Yet Another View on Citation Scores

Wil van der Aalst

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“How to evaluate scientific research?” is a controversial topic. The easiest way to evaluate productivity and impact is to count the number of published papers and the number of citations. Clearly, this is very naïve because it is possible to publish many papers that are incremental or of low quality. Counting the total number of citations has the problem that one may be a co-author of a single high-cited paper. This does not say much about the contribution of the author, and citations tend to follow a power-law distribution (i.e., just a few papers attract most of the citations). To address the limitations of simply counting papers and citations, the scientific community has created journal and conference rankings, and metrics like the Hirsch index (first proposed by Jorge Hirsh in 2005, and adapted in many different ways).

Of course, all of these measures should be taken with a grain of salt. In the Netherlands, the “Recognition and Rewards” (“Erkennen en Waarderen”) program [6] was initiated to improve the evaluation of academics and to give credits to people working in teams or focusing on teaching. Similar initiatives can be seen in other countries and at the European level [7]. Although the goals of such programs are reasonable and it is impossible to disagree with statements such as “quality is more important than quantity” and “one should recognize and value team performance and interdisciplinary research”, suitable measures are lacking. Such programs are often used to abandon any measure to quantify and evaluate productivity and impact. In some universities, it has even become “politically incorrect” to talk about published papers and the number of citations. Yet, when evaluating and selecting academics, committee members still secretly look at the data provided by Google Scholar, Scopus, and Web of Science. This is because it is difficult to evaluate and compare academic performance in an objective and qualitative way. **This creates the risk that evaluations and selections become highly subjective, e.g., based on taste, personal preferences, and criteria not known to the individuals evaluated.** Moreover, in such processes, quantitative data are still used, but in an implicit and inconsistent manner.

Given the above, my personal opinion is that **we cannot avoid using objective data-driven approaches to evaluate productivity and impact**. Of course, quantitative measures should **only support expert assessment** and are not a substitute for informed judgment. When using citation scores, one should definitely consider the "Leiden Manifesto for research metrics" [1], which provides ten principles to guide research evaluations.

Some of the **practical challenges** that I see in research evaluations are the following:

- **Subjectivity**. Rankings of journals and conferences tend to be problematic. Journal lists are highly subjective. For example, in the field of Information Systems, the "College of Senior Scholars" selected a "basket" of journals as the top journals in their field. However, the definition of Information Systems is considered in a very particular manner, mostly driven by non-technical US-based academics publishing in these journals and serving on the editorial boards of the journals they select. The CORE ranking of conferences is much broader, but has similar problems (e.g., the ranking was established by a few computer departments in Australia and New Zealand and is now used all over the globe to decide on research funding and travel budgets). The intentions behind these lists are good. However, **it is unavoidable that there are topical biases and scoping issues.** Moreover, such rankings are like a self-fulfilling prophecy. This leads to a variant of the **Matthew effect** ("the rich get richer"), i.e., the higher the ranking of a conference or journal, the more people want to submit to it, automatically leading to a higher status. This combined with a narrow focus, leads to a degenerate view of research quality and discourages innovations in new directions. Although research is changing rapidly, these journal lists tend to be relatively stable. Moreover, highly-ranked journals and conferences have many papers that are rarely cited. Hence, just looking at the publication venue says little about the quality, novelty, and impact of the work.
- **Biased data sources and data quality problems.** There are multiple databases that can be used to evaluate productivity and impact, e.g., Elsevier's Scopus and Google Scholar (both released in 2004) and Web of Science (online since 2002). Also, dedicated tools running on top of these platforms, such as InCites (using the Web of Science) and SciVal (using Scopus), have been developed. Web of Science has a strong focus on journals published in the US and favors traditional disciplines such as Physics. Conferences are only partially covered. For a researcher in Computer Science, the number of citations in Google

Scholar may be 2-3 times higher than the number of citations in Scopus, and over 10 times the number of citations in Web of Science! For a researcher in Physics, the differences between Google Scholar, Scopus, and Web of Science may be much smaller. This means that Web of Science is simply irrelevant for many disciplines. Google Scholar has the most extensive coverage, but also data quality problems. Google Scholar simply crawls academic-related websites and also counts non-peer-reviewed documents. One may also find stray citations where minor variations in referencing lead to duplicate records for the same paper [8]. Also, Scopus and Web of Science have such problems, but to a lesser degree. In Microsoft Academic Graph, my output and citations were split over eight different user profiles due to my last name ("W. van der Aalst", "Van der Aalst", etc.). Although Microsoft Academic Graph was discontinued, these flawed data are still used in all kinds of rankings (e.g. Research.com). These examples illustrate that the impact of data quality problems and limited coverage are not equally distributed. Considering data quality and coverage, Scopus can be seen as the "middle road".

- **Different publication practices.** Finally, there are different publication traditions that significantly impact the most common measures used today. In many disciplines, the average number of authors is around two. However, in areas like physics, the average is above ten authors, and there are papers with hundreds or even thousands of authors. An article on measuring the Higgs Boson Mass published in Physical Review Letters has **5,154 authors** (cf. https://link.aps.org/doi/10.1103/PhysRevLett.114.191803). This 33-page article has 24 pages to list the authors, and only 9 pages are devoted to the actual paper. When counting H-indices in the standard way, this paper will increase the H-index by one for more than 5000 authors. Also, the order in which authors are listed varies from discipline to discipline. In mathematics, it is common to list authors alphabetically. In other disciplines, the order is based on contribution. Also, the "last author" position may have a specific meaning (e.g., the project leader or most senior researcher). Also, in Computer Science, conference publications are regarded as important and comparable to journal publications. In other areas, conference publications "do not count", and all work is published in journals. The above shows that counting just journal papers while ignoring the number of authors may have hugely diverging consequences for different disciplines.

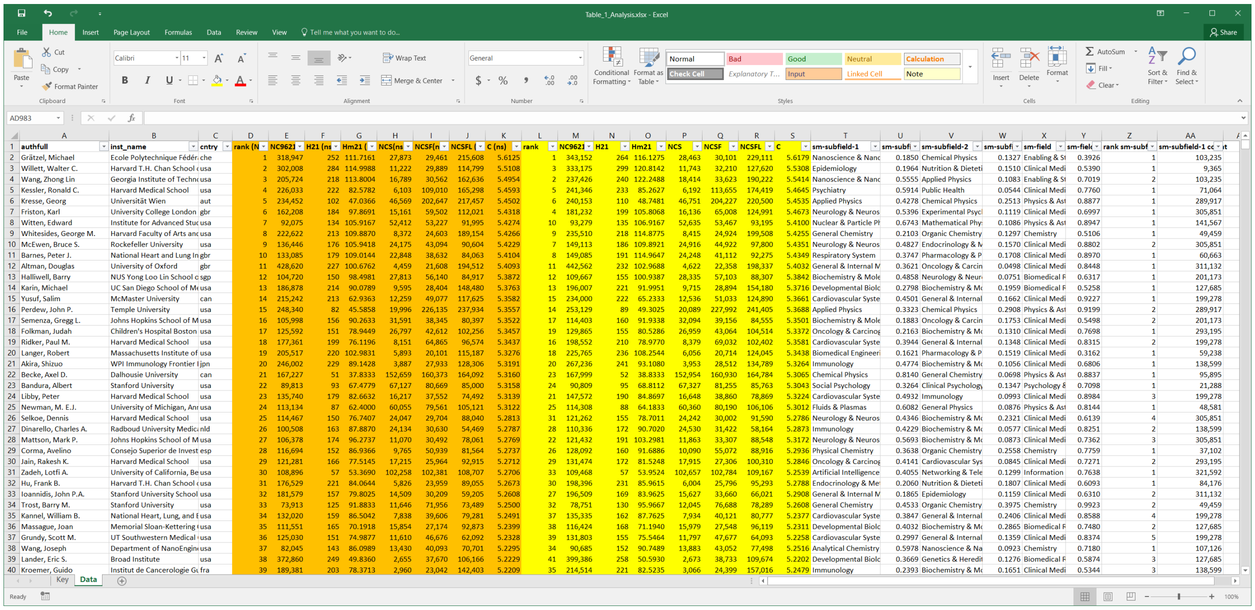
These challenges are hard to address. However, as stated before, **I do not think it is wise to resort to subjective evaluations of research productivity and impact while ignoring the data that are there**. Therefore, I liked the **approach and work presented by John Ioannidis and his colleagues** [2,3,4,5]. Ioannidis et al. propose to use a **composite indicator** (called **C**-score) which is the sum of the standardized six log-transformed citation indicators (**NC**, **H**, **Hm**, **NS**, **NSF**, **NSFL**):

- total number of citations received (**NC**),
- Hirsch index for the citations received (**H**),
- Schreiber co-authorship adjusted Hm index for the citations received (**Hm**).
- total number of citations received to papers for which the scientist is single author (**NCS**),
- total number of citations received to papers for which the scientist is single or first author (**NCSF**), and
- total number of citations received to papers for which the scientist is single, first, or last author (**NCSFL**).

The resulting **C**-score focuses on impact (citations) rather than productivity (number of publications) and incorporates information on co-authorship and author positions (single, first, last author). Each **NC**, **H**, **Hm**, **NS**, **NSF**, **NSFL** score is normalized to a value between 0 and 1, and these are summed up. Hence, the **C**-score has a range between 0 and 6.

