

Statistics and Computing: having an impact

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We all have a sense of which are the premier research journals and which are secondary or tertiary. Long established journals such as the journals of the Royal Statistical Society, the American Statistical Association, *Biometrika*, the Association for Computing Machinery, IEEE, and so on, have come to define the nature of the disciplines they advocate. They have a stature to match their longevity.

It can be difficult for newer journals to be seen to make an impact. This is especially true for journals, like *Statistics and Computing*, which cross traditional disciplinary boundaries. While those who work in the cross-disciplinary area certainly have a sense of the order of journals in these new areas, this assessment is subjective and often based on anecdote.

One objective measure of a journal's impact, and hence of its stature, is the so-called 'impact factor' which the Institute for Scientific Information, or ISI (producers of the Science Citation Index and the Social Sciences Citation Index), has been publishing since 1975 in its Journal Citation Report (JCR). From the Institute's web site (www.isinet.com):

[The impact factor] is a measure of the frequency with which the "average article" in a journal has been cited in a particular year or period. The annual JCR impact factor is a ratio between citations and recent citable items published. Thus, the impact factor of a journal is calculated by dividing the number of current year citations to the source items published in that journal during the previous two years (see Figure 1).

- A = total cites in 1992
- B = 1992 cites to articles published in 1990-91 (this is a subset of A)
- C = number of articles published in 1990-91
- D = B/C = 1992 impact factor

Figure 1: Calculation for journal impact factor.

The impact factor is useful in clarifying the significance of absolute (or total) citation frequencies. It eliminates some of the bias of such counts which favor large journals over small ones, or frequently issued journals over less frequently issued ones, and of older journals over newer ones. Particularly in the latter case such journals have a larger citable body of literature than smaller or younger journals. All things being equal, the larger the number of previously published articles, the more often a journal will be cited.

There is much other interesting information on measuring impact available on their website; it is well worth a visit.

The impact factor for any journal will vary from year to year so the examination of only one year is inappropriate and could be easily tainted by selection bias. As I have available to me the impact factors from the last three years, I computed the average impact factor over these three years for every "Probability and Statistics" journal as listed in the ISI's citation report. The results are compiled in a few tables and they tell an interesting story.

In Table 1, all journals in the 'Probability and Statistics' list which pertain to statistics and computing together with their impact factors are listed in order of the average impact factor. It should come as no surprise that *Statistics and Computing* tops the list as *the premier journal in this area*.

While these are the 'Probability and Statistics' journals most likely to be compared to *Statistics and Computing*, the criticism might be made that the list has been selectively constructed to produce the most favourable ranking. To put this to rest, Table 2 shows the results for the top fifteen journals in probability and statistics from the entire collection of 72 journals listed under this category by the Institute for Scientific Information.

Journal Title	Impact Factor			
	1999	2000	2001	Average
Statistics and Computing	1.30	0.80	1.00	1.04
Journal of Computational and Graphical Statistics	0.72	1.06	0.57	0.78
Journal of the Royal Statistical Society (C) - Applied Statistics	0.27	0.81	0.74	0.61
Combinatorics, Probability & Computing	–	0.37	0.51	0.44
Computational Statistics and Data Analysis	0.30	0.37	0.42	0.36
Journal of Statistical Computation and Simulation	0.38	0.20	0.32	0.30
Communications in Statistics – Simulation and Computation	0.23	0.18	0.15	0.19
Computational Statistics	0.21	0.16	0.19	0.19

Table 1: Statistical Computing Journals

Journal Title	Impact Factor			
	1999	2000	2001	Average
Econometrica	2.21	1.87	1.92	2.00
Journal of the Royal Statistical Society (B) – Statistical Methodology	2.37	1.69	1.90	1.98
Journal of Chemometrics	1.82	2.08	1.85	1.92
Journal of the American Statistical Association	1.75	1.76	1.57	1.70
Statistics in Medicine	1.48	1.72	1.41	1.54
Statistical Science	0.85	1.26	2.00	1.37
Annals of Statistics	1.38	1.26	1.35	1.33
Biometrika	1.27	1.27	1.18	1.24
Technometrics	1.25	1.12	1.25	1.21
Journal of the Royal Statistical Society (A) – Statistics in Society	0.80	1.28	1.53	1.20
Biometrics	1.34	1.17	1.08	1.20
Journal of Quality Technology	1.13	1.00	1.05	1.06
Statistics and Computing	1.30	0.80	1.00	1.04
American Statistician	0.75	1.00	1.20	0.98
Annals of Probability	0.99	0.91	0.93	0.94

