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IN MEMORIAM TIBOR BRAUN (1932—2022)

Professor Dr. Tibor Braun, founder and honorary editor-in-chief of the journals *Scientometrics* and *Journal of Radioanalytical and Nuclear Chemistry*, passed away on September 27, 2022. He was professor emeritus of the Institute of Chemistry of the Eötvös Loránd University, member of the European Academy of Science and Arts and honorary member of the Romanian Academy of Sciences.

He was born in Lugoj (in Hungarian: Lugos), Romania. He was graduated as chemist in 1954 at the Victor Babeş University (today part of the Babeş-Bolyai University), Cluj-Napoca (Kolozsvár). He moved to Budapest in 1963 and became assistant professor at the Department of Inorganic and Analytical Chemistry of the Eötvös Loránd University. In 1979, he joined to the Library of the Hungarian Academy of Sciences, where he founded and directed the Information Science and Scientometrics Research Unit.

He remained active both in chemistry and in information science. He launched two scientific awards: the George Hevesy Medal (awarded by the

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Journal of Radioanalytical and Nuclear Chemistry), the premier international award of excellence in radioanalytical and nuclear chemistry and the Derek de Solla Price Medal (awarded by *Scientometrics*) for outstanding contributions to the fields of quantitative studies of science. The international scientific community awarded him with both Medals: he was the recipient of the Price Medal in 1986 and the Hevesy Medal in 1996. By combining the two fields: chemistry and information science, he significantly contributed to the development of scientometrics into a research field on a strict scientific basis. Without this, scientometrics, as we know it today, would be unimaginable.

Lately, he published a series of popular science articles in Hungarian. One of his main aims was to dispel "chemophobia" by demonstrating the chemical basis of everyday stuff like foods and drinks. Some of these articles have been collected into volumes under attractive titles "The molecules of love" or "The smell of books", among other.

With his death, information science and scientometrics has lost one of its pioneers and leading personalities. He has truly shaped a discipline and served its scientific community for five decades. Tibor was also a prominent researcher and teacher in the field of analytical chemistry and thus he proved to be one of the true outstanding and renowned polymaths of the last century.

We had the privilege of working as Tibor's students and later as colleagues and co-authors for decades. We have jointly co-edited the journal *Scientometrics* with him over many years. We will greatly miss an excellent teacher, colleague, and true friend.

Wolfgang Glänzel
András Schubert

POPULATION AND SOCIAL DATA SCIENCE SUMMER INCUBATOR PROGRAM

1 JUNE — 25 AUGUST, 2023

MAX PLANCK INSTITUTE FOR DEMOGRAPHIC RESEARCH
ROSTOCK, GERMANY

ANNOUNCEMENT

INVITATION FOR SUMMER RESEARCH VISIT

The Max Planck Institute for Demographic Research (MPIDR) is inviting applications from qualified and highly motivated students for a Summer Research Visit.

The goal of the Population and Social Data Science Summer Incubator Program is to enable discovery by bringing together data scientists and population scientists to work on focused, intensive and collaborative projects of broad societal relevance.

For a period of 3 months (1 June — 25 August, 2023) participating students will work in small teams, with support from experienced mentors, towards a common research goal. For the summer of 2023, confirmed organizers and mentors include Diego Alburez-Gutierrez, Aliakbar Akbaritabar, Monica Alexander (University of Toronto), Ugofilippo Basellini, and Emilio Zagheni. This summer, the focus of the program will be on forecasting, and on leveraging online crowd-sourced data.

Students interested in the topics on "science of science", "sociology of science", "scientometrics", "bibliometrics" and similar are welcome to apply to work on forecasting the future of academia and the science system using bibliometric data. Participating students will be exposed to best practices across the social sciences and data sciences while contributing to a hands-on project experience. All participants will also have access to lectures and participate in other scientific activities taking place at the MPIDR.

ELIGIBILITY

Applicants must be enrolled in a doctoral, master's or undergraduate university program (at the time they visit the MPIDR). Selected candidates must obtain approval to participate in the program by their supervisor / administrator. The Incubator program values research teams that include early-career scientists from a range of disciplines and backgrounds, with complementary skill sets. Priority will be placed on bringing together a diverse pool of students. The total number of attendees will be defined based on resources and quality of applications. The mentors will provide seed projects and data ideas, with flexibility for students to put forward their own ideas as well.

Successful candidates will have demonstrated ability to work on research projects independently and in interdisciplinary teams, and interest in research problems related to both data science and the social sciences, broadly defined.

APPLICATION PROCEDURE

Applications must be submitted online via demogr.mpg.de/go/incubator and include the following documents:

1. Curriculum Vitae

2. Cover letter (Max 2 page)

   - Please state why you are interested in spending the summer at the MPIDR, and in which ways you would benefit from participating in the Incubator program.
   - Please articulate your research interests and briefly describe a project you have worked on, the motivation for it and your contribution.
   - Please describe your technical skills, as well what you would like to learn over the course of the Summer visit.