In the dataset [2], data for 194,983 scientists are reported. The selection is based on the top 100.000 scientists by **C**-score (with and without self-citations) or a percentile rank of 2% or above in the subfield. The researchers are classified into 22 scientific fields and 174 sub-fields. The dataset is based on all Scopus author profiles as of September 1, 2022. Scopus can be seen as the middle ground between Google Scholar and Web of Science. As mentioned, Google Scholar has much better coverage, but also more data quality problems. Web of Science is unusable for many disciplines due to its bias towards specific types of journals. Note that Ioannidis et al. tried to avoid the problems mentioned before, i.e., they aimed to avoid subjectivity and biased data, addressed data quality problems, and compensated for different publication practices (e.g., the number of authors).

The data set [2] looks as follows (after hiding some of the columns and showing the first 40 rows):



	authfull	inst_name	cntry	rank (N	NC9621	H21 (ns	Hm21 (	NCS(ns	NCSF(n	NCSFL (	C (ns)
2	Grätzel, Michael	Ecole Polytechnique Fédér	che	1	318,947	252	111.7161	27,873	29,461	215,608	5.6125
3	Willett, Walter C.	Harvard T.H. Chan School (	usa	2	302,008	284	114.9988	11,222	29,889	114,799	5.5108
4	Wang, Zhong Lin	Georgia Institute of Techn	usa	3	205,724	218	113.8004	16,789	30,562	162,636	5.4954
5	Kessler, Ronald C.	Harvard Medical School	usa	4	226,033	222	82.5782	6,103	109,010	165,298	5.4593
6	Kresse, Georg	Universität Wien	aut	5	234,452	102	47.0366	46,569	202,647	217,457	5.4502
7	Friston, Karl	University College London	gbr	6	162,208	184	97.8691	15,161	59,502	112,021	5.4318
8	Witten, Edward	Institute for Advanced Stuc	usa	7	92,075	134	105.9167	52,412	53,227	91,995	5.4274
9	Whitesides, George M.	Harvard Faculty of Arts anc	usa	8	222,622	213	109.8870	8,372	24,603	189,154	5.4266
10	McEwen, Bruce S.	Rockefeller University	usa	9	136,446	176	105.9418	24,175	43,094	90,604	5.4229
11	Barnes, Peter J.	National Heart and Lung In	gbr	10	133,085	179	109.0144	22,848	38,632	84,063	5.4104
12	Altman, Douglas	University of Oxford	gbr	11	428,620	227	100.6762	4,459	21,608	194,512	5.4093
13	Halliwell, Barry	NUS Yong Loo Lin School c	sgp	12	104,720	150	98.4981	27,813	56,140	84,917	5.3872
14	Karin, Michael	UC San Diego School of Me	usa	13	186,878	214	90.0789	9,595	28,404	148,480	5.3763
15	Yusuf, Salim	McMaster University	can	14	215,242	213	62.9363	12,259	49,077	117,625	5.3582
16	Perdew, John P.	Temple University	usa	15	248,340	82	45.5858	19,996	226,135	237,934	5.3557
17	Semenza, Gregg L.	Johns Hopkins School of M	usa	16	105,998	156	90.2633	31,591	38,345	80,397	5.3522
18	Folkman, Judah	Children's Hospital Boston	usa	17	125,592	151	78.9449	26,797	42,612	102,256	5.3457
19	Ridker, Paul M.	Harvard Medical School	usa	18	177,361	199	76.1196	8,151	64,865	96,574	5.3437
20	Langer, Robert	Massachusetts Institute of	usa	19	205,517	220	102.9831	5,893	20,101	115,187	5.3276
21	Akira, Shizuo	WPI Immunology Frontier I	jpn	20	246,002	229	89.1428	3,887	27,933	128,306	5.3191
22	Becke, Axel D.	Dalhousie University	can	21	167,227	51	37.8333	152,659	160,373	164,092	5.3160
23	Bandura, Albert	Stanford University	usa	22	89,813	93	67.4779	67,127	80,669	85,000	5.3158
24	Libby, Peter	Harvard Medical School	usa	23	135,740	179	82.6632	16,217	37,552	74,492	5.3139
25	Newman, M. E.J.	University of Michigan, Anr	usa	24	113,134	87	62.4000	60,055	79,561	105,121	5.3122
26	Selkoe, Dennis	Harvard Medical School	usa	25	114,467	150	76.7407	24,047	29,704	88,040	5.2813
27	Dinarello, Charles A.	Radboud University Medica	nld	26	100,508	163	87.8870	24,134	30,630	54,469	5.2787
28	Mattson, Mark P.	Johns Hopkins School of M	usa	27	106,378	174	96.2737	11,070	30,492	78,061	5.2769
29	Corma, Avelino	Consejo Superior de Invest	esp	28	116,694	152	86.9366	9,765	50,939	81,564	5.2737
30	Jain, Rakesh K.	Harvard Medical School	usa	29	121,281	166	77.5145	17,215	25,964	92,915	5.2712
31	Zadeh, Lotfi A.	University of California, Be	usa	30	108,896	57	53.3690	102,258	102,381	108,707	5.2706
32	Hu, Frank B.	Harvard T.H. Chan School (	usa	31	176,529	221	84.0644	5,826	23,959	89,055	5.2673
33	Ioannidis, John P.A.	Stanford University School	usa	32	181,579	157	79.8025	14,509	30,209	59,205	5.2608
34	Trost, Barry M.	Stanford University	usa	33	73,913	125	91.8833	11,646	71,956	73,489	5.2500
35	Kannel, William B.	National Heart, Lung, and E	usa	34	132,020	159	86.5042	7,838	39,606	79,281	5.2491
36	Massague, Joan	Memorial Sloan-Kettering (	usa	35	111,551	165	70.1918	15,854	27,174	92,873	5.2399
37	Grundy, Scott M.	UT Southwestern Medical (	usa	36	125,030	151	74.9877	11,610	46,676	62,092	5.2328
38	Wang, Joseph	Department of NanoEngin	usa	37	82,045	143	86.0989	13,430	40,093	70,701	5.2295
39	Lander, Eric S.	Broad Institute	usa	38	372,860	249	49.8360	2,655	37,670	106,166	5.2229
40	Kroemer, Guido	Institut de Cancerologie Gu	fra	39	189,381	203	78.3713	2,960	23,042	142,403	5.2209

