiosity, one single pair had a h-similarity of 1: the journals Cambridge Quarterly of Healthcare Ethics and Bioethics had identical h-cores (of size 8).

The frequency distribution of the maximum h-similarity (rounded to the nearest .05) of the 6164 journals is given in Figure 2. The center of the distribution is quite clearly around 0.5 (mode 0.5, median 0.5, mean 0.486)

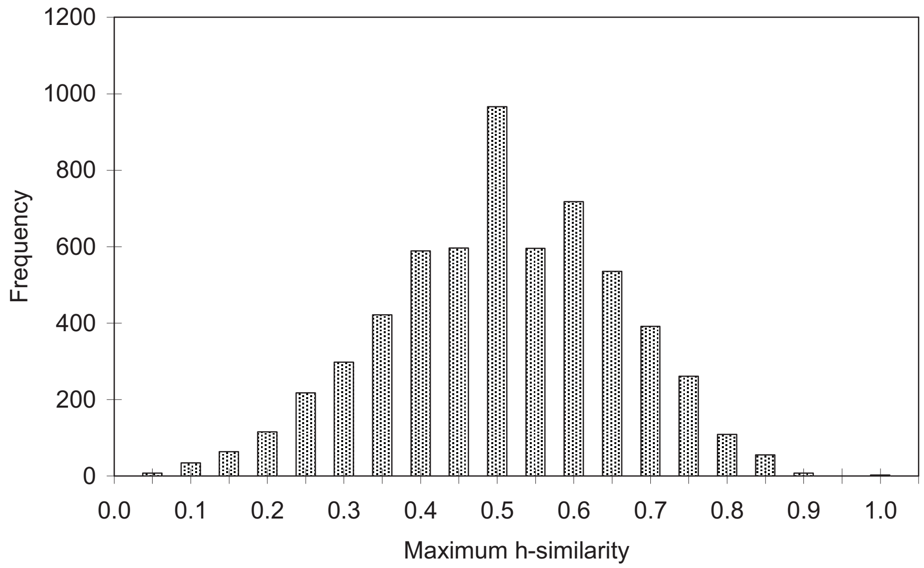

Figure 2. Frequency distribution of the maximum h-similarity of the journals in the SCI JCR 2006

By setting the limit of “close similarity” to 0.5, thus, half of the journals will have no close relatives, while the number of similar journals for the other half is ranging from 1 to 26. The maximum number, 26, is attained by the Journal of Cell Biochemistry indicating that this journal uses the most widely “popular” sources as references.

Lowering the limit, the number of kinless journals is decreasing, and the average number of similar journals is increasing (see Figure 3). The limit 0.2 seems to be a reasonable choice with less than 10% of unrelated journals and a median of about 20 relatives per journal.

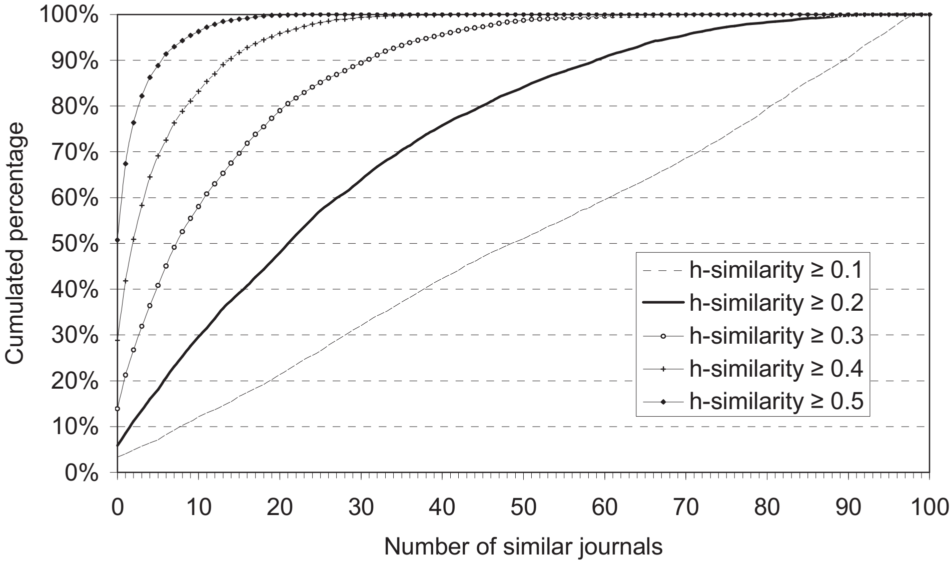

Figure 3. The cumulative distribution of the number of similar journals with various limits of h-similarity

The "h-similarity charts" of journals (lists of other journals ranked by h-similarity) show reassuringly common-sense results supporting the reasonability of the indicator. The top section of the h-similarity charts three major multidisciplinary journals is given in Table 1 (remarkable is the mutual top position of the two giants: Nature and Science), h-similarity rankings above the limit 0.2 for four information science journals are shown in Table 2 (here JASIST and Information Processing & Management exhibits mutual top kinship). Closest similarity (h-similarity ≥ 0.5) is highlighted in the tables with italics.

