Hirsch-type indices for ranking institutions' scientific research output

Recently, Hirsch[1,2] proposed the index h, defined as the number of papers a researcher has with citation number >= h, as a useful measure to quantify the cumulative output and relevance of his or her scientific output.

Braun *et al.*[3] proposed a Hirsch-type index for journals, equal to h if the journal has published h papers, each of which has at least h citations. This is an interesting supplement to the controversial use of journal impact factors to rank journals. As they argue, 'First, it is robust and therefore insensitive to an accidental excess of uncited papers and also to one or several outstandingly highly cited papers. Second, it combines the effect of "quantity" (number of publications) and "quality" (citation rate) in a rather specific, balanced way that should reduce the apparent "overrating" of some of the review journals'.

It is tempting to extend this to the ranking or evaluation of research institutions. Now, it is possible to propose many levels of indices. Two that come to mind are a first order index, h_1 and a second order index h_2:

$h_1 = h$ if the institution has published h papers, each of which has at least h citations.

$h_2 = h$ if the institution has h individuals, each having a individual h index which is at least h.

This can be easily implemented on the available data for any institution. The National Aerospace Laboratories (NAL) procured the Institute of Scientific Information's (ISI) Institutional Citation Report in 1998, compiling the published literature originating from NAL during 1981–1997. From this, one can extract the following information for that period:

NAL's 17 most highly cited papers during this period have accumulated the following citations:

Papers: 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17.
Citations: 71, 51, 36, 35, 29, 26, 25, 25, 22, 21, 19, 19, 18, 18, 18, 16, 16.

As there are 16 papers with more than 16 citations, $h_1 = 16$.

In a similar manner, continuing this exercise, at the individual level, one can find the h-index for the leading scientists in the laboratory and then determine that the 10 individuals with the highest h indices are:

Individuals: 1, 2, 3, 4, 5, 6, 7, 8, 9, 10.
h-index: 11, 11, 11, 7, 6, 5, 5, 5, 5, 4

from which one can compute $h_2 = 5$, as there are 5 individuals who have an h-index greater than or equal to 5.

Thus, $h_1 = 16$, and $h_2 = 5$, are two indices that can be used to quantify the performance of the institute as a whole and of the composition of outstanding research individuals in a more robust manner than to count just papers or citations from that institute. As observed by Braun *et al.*[3] for journals, the *Web of Science* database offers a very simple way to compute these h indices for a determined period.

1. Hirsch, J. E., http://www.arxiv.org/abs/physics/0508025.
2. Hirsch, J. E., *Proc. Natl. Acad. Sci. USA*, 2005, **102**, 16569–16572.
3. Braun, T., Glanzel, W. and Schubert, A., *The Scientist*, 2005, **19**, 8.

GANGAN PRATHAP

CSIR Centre for Mathematical Modelling and Computer Simulation, Bangalore 560 037, India
e-mail: gp@cmmacs.ernet.in

Panchanan Mitra

Panchanan Mitra, the first professor of anthropology in India, was born in Kolkata on 24 May 1892. His grandfather's elder brother was Raja Rajendralal Mitra, the first Indian President of the Asiatic Society and one of the pioneers of the Indian Renaissance. Panchanan Mitra had obtained many distinctions in his life, including being the first Indian to obtain a Ph D from Yale University, USA. At Yale, he worked under the supervision of the famous American anthropologist Clark Wissler. Mitra undertook as well as supervised several pioneering anthropological expeditions in India and abroad. Several students of Mitra rose to become eminent personalities, including Nirmal Kumar Bose who was Mahatma Gandhi's personal/private secretary during the Noakhali pre-partition riots. Some of Mitra's outstanding published works include *Prehistoric India* (1923), *History of American Anthropology* (1930) and *Indo-Polynesian Memories* (1933). He was awarded several medals and fellowships during his lifetime, including the Fellowship of the Royal Anthropological Institute of Great Britain and Ireland. The Asiatic Society awards an annual 'Panchanan Mitra Memorial Lectureship' for outstanding contributions to the field of anthropology. Mitra died on 25 July 1936. The recent (2005) publication of his book entitled *Manual of Prehistoric India* underlines the importance and relevance of Mitra's work even today. Although Mitra's contribution far exceeded the realms of anthropology, probably his greatest legacy is the introduction and development of anthropology as an academic discipline in India. It must be mentioned here that presently, anthropology and its related sub-disciplines are taught in more than 40 Indian universities. It is for this reason that Mitra's contribution must be remembered with great reverence. It is unlikely that anthropology would have developed as a well-established academic discipline without Mitra's efforts and far-sightedness. The flourishing of anthropology in India is a testimony to the legacy of Mitra.

ACKNOWLEDGEMENT. I acknowledge valuable contributions from Ajay Hriday Mitra and Gargi Mitra.

KAUSHIK BOSE

Department of Anthropology, Vidyasagar University, Midnapore 721 102, India
e-mail: banda@vsnl.net