	rank	NC9621	H21	Hm21	NCS	NCSF	NCSFL	C	sm-subfield-1	sm-subfi	sm-subfield-2	sm-subfi	sm-field	sm-fielc	rank sm-subf	sm-subfield-1 cc
2	1	343,152	264	116.1275	28,463	30,101	229,111	5.6179	Nanoscience & Nanc	0.1850	Chemical Physics	0.1327	Enabling & St	0.3926	1	103,235
3	3	333,175	299	120.8142	11,743	32,210	127,620	5.5308	Epidemiology	0.1964	Nutrition & Dieteti	0.1510	Clinical Medi	0.5390	1	9,365
4	2	237,426	240	122.2488	18,414	33,623	190,222	5.5414	Nanoscience & Nanc	0.5555	Applied Physics	0.1083	Enabling & St	0.7019	2	103,235
5	5	241,346	233	85.2627	6,192	113,655	174,419	5.4645	Psychiatry	0.5914	Public Health	0.0544	Clinical Medi	0.7760	1	71,064
6	6	240,153	110	48.7481	46,751	204,227	220,500	5.4535	Applied Physics	0.4278	Chemical Physics	0.2513	Physics & Ast	0.8877	1	289,917
7	4	181,232	199	105.8068	16,136	65,008	124,991	5.4673	Neurology & Neuros	0.5396	Experimental Psycl	0.1119	Clinical Medi	0.6997	1	305,851
8	10	93,279	135	106.9167	52,635	53,467	93,195	5.4100	Nuclear & Particle Pl	0.6743	Mathematical Phy	0.1086	Physics & Ast	0.8947	1	141,567
9	9	235,510	218	114.8775	8,415	24,924	199,508	5.4255	General Chemistry	0.2103	Organic Chemistry	0.1297	Chemistry	0.5106	1	49,459
10	7	149,113	186	109.8921	24,916	44,922	97,800	5.4351	Neurology & Neuros	0.4827	Endocrinology & M	0.1570	Clinical Medi	0.8802	2	305,851
11	8	149,085	191	114.9647	24,248	41,112	92,275	5.4349	Respiratory System	0.3747	Pharmacology & P	0.1708	Clinical Medi	0.8970	1	60,663
12	11	442,562	232	102.9688	4,622	22,358	198,337	5.4032	General & Internal M	0.3621	Oncology & Carcin	0.0498	Clinical Medi	0.8448	1	311,132
13	12	109,667	155	100.9387	28,335	57,103	88,307	5.3842	Biochemistry & Mole	0.4858	Neurology & Neur	0.0751	Biomedical R	0.6317	1	201,173
14	13	196,007	221	91.9951	9,715	28,894	154,180	5.3716	Developmental Biolc	0.2798	Biochemistry & Mc	0.1959	Biomedical R	0.5258	1	127,685
15	15	234,000	222	65.2333	12,536	51,033	124,890	5.3661	Cardiovascular Syste	0.4501	General & Internal	0.1662	Clinical Medi	0.9227	1	199,278
16	14	253,129	89	49.3025	20,089	227,992	241,405	5.3688	Applied Physics	0.3323	Chemical Physics	0.2908	Physics & Ast	0.9199	2	289,917
17	17	114,403	160	91.9338	32,094	39,156	84,555	5.3501	Biochemistry & Mole	0.1883	Oncology & Carcin	0.1753	Clinical Medi	0.5498	2	201,173
18	19	129,865	155	80.5286	26,959	43,064	104,514	5.3372	Oncology & Carcinog	0.2163	Biochemistry & Mc	0.1310	Clinical Medi	0.7698	1	293,195
19	16	198,552	210	78.9770	8,379	69,032	102,402	5.3581	Cardiovascular Syste	0.3944	General & Internal	0.1348	Clinical Medi	0.8315	2	199,278
20	18	225,765	236	108.2544	6,056	20,714	124,045	5.3438	Biomedical Engineeri	0.1621	Pharmacology & P	0.1519	Clinical Medi	0.3162	1	59,238
21	20	267,236	241	93.1080	3,953	28,512	134,789	5.3264	Immunology	0.4774	Biochemistry & Mc	0.1056	Clinical Medi	0.6806	1	138,599
22	23	167,999	52	38.8333	152,954	160,930	164,784	5.3065	Chemical Physics	0.8140	General Chemistry	0.0698	Physics & Ast	0.8837	1	95,895
23	24	90,809	95	68.8112	67,327	81,255	85,763	5.3043	Social Psychology	0.3264	Clinical Psychology	0.1347	Psychology &	0.7098	1	21,288
24	21	147,572	190	84.8697	16,648	38,860	78,869	5.3224	Cardiovascular Syste	0.4932	Immunology	0.0993	Clinical Medi	0.8984	3	199,278
25	25	114,308	88	64.1833	60,360	80,190	106,106	5.3012	Fluids & Plasmas	0.6082	General Physics	0.0876	Physics & Ast	0.8144	1	48,581
26	31	121,262	155	78.7011	24,242	30,002	91,590	5.2786	Neurology & Neuros	0.4346	Biochemistry & Mc	0.2321	Clinical Medi	0.6139	4	305,851
27	28	110,336	172	90.7020	24,530	31,422	58,164	5.2873	Immunology	0.4229	Biochemistry & Mc	0.0577	Clinical Medi	0.8251	2	138,599
28	22	121,432	191	103.2981	11,863	33,307	88,548	5.3172	Neurology & Neuros	0.5693	Biochemistry & Mc	0.0873	Clinical Medi	0.7362	3	305,851
29	26	128,092	160	91.6886	10,090	55,072	88,916	5.2936	Physical Chemistry	0.3638	Organic Chemistry	0.2558	Chemistry	0.7759	1	37,102
30	29	131,474	172	81.5248	17,915	27,306	100,310	5.2846	Oncology & Carcinog	0.4141	Cardiovascular Sys	0.0845	Clinical Medi	0.7271	2	293,195
31	33	109,468	57	53.9524	102,657	102,784	109,167	5.2539	Artificial Intelligence	0.4055	Networking & Tele	0.1299	Information	0.7638	1	321,592
32	30	198,396	231	85.9615	6,004	25,796	95,293	5.2788	Endocrinology & Met	0.2060	Nutrition & Dieteti	0.1807	Clinical Medi	0.6093	1	84,176
33	27	196,509	169	83.9625	15,627	33,660	66,021	5.2908	General & Internal M	0.1865	Epidemiology	0.1159	Clinical Medi	0.6310	2	311,132
34	32	78,751	130	95.9667	12,045	76,688	78,289	5.2608	General Chemistry	0.4533	Organic Chemistry	0.3975	Chemistry	0.9923	2	49,459
35	37	135,335	162	87.7625	7,934	40,121	80,777	5.2377	Cardiovascular Syste	0.3847	General & Internal	0.2406	Clinical Medi	0.8588	4	199,278
36	38	116,424	168	71.1940	15,979	27,548	96,119	5.2311	Developmental Biolc	0.4032	Biochemistry & Mc	0.2865	Biomedical R	0.7480	2	127,685
37	39	131,803	155	75.5464	11,797	47,677	64,093	5.2258	Cardiovascular Syste	0.2997	General & Internal	0.1359	Clinical Medi	0.8374	5	199,278
38	34	90,685	152	90.7489	13,883	43,052	77,498	5.2516	Analytical Chemistry	0.5978	Nanoscience & Na	0.0923	Chemistry	0.7180	1	107,126
39	41	399,386	258	50.5930	2,673	38,733	109,674	5.2202	Developmental Biolc	0.3669	Genetics & Heredit	0.1276	Biomedical R	0.5874	3	127,685
40	35	214,514	221	82.5235	3,066	24,399	157,016	5.2479	Immunology	0.2393	Biochemistry & Mc	0.1651	Clinical Medi	0.5344	3	138,599

The first three columns show the author, institution, and country. The orange columns show the **NC**, **H**, **Hm**, **NS**, **NSF**, **NSFL**, and **C** values for each author ignoring self-citations. The first orange column shows the **overall rank** based on the **C**-score, and the last orange column shows the **C**-score itself (with a value between 0 and 6). The yellow columns show the **NC**, **H**, **Hm**, **NS**, **NSF**, **NSFL**, and **C** values for each author, including self-citations. The final columns aim to show the positioning of the author's work in the respective subfields. The top-ranked Science-Metrix category and second-ranked Science-Metrix category are listed per author, including the fraction of papers in these fields, the **C**-score-based ranking in the top-ranked field, and the total number of authors within the subfield.

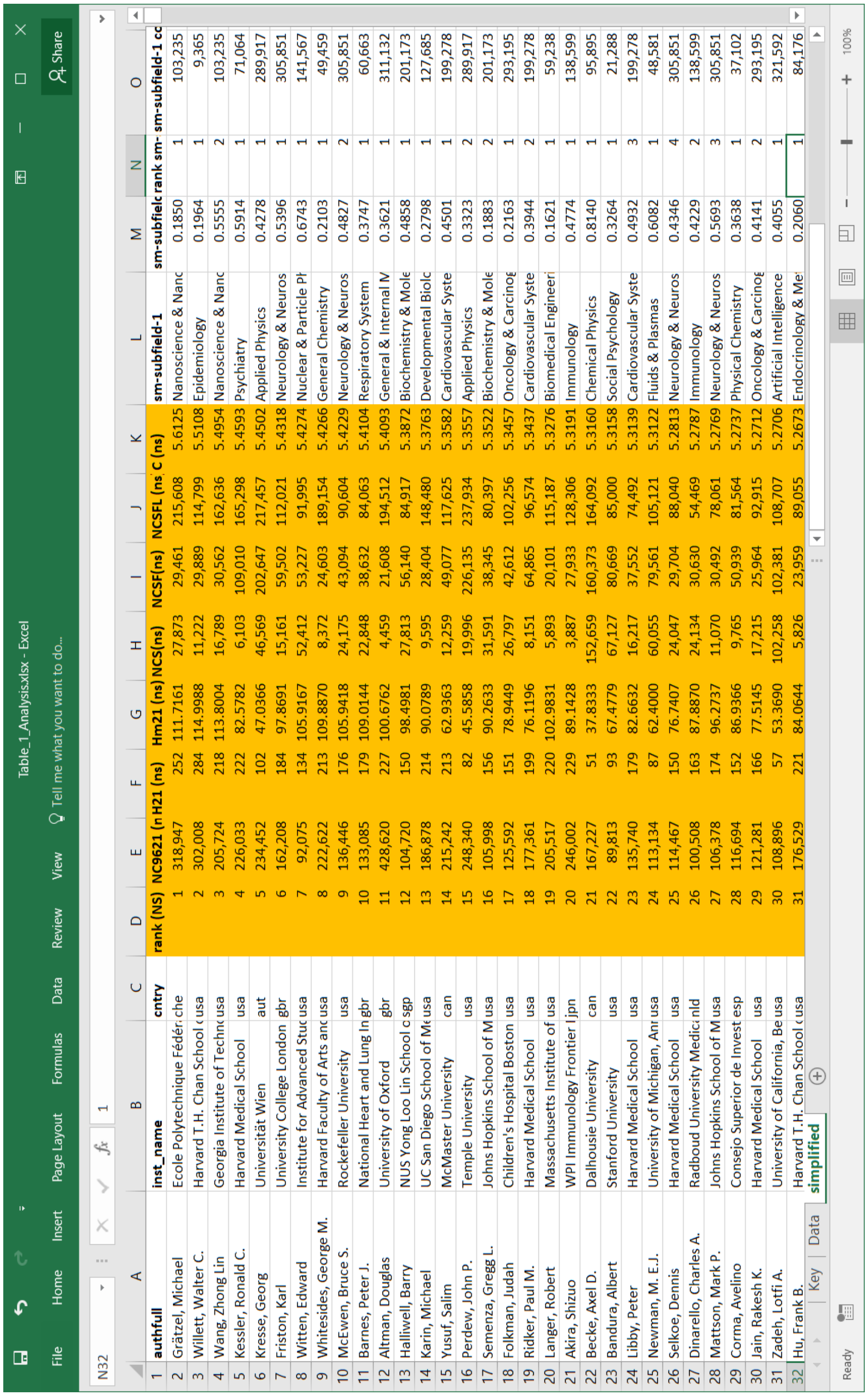
To illustrate the data [2], I take myself as an example:

- **Author name**: van der Aalst, Wil M.P.
- **Institution**: Rheinisch-Westfälische Technische Hochschule Aachen
- **Country**: deu (Germany)
- **Without self-citations:**
    - total number of citations received (**NC**): 42,854
    - Hirsch index for the citations received (**H**): 99
    - Schreiber co-authorship adjusted Hm index for the citations received (**Hm**): 64

    - total number of citations received to papers for which the scientist is single author (**NCS**): 6,678
    - total number of citations received to papers for which the scientist is single or first author (**NCSF**): 21,516
    - total number of citations received to papers for which the scientist is single, first, or last author (**NCSFL**): 35,435
    - **C-score**: 4.8916
    - **Global rank across all fields based on C-score**: 275
- **Including self-citations:**
    - total number of citations received (**NC**): 50,145
    - Hirsch index for the citations received (**H**): 107
    - Schreiber co-authorship adjusted Hm index for the citations received (**Hm**): 68
    - total number of citations received to papers for which the scientist is single author (**NCS**): 7,365
    - total number of citations received to papers for which the scientist is single or first author (**NCSF**): 24,116
    - total number of citations received to papers for which the scientist is single, first, or last author (**NCSFL**): 41,397
    - **C-score**: 4.9370
    - **Global rank across all fields based on C-score**: 243
- **First subfield**: Artificial Intelligence & Image Processing
- **Fraction of papers in the first subfield**: 0.4585
- **Second subfield**: Information & Communication Technologies
- **Fraction of papers in the second subfield**: 0.1444
- **Global ranking within the first subfield based on C-score**: 7
- **Number of researchers in the first subfield**: 321,592

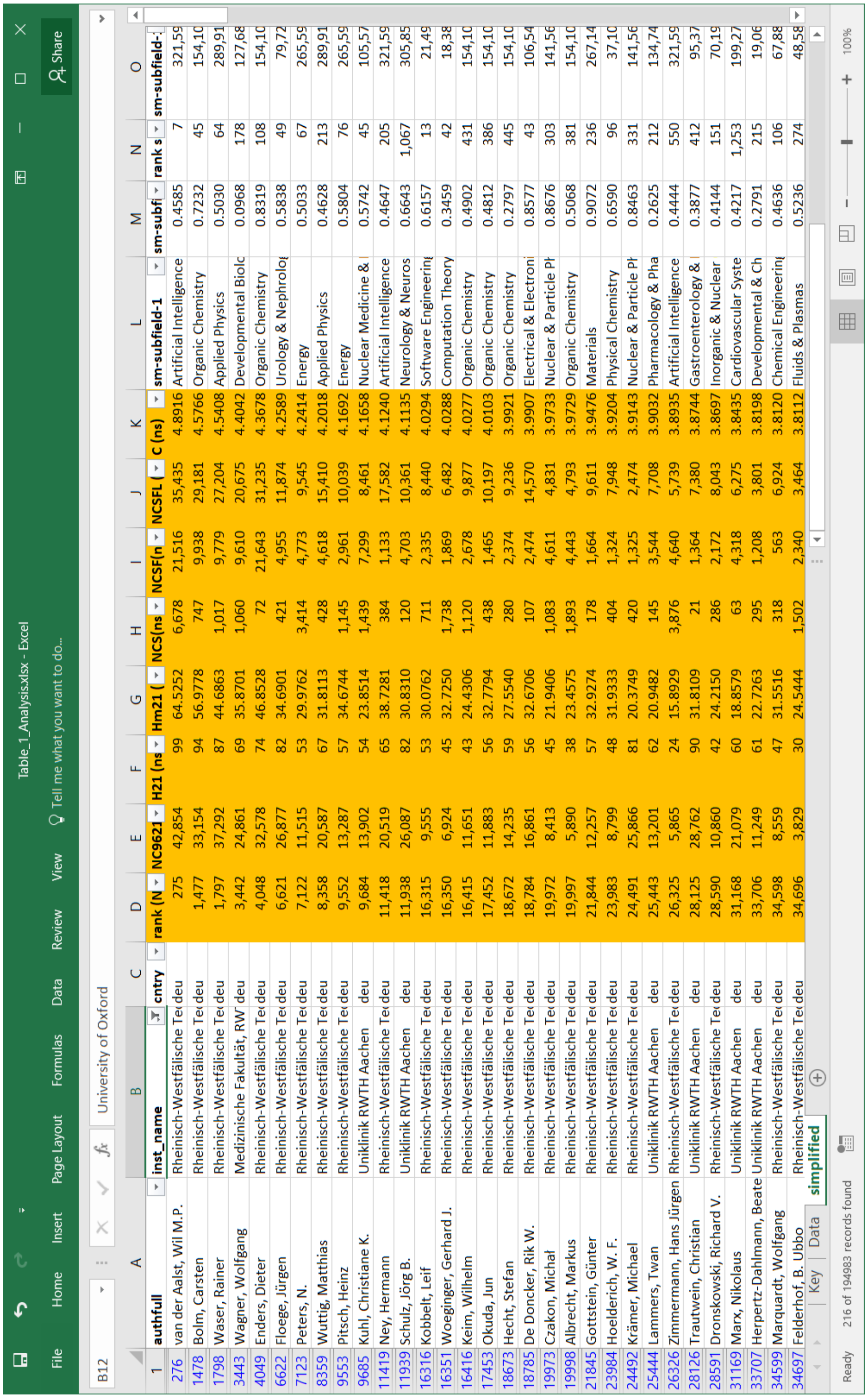
Hence, my global ranking based on the **C**-score not considering self-citations is 275, my global ranking based on the **C**-score also considering self-citations is 243, and I'm ranked 7th among the 321,592 in Artificial Intelligence & Image Processing.

The above describes one row in the table shown before. To further improve readability, I removed the columns related to the second subfield and only considered the citations, excluding self-citations. The top 25 authors based on **C**-score are then readable, and the top view is as follows:



	authfull	inst_name	cntry	rank (NS)	NC9621 (n	H21 (ns)	Hm21 (ns)	NCS(ns)	NCSF(ns)	NCSFL (ns	C (ns)	sm-subfield-1	sm-subfielc	rank sm-	sm-subfield-1 cc
2	Grätzel, Michael	Ecole Polytechnique Fédér	che	1	318,947	252	111.7161	27,873	29,461	215,608	5.6125	Nanoscience & Nanc	0.1850	1	103,235
3	Willett, Walter C.	Harvard T.H. Chan School (	usa	2	302,008	284	114.9988	11,222	29,889	114,799	5.5108	Epidemiology	0.1964	1	9,365
4	Wang, Zhong Lin	Georgia Institute of Techn	usa	3	205,724	218	113.8004	16,789	30,562	162,636	5.4954	Nanoscience & Nanc	0.5555	2	103,235
5	Kessler, Ronald C.	Harvard Medical School	usa	4	226,033	222	82.5782	6,103	109,010	165,298	5.4593	Psychiatry	0.5914	1	71,064
6	Kresse, Georg	Universität Wien	aut	5	234,452	102	47.0366	46,569	202,647	217,457	5.4502	Applied Physics	0.4278	1	289,917
7	Friston, Karl	University College London	gbr	6	162,208	184	97.8691	15,161	59,502	112,021	5.4318	Neurology & Neuros	0.5396	1	305,851
8	Witten, Edward	Institute for Advanced Stuc	usa	7	92,075	134	105.9167	52,412	53,227	91,995	5.4274	Nuclear & Particle Pł	0.6743	1	141,567
9	Whitesides, George M.	Harvard Faculty of Arts anc	usa	8	222,622	213	109.8870	8,372	24,603	189,154	5.4266	General Chemistry	0.2103	1	49,459
10	McEwen, Bruce S.	Rockefeller University	usa	9	136,446	176	105.9418	24,175	43,094	90,604	5.4229	Neurology & Neuros	0.4827	2	305,851
11	Barnes, Peter J.	National Heart and Lung In	gbr	10	133,085	179	109.0144	22,848	38,632	84,063	5.4104	Respiratory System	0.3747	1	60,663
12	Altman, Douglas	University of Oxford	gbr	11	428,620	227	100.6762	4,459	21,608	194,512	5.4093	General & Internal M	0.3621	1	311,132
13	Halliwell, Barry	NUS Yong Loo Lin School c	sgp	12	104,720	150	98.4981	27,813	56,140	84,917	5.3872	Biochemistry & Mole	0.4858	1	201,173
14	Karin, Michael	UC San Diego School of Me	usa	13	186,878	214	90.0789	9,595	28,404	148,480	5.3763	Developmental Biolc	0.2798	1	127,685
15	Yusuf, Salim	McMaster University	can	14	215,242	213	62.9363	12,259	49,077	117,625	5.3582	Cardiovascular Syste	0.4501	1	199,278
16	Perdew, John P.	Temple University	usa	15	248,340	82	45.5858	19,996	226,135	237,934	5.3557	Applied Physics	0.3323	2	289,917
17	Semenza, Gregg L.	Johns Hopkins School of M	usa	16	105,998	156	90.2633	31,591	38,345	80,397	5.3522	Biochemistry & Mole	0.1883	2	201,173
18	Folkman, Judah	Children's Hospital Boston	usa	17	125,592	151	78.9449	26,797	42,612	102,256	5.3457	Oncology & Carcinog	0.2163	1	293,195
19	Ridker, Paul M.	Harvard Medical School	usa	18	177,361	199	76.1196	8,151	64,865	96,574	5.3437	Cardiovascular Syste	0.3944	2	199,278
20	Langer, Robert	Massachusetts Institute of	usa	19	205,517	220	102.9831	5,893	20,101	115,187	5.3276	Biomedical Engineeri	0.1621	1	59,238
21	Akira, Shizuo	WPI Immunology Frontier I	jpn	20	246,002	229	89.1428	3,887	27,933	128,306	5.3191	Immunology	0.4774	1	138,599
22	Becke, Axel D.	Dalhousie University	can	21	167,227	51	37.8333	152,659	160,373	164,092	5.3160	Chemical Physics	0.8140	1	95,895
23	Bandura, Albert	Stanford University	usa	22	89,813	93	67.4779	67,127	80,669	85,000	5.3158	Social Psychology	0.3264	1	21,288
24	Libby, Peter	Harvard Medical School	usa	23	135,740	179	82.6632	16,217	37,552	74,492	5.3139	Cardiovascular Syste	0.4932	3	199,278
25	Newman, M. E.J.	University of Michigan, Anı	usa	24	113,134	87	62.4000	60,055	79,561	105,121	5.3122	Fluids & Plasmas	0.6082	1	48,581
26	Selkoe, Dennis	Harvard Medical School	usa	25	114,467	150	76.7407	24,047	29,704	88,040	5.2813	Neurology & Neuros	0.4346	4	305,851
27	Dinarello, Charles A.	Radboud University Medica	nld	26	100,508	163	87.8870	24,134	30,630	54,469	5.2787	Immunology	0.4229	2	138,599
28	Mattson, Mark P.	Johns Hopkins School of M	usa	27	106,378	174	96.2737	11,070	30,492	78,061	5.2769	Neurology & Neuros	0.5693	3	305,851
29	Corma, Avelino	Consejo Superior de Invest	esp	28	116,694	152	86.9366	9,765	50,939	81,564	5.2737	Physical Chemistry	0.3638	1	37,102
30	Jain, Rakesh K.	Harvard Medical School	usa	29	121,281	166	77.5145	17,215	25,964	92,915	5.2712	Oncology & Carcinog	0.4141	2	293,195
31	Zadeh, Lotfi A.	University of California, Be	usa	30	108,896	57	53.3690	102,258	102,381	108,707	5.2706	Artificial Intelligence	0.4055	1	321,592
32	Hu, Frank B.	Harvard T.H. Chan School (	usa	31	176,529	221	84.0644	5,826	23,959	89,055	5.2673	Endocrinology & Me	0.2060	1	84,176