Including these mutually closest relatives (and the two bioethics journals mentioned above), there are 241 pairs of journals with mutual top positions in each other's h-similarity chart. They are given in Appendix 1.

Table 1. The h-similarity charts of three major multidisciplinary journals

	NATURE		SCIENCE		P NATL ACAD SCI USA	
1	***SCIENCE***	***0.634***	***NATURE***	***0.634***	***FEBS LETT***	***0.582***
2	***CELL***	***0.518***	PLOS BIOL	0.493	***J BIOL CHEM***	***0.538***
3	EMBO J	0.494	P NATL ACAD SCI USA	0.405	***BIOCHEM BIOPH RES CO***	***0.515***
4	P NATL ACAD SCI USA	0.474	CELL	0.356	***EMBO J***	***0.500***
5	PLOS BIOL	0.443	EMBO J	0.356	NUCLEIC ACIDS RES	0.487
6	GENE DEV	0.442	CURR BIOL	0.337	CELL	0.476
7	J CELL BIOL	0.427	PHILOS T R SOC B	0.329	NATURE	0.474
8	FEBS LETT	0.422	FEBS LETT	0.317	BIOCHEM J	0.464
9	J CELL SCI	0.404	J CELL BIOL	0.298	J CELL SCI	0.450
10	MOL BIOL CELL	0.391	J THEOR BIOL	0.298	MOL CELL BIOL	0.444
11	NAT REV MOL CELL BIO	0.380	NAT STRUCT MOL BIOL	0.297	GENE DEV	0.443
12	J BIOL CHEM	0.379	MOL BIOL CELL	0.290	J MOL BIOL	0.437
13	MOL CELL BIOL	0.373	GENE DEV	0.289	BIOCHEMISTRY-US	0.419
14	HUM MOL GENET	0.371	NUCLEIC ACIDS RES	0.288	GENE	0.415
15	BIOCHEM J	0.361	GENETICS	0.280	SCIENCE	0.405
	41 other journals above 0.2		28 other journals above 0.2		62 other journals above 0.2	

Table 2. The h-similarity charts of four information science journals

	SCIENTOMETRICS		J AM SOC INF SCI TEC		J INF SCI		INFORM PROCESS MANAG	
1	J AM SOC INF SCI TEC	0.400	***INFORM PROCESS MANAG***	***0.500***	ANNU REV INFORM SCI	0.455	***J AM SOC INF SCI TEC***	***0.500***
2	INFORM PROCESS MANAG	0.316	J INF SCI	0.412	J AM SOC INF SCI TEC	0.412	INFORM RETRIEVAL	0.462
3	J INF SCI	0.294	SCIENTOMETRICS	0.400	INFORM PROCESS MANAG	0.400	J INF SCI	0.400
4	ANNU REV INFORM SCI	0.250	INTERNET RES	0.353	ONLINE INFORM REV	0.308	ANNU REV INFORM SCI	0.357
5	SCIENTIST	0.235	COMMUN ACM	0.294	INTERNET RES	0.308	SCIENTOMETRICS	0.316
6	ASLIB PROC	0.200	ANNU REV INFORM SCI	0.294	SCIENTOMETRICS	0.294	ACM COMPUT SURV	0.278
7			INFORM RETRIEVAL	0.294	ASLIB PROC	0.273	ASLIB PROC	0.214
8			ONLINE INFORM REV	0.278	J MANAGE INFORM SYST	0.250	ACM T INFORM SYST	0.200
9			DECIS SUPPORT SYST	0.269	ACM T INFORM SYST	0.250		
10			J MANAGE INFORM SYST	0.238	INFORM RETRIEVAL	0.231		

11			INT J ELECTRON COMM	0.211	DECIS SUPPORT SYST	0.227		
12			INT J HUM-COMPUT ST	0.200	J DATABASE MANAGE	0.214		
13			EUR J INFORM SYST	0.200	INT J HUM-COMPUT ST	0.200		
14					INFORM TECHNOL LIBR	0.200		
15					J INF TECHNOL	0.200		

Application of the h-similarity measure for constructing a reference standard for the impact factor of journals

The demand for standardizing journal impact factors to balance disciplinary differences dates back to the earliest use of this indicator. The pioneering paper of Hirst (1978) is widely cited up to the present days. The idea of comparing the impact factor of a journal to the (weighted) average of the impact factor of its cited journals was first suggested by Vinkler (1988) and was further developed by Schubert & Braun (1993).