Table 2: Top fifteen Probability and Statistics Journals (out of 72)

Here we see that *Statistics and Computing* is comfortably positioned as 13th in impact out of the 72 journals listed. As can be seen from the well known titles, *Statistics and Computing* is keeping good company with the pre-eminent journals in the field. No other journal from Table 1 makes the list – the two nearest competitors, *JCGS* and *Applied Statistics*, place 18th and 25th, respectively.

This gives some indication of the research quality neighbourhood in which *Statistics and Computing* finds itself within ‘Probability and Statistics’. How the journal fares compared to other ‘Computer Science’ journals is less easy to tell.

First, unlike ‘Probability and Statistics’ the ISI further subdivides ‘Computer Science’ into several categories. Of these, I have selected the category ‘Artificial Intelligence’ as that most likely to contain many journals sharing some common interest with *Statistics and Computing*. This list, with *Statistics and Computing* added, was sorted by average impact factor and the top twenty (to include *Statistics and Computing* at 18) are shown in Table 3

One might pare this list down a little so that a few, more clearly relevant, AI journals could be added to the bottom but this would only move *Statistics and Computing* up in rank and add little new information. Again *Statistics and Computing* appears to be in good company.

There are other journals sharing some common interest with *Statistics and Computing* but which do not appear on either of the ISI constructed lists I have explored. The broad mandate which *Statistics and Computing* has taken on ensures that this will always be the case. It also suggests that *Statistics and Computing* ought never top the list in any of ISI’s defined categories. Instead, the journal should be comfortably positioned across several. That it is already so positioned is a remarkable achievement.

Of course the impact performance of *Statistics and Computing* can be credited to many individuals: the editorial board and the many anonymous referees who have maintained high standards for publication in this journal, the guest

Journal Title	Impact Factor			
	1999	2000	2001	Average
Neural Computation	2.83	2.70	2.73	2.75
Cognitive Brain Research	2.33	2.73	2.88	2.65
IEEE Transactions on Pattern Analysis and Machine Intelligence	1.88	2.09	2.29	2.09
Data Mining and Knowledge Discovery	2.55	1.93	1.41	1.96
Artificial Life	–	2.54	1.31	1.92
Artificial Intelligence	1.95	2.03	1.68	1.89
IEEE Transactions on Evolutionary Computation	–	–	1.71	1.71
Machine Learning	2.19	1.45	1.48	1.70
International Journal of Computer Vision	1.65	1.84	1.60	1.69
IEEE Transactions on Fuzzy Systems	1.60	1.87	1.51	1.66
Chemometrics and Intelligent Laboratory Systems	1.66	1.46	1.41	1.51
AI Magazine	1.71	1.45	1.29	1.48
Artificial Intelligence in Medicine	1.03	1.79	1.47	1.43
IEEE Transactions on Neural Networks	1.41	1.10	1.48	1.33
Neural Networks	1.12	1.22	1.43	1.26
Journal of Artificial Intelligence Research	1.03	1.06	1.68	1.26
Pattern Recognition	0.98	1.08	1.35	1.14
Statistics and Computing	1.30	0.80	1.00	1.04
Knowledge Engineering Review	1.24	1.03	0.71	0.99
Network-Computation in Neural Systems	0.79	0.84	1.33	0.99

Table 3: Top twenty Artificial Intelligence Journals (out of 74)

editors who have put together timely issues of wide interest, and most of all the researchers who, by submitting novel research of high quality, continue to provide the material that make this journal an important research source across the many boundaries of statistics and computing.