For researchers from **RWTH Aachen University**, the table looks as follows:

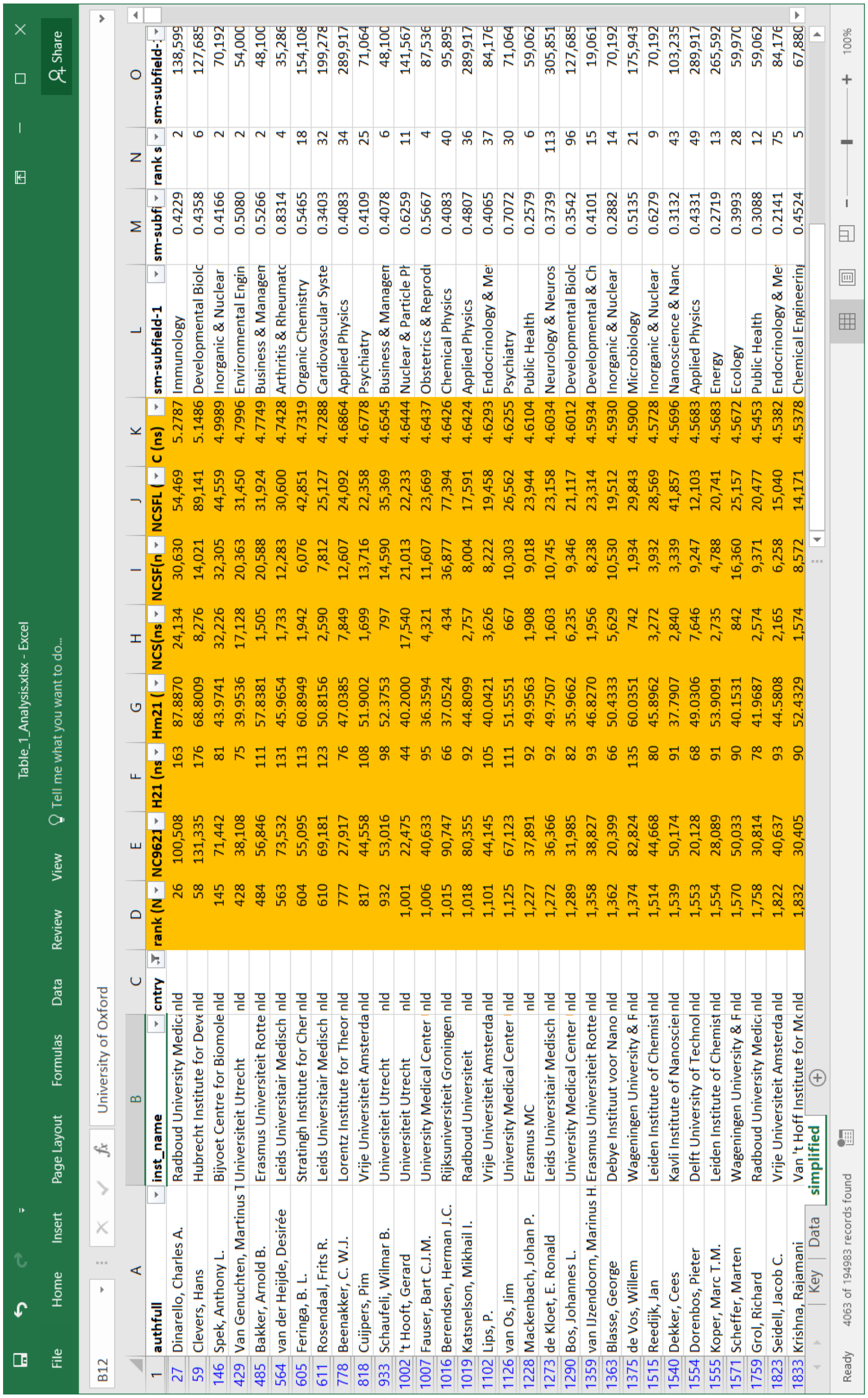


	authfull	inst_name	cntry	rank (N	NC9621	H21 (ns	Hm21 (	NCS(ns	NCSF(n	NCSFL (	C (ns)	sm-subfield-1	sm-subfi	rank s	sm-subfield-:
276	van der Aalst, Wil M.P.	Rheinisch-Westfälische Te	deu	275	42,854	99	64.5252	6,678	21,516	35,435	4.8916	Artificial Intelligence	0.4585	7	321,59
1478	Bolm, Carsten	Rheinisch-Westfälische Te	deu	1,477	33,154	94	56.9778	747	9,938	29,181	4.5766	Organic Chemistry	0.7232	45	154,10
1798	Waser, Rainer	Rheinisch-Westfälische Te	deu	1,797	37,292	87	44.6863	1,017	9,779	27,204	4.5408	Applied Physics	0.5030	64	289,91
3443	Wagner, Wolfgang	Medizinische Fakultät, RW	deu	3,442	24,861	69	35.8701	1,060	9,610	20,675	4.4042	Developmental Biolc	0.0968	178	127,68
4049	Enders, Dieter	Rheinisch-Westfälische Te	deu	4,048	32,578	74	46.8528	72	21,643	31,235	4.3678	Organic Chemistry	0.8319	108	154,10
6622	Floege, Jürgen	Rheinisch-Westfälische Te	deu	6,621	26,877	82	34.6901	421	4,955	11,874	4.2589	Urology & Nephrolo	0.5838	49	79,72
7123	Peters, N.	Rheinisch-Westfälische Te	deu	7,122	11,515	53	29.9762	3,414	4,773	9,545	4.2414	Energy	0.5033	67	265,59
8359	Wuttig, Matthias	Rheinisch-Westfälische Te	deu	8,358	20,587	67	31.8113	428	4,618	15,410	4.2018	Applied Physics	0.4628	213	289,91
9553	Pitsch, Heinz	Rheinisch-Westfälische Te	deu	9,552	13,287	57	34.6744	1,145	2,961	10,039	4.1692	Energy	0.5804	76	265,59
9685	Kuhl, Christiane K.	Uniklinik RWTH Aachen	deu	9,684	13,902	54	23.8514	1,439	7,299	8,461	4.1658	Nuclear Medicine &	0.5742	45	105,57
11419	Ney, Hermann	Rheinisch-Westfälische Te	deu	11,418	20,519	65	38.7281	384	1,133	17,582	4.1240	Artificial Intelligence	0.4647	205	321,59
11939	Schulz, Jörg B.	Uniklinik RWTH Aachen	deu	11,938	26,087	82	30.8310	120	4,703	10,361	4.1135	Neurology & Neuros	0.6643	1,067	305,85
16316	Kobbelt, Leif	Rheinisch-Westfälische Te	deu	16,315	9,555	53	30.0762	711	2,335	8,440	4.0294	Software Engineerin	0.6157	13	21,49
16351	Woeginger, Gerhard J.	Rheinisch-Westfälische Te	deu	16,350	6,924	45	32.7250	1,738	1,869	6,482	4.0288	Computation Theory	0.3459	42	18,38
16416	Keim, Wilhelm	Rheinisch-Westfälische Te	deu	16,415	11,651	43	24.4306	1,120	2,678	9,877	4.0277	Organic Chemistry	0.4902	431	154,10
17453	Okuda, Jun	Rheinisch-Westfälische Te	deu	17,452	11,883	56	32.7794	438	1,465	10,197	4.0103	Organic Chemistry	0.4812	386	154,10
18673	Hecht, Stefan	Rheinisch-Westfälische Te	deu	18,672	14,235	59	27.5540	280	2,374	9,236	3.9921	Organic Chemistry	0.2797	445	154,10
18785	De Doncker, Rik W.	Rheinisch-Westfälische Te	deu	18,784	16,861	56	32.6706	107	2,474	14,570	3.9907	Electrical & Electroni	0.8577	43	106,54
19973	Czakon, Michał	Rheinisch-Westfälische Te	deu	19,972	8,413	45	21.9406	1,083	4,611	4,831	3.9733	Nuclear & Particle Pl	0.8676	303	141,56
19998	Albrecht, Markus	Rheinisch-Westfälische Te	deu	19,997	5,890	38	23.4575	1,893	4,443	4,793	3.9729	Organic Chemistry	0.5068	381	154,10
21845	Gottstein, Günter	Rheinisch-Westfälische Te	deu	21,844	12,257	57	32.9274	178	1,664	9,611	3.9476	Materials	0.9072	236	267,14
23984	Hoelderich, W. F.	Rheinisch-Westfälische Te	deu	23,983	8,799	48	31.9333	404	1,324	7,948	3.9204	Physical Chemistry	0.6590	96	37,10
24492	Krämer, Michael	Rheinisch-Westfälische Te	deu	24,491	25,866	81	20.3749	420	1,325	2,474	3.9143	Nuclear & Particle Pl	0.8463	331	141,56
25444	Lammers, Twan	Uniklinik RWTH Aachen	deu	25,443	13,201	62	20.9482	145	3,544	7,708	3.9032	Pharmacology & Pha	0.2625	212	134,74
26326	Zimmermann, Hans Jürgen	Rheinisch-Westfälische Te	deu	26,325	5,865	24	15.8929	3,876	4,640	5,739	3.8935	Artificial Intelligence	0.4444	550	321,59
28126	Trautwein, Christian	Uniklinik RWTH Aachen	deu	28,125	28,762	90	31.8109	21	1,364	7,380	3.8744	Gastroenterology &	0.3877	412	95,37
28591	Dronskowski, Richard V.	Rheinisch-Westfälische Te	deu	28,590	10,860	42	24.2150	286	2,172	8,043	3.8697	Inorganic & Nuclear	0.4144	151	70,19
31169	Marx, Nikolaus	Uniklinik RWTH Aachen	deu	31,168	21,079	60	18.8579	63	4,318	6,275	3.8435	Cardiovascular Syste	0.4217	1,253	199,27
33707	Herpertz-Dahlmann, Beate	Uniklinik RWTH Aachen	deu	33,706	11,249	61	22.7263	295	1,208	3,801	3.8198	Developmental & Ch	0.2791	215	19,06
34599	Marquardt, Wolfgang	Rheinisch-Westfälische Te	deu	34,598	8,559	47	31.5516	318	563	6,924	3.8120	Chemical Engineerin	0.4636	106	67,88
34697	Felderhof, B. Ubbo	Rheinisch-Westfälische Te	deu	34,696	3,829	30	24.5444	1,502	2,340	3,464	3.8112	Fluids & Plasmas	0.5236	274	48,58

For researchers working in **Germany**, the table looks as follows:

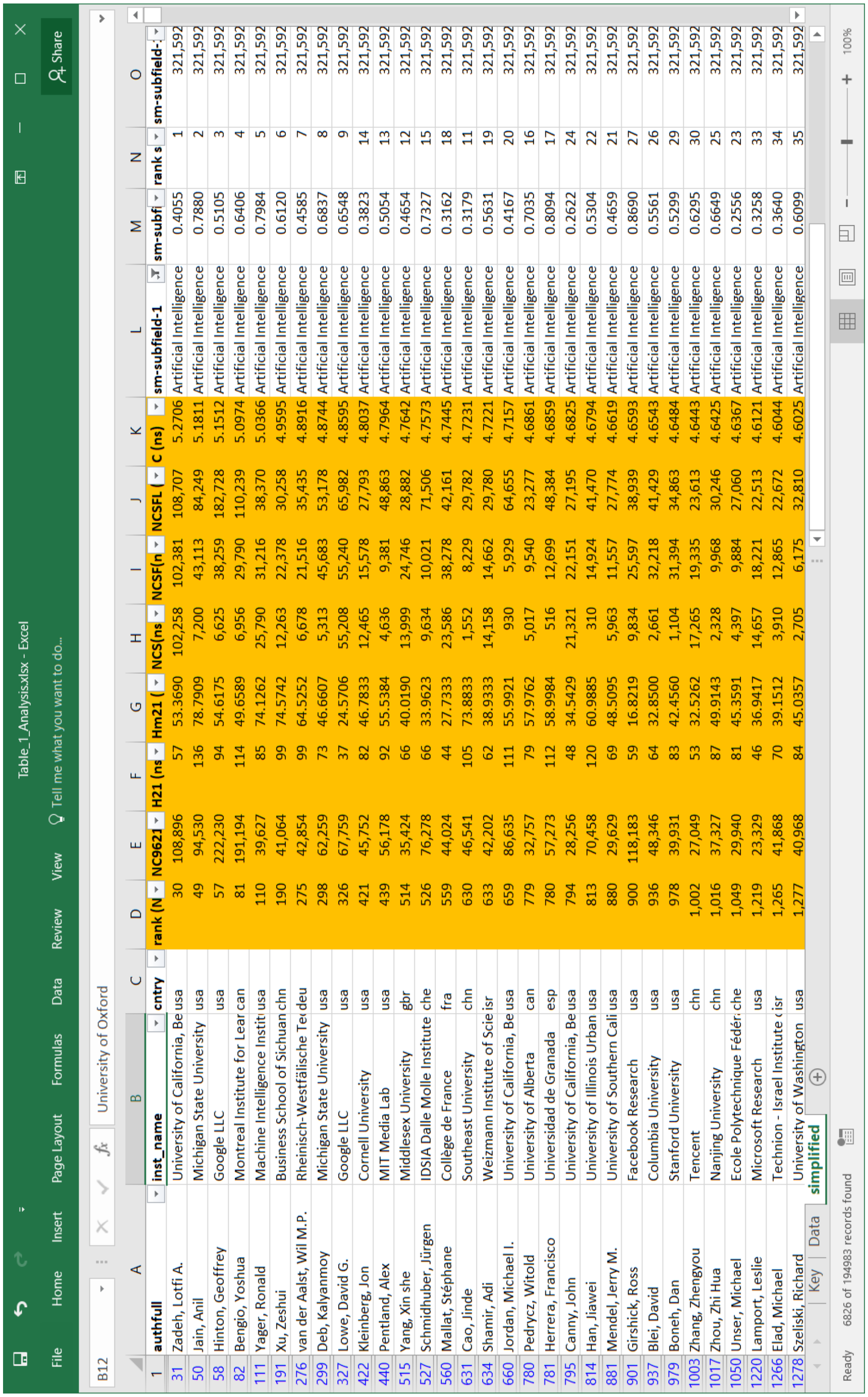
	authfull	inst_name	cntry	rank (N	NC9621	H21 (ns	Hm21 (	NCS(ns	NCSF(n	NCSFL (	C (ns)	sm-subfield-1	sm-subfi	rank s	sm-subfield-:
41	Grimme, Stefan	Universität Bonn	deu	40	89,873	99	61.4692	29,603	65,151	81,271	5.2184	Chemical Physics	0.3613	2	95,895
43	Sheldrick, George M.	Georg-August-Universität (	deu	42	143,376	52	29.4868	126,508	128,811	135,982	5.2083	Inorganic & Nuclear	0.4456	1	70,192
116	Mann, Matthias	Max-Planck-Institut für Bic	deu	115	179,890	199	80.9208	1,101	7,375	111,422	5.0259	Developmental Biolc	0.3269	11	127,685
171	Sies, Helmut	Leibniz Research Institute f	deu	170	57,593	111	67.9401	10,345	17,143	42,351	4.9773	Biochemistry & Mole	0.4750	13	201,173
229	Bork, Peer	European Molecular Biolo|	deu	228	181,563	177	64.3198	1,334	7,808	57,801	4.9268	Developmental Biolc	0.3297	17	127,685
259	Neese, Frank	Max Planck Institute for Cc	deu	258	45,841	102	56.8199	12,977	17,024	32,162	4.9043	Chemical Physics	0.3778	8	95,895
276	van der Aalst, Wil M.P.	Rheinisch-Westfälische Te	deu	275	42,854	99	64.5252	6,678	21,516	35,435	4.8916	Artificial Intelligence	0.4585	7	321,592
319	Fürstner, Alois	Max Planck Institute for Cc	deu	318	35,440	98	62.9131	5,448	25,485	34,540	4.8646	Organic Chemistry	0.5793	4	154,108
347	Ackermann, Lutz	Georg-August-Universität (	deu	346	36,445	101	62.8925	6,058	17,076	34,035	4.8472	Organic Chemistry	0.7056	6	154,108
350	Reetz, Manfred	Max Planck Institute for Cc	deu	349	33,479	94	60.4842	6,060	24,676	31,833	4.8446	Organic Chemistry	0.6472	9	154,108
396	Blöchl, P. E.	Technische Universität Cla	deu	395	60,069	41	21.3778	48,507	54,890	58,641	4.8192	Applied Physics	0.3404	21	289,917
414	Springel, Volker	Max Planck Institute for As	deu	413	55,056	106	46.9922	5,619	17,423	28,056	4.8073	Astronomy & Astropl	0.9101	1	47,944
424	Maier, Joachim	Max Planck Institute for Sc	deu	423	55,175	124	62.7452	4,631	5,035	38,199	4.8024	Energy	0.2679	4	265,592
433	Antonietti, Markus	Max-Planck-Institut für Kol	deu	432	109,033	161	80.8316	282	8,202	61,696	4.7983	Nanoscience & Nanc	0.2295	14	103,235
454	Binder, Kurt	Johannes Gutenberg-Unive	deu	453	36,288	87	60.7603	5,583	14,375	32,640	4.7895	Fluids & Plasmas	0.3108	5	48,581
468	Wittchen, Hans Ulrich	Technische Universität Dre	deu	467	70,832	120	47.8812	2,561	14,065	33,013	4.7825	Psychiatry	0.4919	13	71,064
492	Crutzen, P. J.	Max Planck Institute for Cł	deu	491	50,265	96	51.2010	6,522	11,809	24,734	4.7715	Meteorology & Atmc	0.6983	2	66,873
503	Herrmann, Wolfgang A.	Technical University of Mu	deu	502	39,937	93	46.9924	4,489	21,745	31,332	4.7677	Organic Chemistry	0.7039	16	154,108
598	Stamatakis, Alexandros	Heidelberg Institute for Th	deu	597	53,986	49	20.7997	28,655	36,109	43,342	4.7345	Evolutionary Biology	0.2381	7	27,371
617	Holsboer, Florian	Max Planck Institute of Psy	deu	616	62,499	122	55.8357	3,178	5,871	23,501	4.7276	Psychiatry	0.3817	18	71,064
637	Singer, Wolf	Max Planck Institute for Br	deu	636	43,660	93	49.6258	4,969	7,881	35,240	4.7213	Neurology & Neuros	0.6719	68	305,851
638	Brenner, Hermann	German Cancer Research (	deu	637	103,605	127	52.9228	779	11,497	30,547	4.7209	Oncology & Carcinog	0.3094	22	293,195
671	Kaufmann, Stefan H.E.	Max Planck Institute for In	deu	670	37,891	103	57.5552	4,194	6,860	27,220	4.7130	Immunology	0.4046	31	138,599
694	Hell, Stefan W.	Max Planck Institute for M	deu	693	41,294	102	45.6227	3,836	10,209	31,219	4.7056	Optics	0.2174	3	64,044
697	Hashmi, A. Stephen K.	Universität Heidelberg	deu	696	30,194	83	45.8373	4,964	17,988	27,954	4.7050	Organic Chemistry	0.5595	22	154,108
707	Jonas, Jost B.	Universität Heidelberg	deu	706	100,813	112	48.3032	1,026	15,043	23,845	4.7029	Ophthalmology & Op	0.6519	3	69,077
755	Andreae, Meinrat O.	Max Planck Institute for Cł	deu	754	43,074	95	48.2626	2,970	13,347	24,849	4.6904	Meteorology & Atmc	0.7097	4	66,873
759	Hartl, F. Ulrich	Max-Planck-Institut für Bic	deu	758	44,225	108	41.9758	3,334	10,215	30,260	4.6897	Developmental Biolc	0.3882	53	127,685
836	Friederici, Angela D.	Max Planck Institute for Hu	deu	835	30,667	89	55.5647	3,843	9,746	23,521	4.6734	Experimental Psycho	0.4288	12	29,975
844	Löscher, Wolfgang	Tierärztliche Hochschule H	deu	843	28,707	77	52.3948	3,996	14,383	25,482	4.6720	Neurology & Neuros	0.5689	64	305,851
874	List, Benjamin	Max Planck Institute for Cc	deu	873	30,841	82	44.8588	5,201	10,313	29,803	4.6640	Organic Chemistry	0.5953	31	154,108