In the present paper, another standardized impact factor free from any a priori disciplinary categorization is proposed with a standard based not on the cited journals themselves but on journals with shared references, i.e., h-similarity. Namely,

$$\xi_A = x_A/(\Sigma_B h_{A,B} x_B/\Sigma_B h_{A,B}) ,$$

where ξ_A is the standardized impact factor of journal A, x_A and x_B are the JCR impact factors of journals A and B, $h_{A,B}$ is the h-similarity between journals A and B, and Σ_B denotes summation over all journals B other than A.

Similarly to the majority of bibliometric indicators, ξ has a rather skew distribution (see Figure 4). Its average value is 0.544, the maximum and the median is at about 0.4. About 10% of all journals (exactly 561 titles; black columns in Figure 4) have a standardized impact factor value of 1 or above. These journals can be considered the “upper class” of scientific publication, since their impact factor is higher than the average of their h-similar peers.

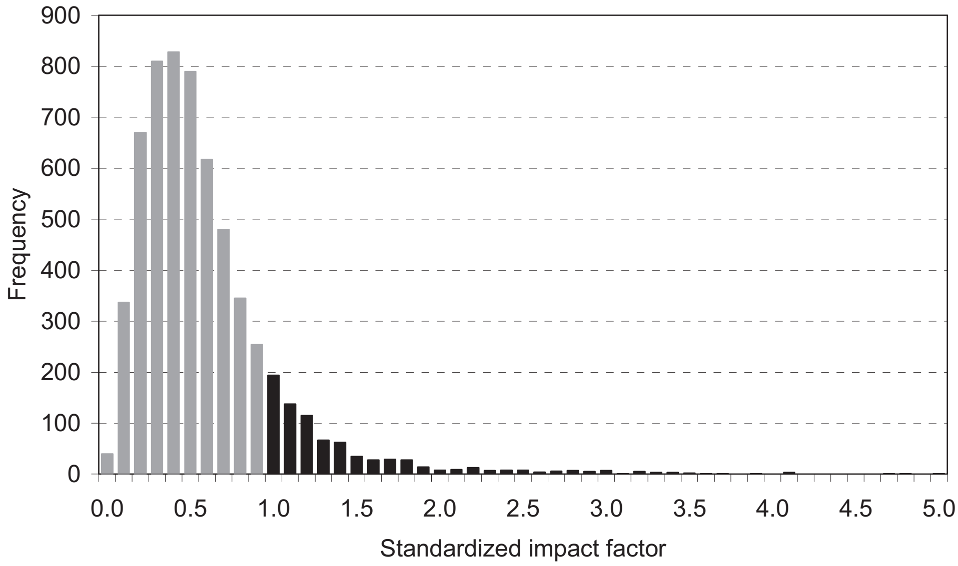

Figure 4. Frequency distribution of the standardized impact factor of the journals in the SCI JCR 2006

It is well known (see, e.g., Schubert & Braun (1993)) that review journals are highly preferred by citation-based indicators. Schubert & Braun (1993) also established a simple and sensible indicator distinguishing review from non-review journals: the percentage share of journal self-references among the total number of references, which is significantly lower for review journals than for non-review journals. Table 3 contains separate lists for journals below and above self-reference rate of 5%. The top

20 review journals had a standardized impact factor of 3 or higher, the top 32 non-review journals had $\xi > 2$.

Table 3. The top review and non-review journals ranked by standardized impact factor

Review journals (self-ref < 5%)				
Rank	**Title**	**Std IF**	**JCR IF**	**Self-ref**
1	CA-CANCER J CLIN	10.562	63.342	1.89%
2	REV MOD PHYS	9.662	33.508	1.43%
3	ANNU REV FLUID MECH	6.313	12.469	3.31%
4	PROG POLYM SCI	5.470	14.818	0.85%
5	MAT SCI ENG R	5.280	17.731	0.58%
6	ANNU REV IMMUNOL	4.987	47.237	2.32%
7	CHEM REV	4.791	26.054	1.30%
8	ANNU REV ASTRON ASTR	4.643	16.914	1.89%
9	NAT MATER	4.092	19.194	3.69%
10	PHYSIOL REV	4.046	31.441	0.64%
11	PROG MATER SCI	3.807	10.229	0.30%
12	ANNU REV BIOCHEM	3.698	36.525	0.95%
13	ANNU REV NEUROSCI	3.566	28.533	1.90%
14	PROG ENERG COMBUST	3.369	4.333	2.36%
15	ENDOCR REV	3.355	23.901	0.88%
16	TRENDS ECOL EVOL	3.313	14.125	4.02%
17	BRIEF BIOINFORM	3.239	24.370	1.18%
18	NAT REV CANCER	3.180	31.583	2.25%
19	ACCOUNTS CHEM RES	3.161	17.113	1.49%
20	ASTRON ASTROPHYS REV	3.058	13.667	0.00%
Non-review journals (self-ref > 5%)				
Rank	**Title**	**Std IF**	**JCR IF**	**Self-ref**
1	NEW ENGL J MED	6.448	51.296	11.46%
2	MIS QUART	3.436	4.731	6.86%
3	INT J NONLINEAR SCI	3.421	4.386	12.49%
4	INT J COMPUT VISION	3.280	6.085	7.45%
5	LANCET	3.254	25.800	9.70%
6	JAMA-J AM MED ASSOC	3.136	23.175	10.03%
7	INT J PLASTICITY	3.104	4.113	19.61%
8	ANN MATH	2.834	2.426	6.84%
9	PROD OPER MANAG	2.783	2.516	15.03%
10	IEEE T AUTOMAT CONTR	2.665	2.772	18.22%
11	NAT IMMUNOL	2.624	27.596	7.13%
12	SCIENCE	2.612	30.028	10.85%
13	ACM T GRAPHIC	2.588	4.081	13.15%
14	IEEE T PATTERN ANAL	2.537	4.306	12.39%
15	ARCH GEN PSYCHIAT	2.526	13.936	6.98%
16	IEEE T EVOLUT COMPUT	2.497	3.770	10.44%
17	CELL	2.452	29.194	8.85%
18	NAT GENET	2.339	24.176	9.44%
19	J R STAT SOC B	2.315	2.315	7.17%
20	AUTOMATICA	2.233	2.273	9.68%
21	ASTROPHYS J SUPPL S	2.192	8.627	6.43%
22	NATURE	2.167	26.681	12.34%
23	NAT BIOTECHNOL	2.118	22.672	7.22%
24	J PROD INNOVAT MANAG	2.117	1.588	8.80%
25	NANO LETT	2.116	9.960	6.75%
26	IEEE T SOFTWARE ENG	2.105	2.132	7.41%
27	INVENT MATH	2.103	1.659	5.91%
28	ANN STAT	2.061	1.902	15.97%
29	ANN INTERN MED	2.043	14.780	6.89%
30	ECONOMETRICA	2.037	2.402	17.56%
31	ANGEW CHEM INT EDIT	2.019	10.232	16.29%
32	TRANSPORT RES B-METH	2.006	1.761	12.70%

It is very reassuring to see that the indisputable "top stars" (Science, Nature, Cell, New England Journal of Medicine, Lancet) are all there on the list. On the other hand, journals from disciplines less favored by the JCR impact factor may find place on the top indicating a paramount relative eminence within their kinship. Whether these positions are stable or reflect a kind of ephemeral fame may be the target of future longitudinal studies.

Conclusions

It was demonstrated on another example that Hirsch's concept of h-index stretches far beyond of its original scope "to quantify an individual's scientific research output". Similarly to some earlier attempts to use it for constructing a centrality measure of networks by Korn & al. (2009) and specifically for journal networks by Schubert & al. (2009), it could be used effectively in defining a similarity measure for journals, as well. The h-similarity is easy to calculate from the publicly available data of the Journal Citation Reports, and allows for plausible interpretation. No obvious artifacts or systematic weaknesses have been found.

On the basis of h-similarity, a relative eminence indicator of journals can be determined: the ratio of the JCR impact factor to the weighted average of that of similar journals. Similarly to the original impact factor, this indicator also favors review journals, which should be treated, therefore, separately. The standardization allows journals from disciplines with lower average citation level (mathematics, engineering, etc.) to get into the top lists.

Further studies including cluster analysis based on h-similarity, or longitudinal studies of the standardized impact factors would be welcome.