For researchers working in **The Netherlands**, the table looks as follows:



1	authfull	inst_name	cntry	rank (N	NC9621	H21 (ns	Hm21 (	NCS(ns	NCSF(n	NCSFL (	C (ns)	sm-subfield-1	sm-subfi	rank s	sm-subfield-1
27	Dinarello, Charles A.	Radboud University Medic	nld	26	100,508	163	87.8870	24,134	30,630	54,469	5.2787	Immunology	0.4229	2	138,599
59	Clevers, Hans	Hubrecht Institute for Deve	nld	58	131,335	176	68.8009	8,276	14,021	89,141	5.1486	Developmental Biolc	0.4358	6	127,685
146	Spek, Anthony L.	Bijvoet Centre for Biomole	nld	145	71,442	81	43.9741	32,226	32,305	44,559	4.9989	Inorganic & Nuclear	0.4166	2	70,192
429	Van Genuchten, Martinus T	Universiteit Utrecht	nld	428	38,108	75	39.9536	17,128	20,363	31,450	4.7996	Environmental Engin	0.5080	2	54,000
485	Bakker, Arnold B.	Erasmus Universiteit Rotte	nld	484	56,846	111	57.8381	1,505	20,588	31,924	4.7749	Business & Managen	0.5266	2	48,100
564	van der Heijde, Desirée	Leids Universitair Medisch	nld	563	73,532	131	45.9654	1,733	12,283	30,600	4.7428	Arthritis & Rheumatc	0.8314	4	35,286
605	Feringa, B. L.	Stratingh Institute for Cher	nld	604	55,095	113	60.8949	1,942	6,076	42,851	4.7319	Organic Chemistry	0.5465	18	154,108
611	Rosendaal, Frits R.	Leids Universitair Medisch	nld	610	69,181	123	50.8156	2,590	7,812	25,127	4.7288	Cardiovascular Syste	0.3403	32	199,278
778	Beenakker, C. W.J.	Lorentz Institute for Theor	nld	777	27,917	76	47.0385	7,849	12,607	24,092	4.6864	Applied Physics	0.4083	34	289,917
818	Cuijpers, Pim	Vrije Universiteit Amsterda	nld	817	44,558	108	51.9002	1,699	13,716	22,358	4.6778	Psychiatry	0.4109	25	71,064
933	Schaufeli, Wilmar B.	Universiteit Utrecht	nld	932	53,016	98	52.3753	797	14,590	35,369	4.6545	Business & Managen	0.4078	6	48,100
1002	't Hooft, Gerard	Universiteit Utrecht	nld	1,001	22,475	44	40.2000	17,540	21,013	22,233	4.6444	Nuclear & Particle Pl	0.6259	11	141,567
1007	Fauser, Bart C.J.M.	University Medical Center	nld	1,006	40,633	95	36.3594	4,321	11,607	23,669	4.6437	Obstetrics & Reprodi	0.5667	4	87,536
1016	Berendsen, Herman J.C.	Rijksuniversiteit Groningen	nld	1,015	90,747	66	37.0524	434	36,877	77,394	4.6426	Chemical Physics	0.4083	40	95,895
1019	Katsnelson, Mikhail I.	Radboud Universiteit	nld	1,018	80,355	92	44.8099	2,757	8,004	17,591	4.6424	Applied Physics	0.4807	36	289,917
1102	Lips, P.	Vrije Universiteit Amsterda	nld	1,101	44,145	105	40.0421	3,626	8,222	19,458	4.6293	Endocrinology & Me	0.4065	37	84,176
1126	van Os, Jim	University Medical Center	nld	1,125	67,123	111	51.5551	667	10,303	26,562	4.6255	Psychiatry	0.7072	30	71,064
1228	Mackenbach, Johan P.	Erasmus MC	nld	1,227	37,891	92	49.9563	1,908	9,018	23,944	4.6104	Public Health	0.2579	6	59,062
1273	de Kloet, E. Ronald	Leids Universitair Medisch	nld	1,272	36,366	92	49.7507	1,603	10,745	23,158	4.6034	Neurology & Neuros	0.3739	113	305,851
1290	Bos, Johannes L.	University Medical Center	nld	1,289	31,985	82	35.9662	6,235	9,346	21,117	4.6012	Developmental Biolc	0.3542	96	127,685
1359	van IJzendoorn, Marinus H.	Erasmus Universiteit Rotte	nld	1,358	38,827	93	46.8270	1,956	8,238	23,314	4.5934	Developmental & Ch	0.4101	15	19,061
1363	Blasse, George	Debye Instituut voor Nano	nld	1,362	20,399	66	50.4333	5,629	10,530	19,512	4.5930	Inorganic & Nuclear	0.2882	14	70,192
1375	de Vos, Willem	Wageningen University & F	nld	1,374	82,824	135	60.0351	742	1,934	29,843	4.5900	Microbiology	0.5135	21	175,943
1515	Reedijk, Jan	Leiden Institute of Chemist	nld	1,514	44,668	80	45.8962	3,272	3,932	28,569	4.5728	Inorganic & Nuclear	0.6279	9	70,192
1540	Dekker, Cees	Kavli Institute of Nanoscie	nld	1,539	50,174	91	37.7907	2,840	3,339	41,857	4.5696	Nanoscience & Nanc	0.3132	43	103,235
1554	Dorenbos, Pieter	Delft University of Technol	nld	1,553	20,128	68	49.0306	7,646	9,247	12,103	4.5683	Applied Physics	0.4331	49	289,917
1555	Koper, Marc T.M.	Leiden Institute of Chemist	nld	1,554	28,089	91	53.9091	2,735	4,788	20,741	4.5683	Energy	0.2719	13	265,592
1571	Scheffer, Marten	Wageningen University & F	nld	1,570	50,033	90	40.1531	842	16,360	25,157	4.5672	Ecology	0.3993	28	59,970
1759	Grol, Richard	Radboud University Medic	nld	1,758	30,814	78	41.9687	2,574	9,371	20,477	4.5453	Public Health	0.3088	12	59,062
1823	Seidell, Jacob C.	Vrije Universiteit Amsterda	nld	1,822	40,637	93	44.5808	2,165	6,258	15,040	4.5382	Endocrinology & Me	0.2141	75	84,176
1833	Krishna, Rajamani	Van 't Hoff Institute for Mc	nld	1,832	30,405	90	52.4329	1,574	8,572	14,171	4.5378	Chemical Engineerin	0.4524	5	67,880