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Appendix 1

Mutually closest h-similarity between pairs of journals

1.000	BIOETHICS ↔ CAMB Q HEALTHC ETHIC
0.897	CLIN ENDOCRINOL ↔ EUR J ENDOCRINOL
0.889	MULTIVAR BEHAV RES ↔ STRUCT EQU MODELING
0.846	ANNU REV IMMUNOL ↔ IMMUNOL RES
0.846	INORG CHIM ACTA ↔ POLYHEDRON
0.842	COMPOS MATH ↔ INVENT MATH
0.838	ORG LETT ↔ TETRAHEDRON
0.833	IEEE J QUANTUM ELECT ↔ IEEE J SEL TOP QUANT
0.833	IEEE T VEH TECHNOL ↔ IEEE T WIREL COMMUN
0.824	AAPS PHARMSCITECH ↔ DRUG DEV IND PHARM
0.824	GEOL SOC AM BULL ↔ GEOLOGY
0.821	IBIS ↔ J ORNITHOL
0.818	ECHOCARDIOGR-J CARD ↔ J AM SOC ECHOCARDIOG
0.816	ANN RHEUM DIS ↔ RHEUMATOLOGY
0.815	HEART RHYTHM ↔ J CARDIOVASC ELECTR
0.813	ASTRON LETT+ ↔ ASTRON REP+
0.811	CURR OPIN IMMUNOL ↔ NAT REV IMMUNOL
0.806	DALTON T ↔ EUR J INORG CHEM
0.803	J ORGANOMET CHEM ↔ ORGANOMETALLICS
0.794	MOL CANCER RES ↔ NEOPLASIA
0.793	AUK ↔ CONDOR
0.793	MATURITAS ↔ MENOPAUSE
0.789	CRUSTACEANA ↔ J CRUSTACEAN BIOL
0.788	IMMUNITY ↔ NAT IMMUNOL
0.787	GYNECOL ONCOL ↔ INT J GYNECOL CANCER
0.784	SYNLETT ↔ SYNTHESIS-STUTTGART
0.778	ACM SIGPLAN NOTICES ↔ ACM T PROGR LANG SYS
0.778	IEE P-GENER TRANSM D ↔ INT J ELEC POWER
0.778	NEUROPSYCHOPHARMACOL ↔ PSYCHOPHARMACOLOGY
0.774	PHYS LETT B ↔ PHYS REV D
0.771	J THROMB HAEMOST ↔ THROMB HAEMOSTASIS
0.769	PERCEPT PSYCHOPHYS ↔ PERCEPTION
0.768	PLANT J ↔ PLANT PHYSIOL
0.767	J UROLOGY ↔ UROLOGY
0.765	INT J DERMATOL ↔ J EUR ACAD DERMATOL
0.762	EUR NEUROPSYCHOPHARM ↔ PROG NEURO-PSYCHOPH
0.761	BIOL REPROD ↔ REPRODUCTION
0.760	BIOTROPICA ↔ J TROP ECOL
0.758	DIABETES RES CLIN PR ↔ DIABETIC MED
0.758	EUR J NEUROSCI ↔ NEUROSCIENCE
0.757	INT J MOD PHYS A ↔ MOD PHYS LETT A
0.756	PLANT SCI ↔ PLANTA
0.755	PROTEIN SCI ↔ PROTEINS
0.750	GEOSYNTH INT ↔ GEOTEXT GEOMEMBRANES
0.750	MED EDUC ↔ MED TEACH
0.750	PATHOL INT ↔ PATHOLOGY
0.746	J CELL BIOL ↔ MOL BIOL CELL
0.745	J AM CERAM SOC ↔ J EUR CERAM SOC
0.742	EUR J HEART FAIL ↔ J CARD FAIL
0.741	AIDS RES HUM RETROV ↔ AIDS REV
0.741	ASTRON ASTROPHYS ↔ ASTROPHYS J
0.738	CANCER LETT ↔ INT J ONCOL
0.737	J COMPUT CHEM ↔ THEOR CHEM ACC
0.734	CHEM COMMUN ↔ CHEM-EUR J
0.734	MATER CHEM PHYS ↔ MATER LETT
0.732	DEV BIOL ↔ DEVELOPMENT
0.732	NAT REV MOL CELL BIO ↔ TRENDS CELL BIOL
0.730	BRAIN LANG ↔ CORTEX
0.729	BIOINFORMATICS ↔ BMC BIOINFORMATICS
0.729	CLIN ORTHOP RELAT R ↔ J BONE JOINT SURG AM
0.727	AM SURGEON ↔ ARCH SURG-CHICAGO
0.727	MAG CONCRETE RES ↔ MATER STRUCT
0.725	BBA-GEN SUBJECTS ↔ GLYCOBIOLOGY
0.724	ANIM REPROD SCI ↔ REPROD DOMEST ANIM
0.714	AM J PHYSIOL-LUNG C ↔ AM J RESP CELL MOL
0.714	CHEM ENG PROG ↔ CHEM ENG-NEW YORK
0.714	ELECTR POW COMPO SYS ↔ ELECTR POW SYST RES
0.714	NUCL ENG DES ↔ NUCL TECHNOL
0.708	CLIN OBSTET GYNECOL ↔ J REPROD MED
0.708	SEX TRANSM DIS ↔ SEX TRANSM INFECT
0.706	COMMUN NUMER METH EN ↔ COMPUT MECH
0.706	LAIT ↔ MILCHWISSENSCHAFT
0.704	ANN DERMATOL VENER ↔ ARCH DERMATOL
0.704	NEUROL MED-CHIR ↔ SURG NEUROL
0.698	ELECTROCHEM COMMUN ↔ J ELECTROANAL CHEM
0.698	J EXP MAR BIOL ECOL ↔ MAR BIOL
0.696	J FLUID MECH ↔ PHYS FLUIDS

0.692	TOXICOL APPL PHARM ↔ TOXICOLOGY
0.689	AM J GASTROENTEROL ↔ SCAND J GASTROENTERO
0.688	AM HEART J ↔ AM J CARDIOL
0.686	ADV FUNCT MATER ↔ ADV MATER
0.686	J NEUROSURG ↔ NEUROSURGERY
0.685	FEMS MICROBIOL LETT ↔ MICROBIOL-SGM
0.684	ANGLE ORTHOD ↔ EUR J ORTHODONT
0.683	RARE METAL MAT ENG ↔ T NONFERR METAL SOC
0.682	LEUKEMIA ↔ LEUKEMIA RES
0.682	SOL PHYS ↔ SPACE SCI REV
0.681	BIOCHEM BIOPH RES CO ↔ J BIOL CHEM
0.676	ANTI-CANCER DRUG ↔ CANCER CHEMOTH PHARM
0.675	CAN J ZOOL ↔ J ANIM ECOL
0.674	BEHAV ECOL ↔ BEHAV ECOL SOCIOBIOL
0.674	BONE ↔ J BONE MINER RES
0.673	DIABETOLOGIA ↔ METABOLISM
0.672	ECOLOGY ↔ OECOLOGIA
0.667	HUM REPROD ↔ HUM REPROD UPDATE
0.667	J GASTROEN HEPATOL ↔ J GASTROENTEROL
0.667	MULTIMED TOOLS APPL ↔ MULTIMEDIA SYST
0.667	MUTAGENESIS ↔ MUTAT RES-GEN TOX EN
0.667	NAT GENET ↔ NAT REV GENET
0.667	TRANSPORT RES A-POL ↔ TRANSPORT RES B-METH
0.662	CANCER ↔ J CLIN ONCOL
0.659	ANN SURG ↔ BRIT J SURG
0.657	ENTOMOL EXP APPL ↔ ENVIRON ENTOMOL
0.654	ARTH RHEUM/AR C RES ↔ ARTHRITIS RES THER
0.653	BIOORG MED CHEM LETT ↔ BIOORGAN MED CHEM
0.653	CHEM PHYS ↔ CHEM PHYS LETT
0.652	EPILEPSIA ↔ EPILEPSY RES
0.651	Z ANORG ALLG CHEM ↔ Z NATURFORSCH B
0.650	BIOCONTROL ↔ BIOCONTROL SCI TECHN
0.650	J LOND MATH SOC ↔ J PURE APPL ALGEBRA
0.650	MATH ANN ↔ MATH RES LETT
0.649	ARCH OPHTHALMOL-CHIC ↔ BRIT J OPHTHALMOL
0.648	BIOTECHNOL BIOENG ↔ J BIOTECHNOL
0.647	HIV CLIN TRIALS ↔ HIV MED
0.645	J GEN VIROL ↔ VIROLOGY
0.644	BIODIVERS CONSERV ↔ J BIOGEOGR
0.638	ANAL BIOANAL CHEM ↔ ANAL CHIM ACTA
0.636	SEDIMENT GEOL ↔ SEDIMENTOLOGY
0.636	SEP PURIF TECHNOL ↔ SEP SCI TECHNOL