The people having **Artificial Intelligence & Image Processing** as the first subfield, the table looks as follows:



	authfull	inst_name	cntry	rank (N	NC9621	H21 (ns	Hm21 (	NCS(ns	NCSF(n	NCSFL (	C (ns)	sm-subfield-1	sm-subfi	rank s	sm-subfield-
31	Zadeh, Lotfi A.	University of California, Be	usa	30	108,896	57	53.3690	102,258	102,381	108,707	5.2706	Artificial Intelligence	0.4055	1	321,592
50	Jain, Anil	Michigan State University	usa	49	94,530	136	78.7909	7,200	43,113	84,249	5.1811	Artificial Intelligence	0.7880	2	321,592
58	Hinton, Geoffrey	Google LLC	usa	57	222,230	94	54.6175	6,625	38,259	182,728	5.1512	Artificial Intelligence	0.5105	3	321,592
82	Bengio, Yoshua	Montreal Institute for Lear	can	81	191,194	114	49.6589	6,956	29,790	110,239	5.0974	Artificial Intelligence	0.6406	4	321,592
111	Yager, Ronald	Machine Intelligence Institu	usa	110	39,627	85	74.1262	25,790	31,216	38,370	5.0366	Artificial Intelligence	0.7984	5	321,592
191	Xu, Zeshui	Business School of Sichuan	chn	190	41,064	99	74.5742	12,263	22,378	30,258	4.9595	Artificial Intelligence	0.6120	6	321,592
276	van der Aalst, Wil M.P.	Rheinisch-Westfälische Te	deu	275	42,854	99	64.5252	6,678	21,516	35,435	4.8916	Artificial Intelligence	0.4585	7	321,592
299	Deb, Kalyanmoy	Michigan State University	usa	298	62,259	73	46.6607	5,313	45,683	53,178	4.8744	Artificial Intelligence	0.6837	8	321,592
327	Lowe, David G.	Google LLC	usa	326	67,759	37	24.5706	55,208	55,240	65,982	4.8595	Artificial Intelligence	0.6548	9	321,592
422	Kleinberg, Jon	Cornell University	usa	421	45,752	82	46.7833	12,465	15,578	27,793	4.8037	Artificial Intelligence	0.3823	14	321,592
440	Pentland, Alex	MIT Media Lab	usa	439	56,178	92	55.5384	4,636	9,381	48,863	4.7964	Artificial Intelligence	0.5054	13	321,592
515	Yang, Xin she	Middlesex University	gbr	514	35,424	66	40.0190	13,999	24,746	28,882	4.7642	Artificial Intelligence	0.4654	12	321,592
527	Schmidhuber, Jürgen	IDSIA Dalle Molle Institute	che	526	76,278	66	33.9623	9,634	10,021	71,506	4.7573	Artificial Intelligence	0.7327	15	321,592
560	Mallat, Stéphane	Collège de France	fra	559	44,024	44	27.7333	23,586	38,278	42,161	4.7445	Artificial Intelligence	0.3162	18	321,592
631	Cao, Jinde	Southeast University	chn	630	46,541	105	73.8833	1,552	8,229	29,782	4.7231	Artificial Intelligence	0.3179	11	321,592
634	Shamir, Adi	Weizmann Institute of Scie	isr	633	42,202	62	38.9333	14,158	14,662	29,780	4.7221	Artificial Intelligence	0.5631	19	321,592
660	Jordan, Michael I.	University of California, Be	usa	659	86,635	111	55.9921	930	5,929	64,655	4.7157	Artificial Intelligence	0.4167	20	321,592
780	Pedrycz, Witold	University of Alberta	can	779	32,757	79	57.9762	5,017	9,540	23,277	4.6861	Artificial Intelligence	0.7035	16	321,592
781	Herrera, Francisco	Universidad de Granada	esp	780	57,273	112	58.9984	516	12,699	48,384	4.6859	Artificial Intelligence	0.8094	17	321,592
795	Canny, John	University of California, Be	usa	794	28,256	48	34.5429	21,321	22,151	27,195	4.6825	Artificial Intelligence	0.2622	24	321,592
814	Han, Jiawei	University of Illinois Urban	usa	813	70,458	120	60.9885	310	14,924	41,470	4.6794	Artificial Intelligence	0.5304	22	321,592
881	Mendel, Jerry M.	University of Southern Cali	usa	880	29,629	69	48.5095	5,963	11,557	27,774	4.6619	Artificial Intelligence	0.4659	21	321,592
901	Girshick, Ross	Facebook Research	usa	900	118,183	59	16.8219	9,834	25,597	38,939	4.6593	Artificial Intelligence	0.8690	27	321,592
937	Blei, David	Columbia University	usa	936	48,346	64	32.8500	2,661	32,218	41,429	4.6543	Artificial Intelligence	0.5561	26	321,592
979	Boneh, Dan	Stanford University	usa	978	39,931	83	42.4560	1,104	31,394	34,863	4.6484	Artificial Intelligence	0.5299	29	321,592
1003	Zhang, Zhengyou	Tencent	chn	1,002	27,049	53	32.5262	17,265	19,335	23,613	4.6443	Artificial Intelligence	0.6295	30	321,592
1017	Zhou, Zhi Hua	Nanjing University	chn	1,016	37,327	87	49.9143	2,328	9,968	30,246	4.6425	Artificial Intelligence	0.6649	25	321,592
1050	Unser, Michael	Ecole Polytechnique Fédér	che	1,049	29,940	81	45.3591	4,397	9,884	27,060	4.6367	Artificial Intelligence	0.2556	23	321,592
1220	Lamport, Leslie	Microsoft Research	usa	1,219	23,329	46	36.9417	14,657	18,221	22,513	4.6121	Artificial Intelligence	0.3258	33	321,592
1266	Elad, Michael	Technion - Israel Institute	isr	1,265	41,868	70	39.1512	3,910	12,865	22,672	4.6044	Artificial Intelligence	0.3640	34	321,592
1278	Szeliski, Richard	University of Washington	usa	1,277	40,968	84	45.0357	2,705	6,175	32,810	4.6025	Artificial Intelligence	0.6099	35	321,592

Readers interested in creating their own analyses can download the dataset created by John Ioannidis and his colleagues [2] and read the supporting articles [3,4,5]. In my view, this is a great initiative to address the apparent problems related to naively counting papers and citations. As usual, the impact of scientific work can only be measured after some time. Hence, measures such as the **C**-score should **not be used to evaluate early career researchers**. However, it could help younger researchers to set goals. Also, one should never forget the first principle of the Leiden Manifesto for research metrics [1]: "Quantitative evaluation should support qualitative, expert assessment. Quantitative metrics can challenge bias tendencies in peer review and facilitate deliberation. This should strengthen peer review, because making judgments about colleagues is difficult without a range of relevant information. However, assessors must not be tempted to cede decision-making to the numbers. Indicators must not substitute for informed judgment. Everyone retains responsibility for their assessments." However, as also demonstrated in [8], **it is very well possible to conduct a fair and inclusive cross-disciplinary comparison of research performance using Google Scholar or Scopus as a data source and more refined measures that correct for the number of authors**.

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