0.635	J POLYM SCI POL CHEM ↔ MACROMOLECULES
0.634	J BIOL INORG CHEM ↔ J INORG BIOCHEM
0.634	NATURE ↔ SCIENCE
0.633	MYCOL RES ↔ MYCOLOGIA
0.630	SYST BOT ↔ TAXON
0.627	J NEUROSCI RES ↔ NEUROBIOL DIS
0.625	PHOTOCH PHOTOBIO SCI ↔ PHOTOCHEM PHOTOBIOL
0.625	SPE J ↔ SPE RESERV EVAL ENG
0.624	BIOCHEMISTRY-US ↔ J MOL BIOL
0.623	PHYSICA B ↔ SOLID STATE COMMUN
0.618	FISH RES ↔ ICES J MAR SCI
0.616	INFECT IMMUN ↔ MICROBES INFECT
0.615	FUEL ↔ FUEL PROCESS TECHNOL
0.615	NUCL FUSION ↔ PLASMA PHYS CONTR F
0.611	BLOOD PRESS MONIT ↔ BLOOD PRESSURE
0.609	ARCH ANDROLOGY ↔ ASIAN J ANDROL
0.607	ENDOCR J ↔ EXP CLIN ENDOCR DIAB
0.607	J VERTEBR PALEONTOL ↔ PALAEONTOLOGY
0.606	INSECT BIOCHEM MOLEC ↔ INSECT MOL BIOL
0.606	SEMICOND SCI TECH ↔ SUPERLATTICE MICROST
0.604	GEOPHYS RES LETT ↔ J GEOPHYS RES
0.600	CHEM ENG RES DES ↔ CHEM ENG TECHNOL
0.600	CHINESE PHYS ↔ CHINESE PHYS LETT
0.600	CHROMOSOMA ↔ CHROMOSOME RES
0.600	INDIAN J ANIM SCI ↔ INDIAN VET J
0.594	ALLERGY ASTHMA PROC ↔ ANN ALLERG ASTHMA IM
0.593	SOIL SCI ↔ SOIL TILL RES
0.591	BIOMETRICS ↔ BIOSTATISTICS
0.590	ARTERIOSCL THROM VAS ↔ ATHEROSCLEROSIS
0.590	DEEP-SEA RES PT II ↔ J MARINE SYST
0.588	RENEW ENERG ↔ RENEW SUST ENERG REV
0.586	ECOTOX ENVIRON SAFE ↔ ENVIRON TOXICOL
0.585	MOL PLANT MICROBE IN ↔ MOL PLANT PATHOL
0.583	GROUND WATER ↔ GROUND WATER MONIT R
0.583	J HAND SURG-AM ↔ J HAND SURG-BRIT EUR
0.582	ARCH INTERN MED ↔ JAMA-J AM MED ASSOC
0.581	RADIOTHER ONCOL ↔ STRAHLENTHER ONKOL
0.580	NEUROPHARMACOLOGY ↔ SYNAPSE
0.577	PHYTOMEDICINE ↔ PHYTOTHER RES
0.571	COMB PROBAB COMPUT ↔ COMBINATORICA

0.571	IEE P-MICROW ANTEN P ↔ IEEE MICROW WIREL CO
0.571	IEEE T IND APPL ↔ IEEE T POWER ELECTR
0.571	MAR ENVIRON RES ↔ MAR POLLUT BULL
0.569	J ALZHEIMERS DIS ↔ NEUROBIOL AGING
0.568	INT J ADV MANUF TECH ↔ INT J PROD RES
0.565	AVIAN DIS ↔ AVIAN PATHOL
0.561	ENDOCRINE ↔ HORM METAB RES
0.556	AQUAC RES ↔ AQUACULT NUTR
0.556	J FOOD PROCESS PRES ↔ J FOOD QUALITY
0.556	TECH PHYS LETT+ ↔ TECH PHYS+
0.556	WASTE MANAGE ↔ WASTE MANAGE RES
0.553	CHEM BIOL ↔ CHEMBIOCHEM
0.550	ATMOS CHEM PHYS ↔ ATMOS RES
0.549	INT J PHARM ↔ J CONTROL RELEASE
0.549	J SURG RES ↔ SURGERY
0.547	J PHYS A-MATH GEN ↔ J STAT MECH-THEORY E
0.545	AERONAUT J ↔ AEROSP SCI TECHNOL
0.545	EXP FLUIDS ↔ EXP THERM FLUID SCI
0.543	CURR MED CHEM ↔ CURR TOP MED CHEM
0.538	J CRANIO MAXILL SURG ↔ J CRANIOFAC SURG
0.538	URSUS ↔ WILDLIFE MONOGR
0.536	DIGEST DIS ↔ DIGESTION
0.533	DEV GENES EVOL ↔ EVOL DEV
0.533	IEEE T CIRCUITS-I ↔ IEEE T CIRCUITS-II
0.533	LC GC EUR ↔ LC GC N AM
0.533	PHLEBOLOGIE ↔ PHLEBOLOGY
0.528	AUTOIMMUN REV ↔ AUTOIMMUNITY
0.526	EQUINE VET EDUC ↔ EQUINE VET J
0.525	J ORAL MAXIL SURG ↔ ORAL SURG ORAL MED O
0.524	AM J PREV MED ↔ AM J PUBLIC HEALTH
0.523	J NEURAL TRANSM ↔ J NEURAL TRANSM-SUPP
0.522	INT J ADHES ADHES ↔ J ADHES SCI TECHNOL
0.522	WILDLIFE BIOL ↔ WILDLIFE RES
0.520	ENVIRON HEALTH PERSP ↔ ENVIRON RES
0.520	FOOD CONTROL ↔ FOOD MICROBIOL
0.519	ARTIF ORGANS ↔ ASAIO J
0.515	NUTR METAB CARDIOVAS ↔ NUTR REV
0.514	ANAT EMBRYOL ↔ ANAT REC PART A
0.509	FRESHWATER BIOL ↔ HYDROBIOLOGIA
0.508	CLIN CHEM ↔ CLIN CHIM ACTA
0.508	MAT SCI ENG A-STRUCT ↔ MATER TRANS
0.500	ALCOHOL ↔ ALCOHOL CLIN EXP RES
0.500	CLIN BIOCHEM ↔ CLIN CHEM LAB MED
0.500	COMBUST FLAME ↔ COMBUST SCI TECHNOL
0.500	J HYDRAUL ENG-ASCE ↔ J HYDRAUL RES
0.500	J MICROELECTROMECH S ↔ J MICROMECH MICROENG
0.500	MICROCIRCULATION ↔ MICROVASC RES
0.500	RUSS CHEM B+ ↔ RUSS J GEN CHEM+
0.500	SLEEP MED ↔ SLEEP MED REV
0.495	PHYS REV E ↔ PHYS REV LETT
0.481	CURR MED RES OPIN ↔ INT J CLIN PRACT
0.478	ANNU REV PSYCHOL ↔ BEHAV BRAIN SCI
0.477	J MATH ANAL APPL ↔ NONLINEAR ANAL-THEOR
0.474	ARCH ANIM NUTR ↔ CAN J ANIM SCI
0.474	WEED RES ↔ WEED TECHNOL
0.469	PHARMACOGENET GENOM ↔ PHARMACOGENOMICS
0.464	GENET RES ↔ GENETICA
0.464	J APPL MECH-T ASME ↔ J ENG MECH-ASCE
0.464	MICRON ↔ MICROSC RES TECHNIQ
0.462	ENERG EXPLOR EXPLOIT ↔ ENERG SOURCE PART B
0.462	STEM CELLS ↔ STEM CELLS DEV
0.458	VET COMP ORTHOPAED ↔ VET SURG
0.452	J COMP PHYSIOL B ↔ J THERM BIOL
0.450	ADSORPT SCI TECHNOL ↔ ADSORPTION
0.450	ANIM RES ↔ ANIM SCI
0.444	EUR J MECH B-FLUID ↔ FLUID DYN RES
0.440	SEMIN RADIAT ONCOL ↔ TECHNOL CANCER RES T
0.439	CURR OPIN DRUG DISC ↔ DRUG DISCOV TODAY
0.435	HYDROL EARTH SYST SC ↔ HYDROLOG SCI J
0.419	BRIT MED J ↔ CAN MED ASSOC J
0.400	CRYOBIOLOGY ↔ CRYOLETTERS
0.400	FIRE SAFETY J ↔ FIRE TECHNOL
0.400	TEKSTIL ↔ TEXT RES J
0.394	J NEURO-ONCOL ↔ NEURO-ONCOLOGY
0.389	SEED SCI RES ↔ SEED SCI TECHNOL
0.367	J LABELLED COMPD RAD ↔ NUCL MED BIOL
0.357	ZOOL ANZ ↔ ZOOMORPHOLOGY
0.353	ECOL ECON ↔ ENERG J
0.345	J REHABIL RES DEV ↔ NEUROREHAB NEURAL RE
0.310	REV CHIM-BUCHAREST ↔ REV ROUM CHIM
0.300	IEE P-SCI MEAS TECH ↔ IEEE ELECTR INSUL M
0.200	ALTEX-ALTERN TIEREXP ↔ ATLA-ALTERN LAB ANIM