3. Names and contact information for 2 academic referees

In order to receive full consideration, applications should be received by January 15th 2023. Notifications will be sent out by March 2023.

FINANCING

This will be an in-person summer program, and students will be expected to be in residence at the MPIDR in Rostock for the period of the research visit and to devote most of their working time to the collaborative research project during that period. Selected students enrolled in a PhD program will be offered reimbursement for travel costs to/from Rostock, and a stipend. Selected students who are not enrolled in a PhD program will be offered reimbursement for travel costs to/from Rostock, lodging in Rostock, and a per diem.

CONTACT

For administrative questions please get in touch with Beatrice Michaelis (michaelis@demogr.mpg.de). For scientific questions please contact Diego Alburez-Gutierrez (alburezgutierrez@demogr.mpg.de – *crowd-sourced data*) or Aliakbar Akbaritabar (akbaritabar@demogr.mpg.de – *forecasting*).

DIVERSITY POLICY

The MPS values diversity and is keen to employ individuals from minorities.

We are committed to increasing the number of individuals with disabilities in our institutes and therefore encourage applications from such qualified individuals. Furthermore, the Max Planck Society seeks to increase the number of women in those areas where they are underrepresented and therefore explicitly encourages women to apply.

Here is the list of participants from the previous year's program indicating the diverse background of participants: https://www.demogr.mpg.de/en/news_events_6123/news_press_releases_4630/news/population_and_social_data_science_summer_incubator_program_10619

13th INTERNATIONAL WORKSHOP ON BIBLIOMETRIC-ENHANCED INFORMATION RETRIEVAL

02 APRIL 2023, DUBLIN, IRELAND

CALL FOR PAPERS

Photo © Leonhard Niederwimmer / Pixabay

The Bibliometric-enhanced Information Retrieval workshop series (BIR) at ECIR goes into its 13th iteration. In this workshop, held in conjunction with the 45th European Conference on Information Retrieval (ECIR 2023), we will tackle issues related to academic search, at the intersection between Information Retrieval and Bibliometrics. We strive to get the 'retrievalists' and 'citationists' active in both academia and the industry together, who are developing search engines and recommender systems for scholarly search.

You are invited to submit to the 13th international workshop on Bibliometric-enhanced Information Retrieval (BIR 2023), to be held as part of the 45th European Conference on Information Retrieval (ECIR 2023, https://ecir2023.org/) in Dublin, Ireland. https://sites.google.com/view/bir-ws/bir-2023 We encourage speakers to join us in Dublin, but remote attendance will be possible.

IMPORTANT DATES

All dates are in Anywhere on Earth – AoE Time Zone

Submissions:	20 Jan 2023
Notifications:	17 Feb 2023
Camera Ready Contributions:	03 Mar 2023
Workshop:	02 Apr 2023

WORKSHOP TOPICS

We welcome (but are not limited to) submissions regarding the aspects of academic search below:

- Information seeking & searching with scientific information, such as:
  - → Finding relevant papers/authors for a literature review.
  - → Measuring the degree of plagiarism in a paper.
  - → Identifying expert reviewers for a given submission.
  - → Flagging predatory conferences and journals.
  - → Information seeking behaviour and human-computer interaction in academic search.
- Mining the scientific literature, such as:
  - → Information extraction, text mining and parsing of scholarly literature.
  - → Natural language processing (e.g., citation contexts).
  - → Discourse modelling and argument mining.
  - → Neural models.
- Academic search/recommender systems, such as:
  - → Modelling the multifaceted nature of scientific information.
  - → Building test collections for reproducible BIR.
  - → System support for literature search and recommendation.
- Dataset development for bibliographic research

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SUBMISSION VIA EASYCHAIR:

easychair.org/conferences/?conf=bir2023

Submission details are available on the BIR 2023 homepage.

Workshop proceedings will be deposited online in the CEUR workshop proceedings publication service (ISSN 1613-0073) - this way the proceedings will be permanently available and citable (digital persistent identifiers and long term preservation).

PROGRAM CHAIRS

- Ingo Frommholz,
  University of Wolverhampton, UK
- Philipp Mayr,
  GESIS - Leibniz Institute for the Social Sciences, Germany
- Guillaume Cabanac,
  University of Toulouse, France
- Suzan Verberne,
  Leiden University, the Netherlands

For any enquiries please send an email to bir2023@easychair.org.

THE 27th NORDIC WORKSHOP ON **BIBLIOMETRICS AND RESEARCH POLICY**

A WORKSHOP REPORT

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Turku, Finland

The Nordic Workshop on Bibliometrics and Research Policy was organized on September 21-23, 2022, in Turku, Finland. The workshop has been organized annually since its beginning in 1996, alternating between locations in Denmark, Finland, Iceland, Norway, and Sweden. The purpose of the workshop has always been to link bibliometric research with research policy and to present the newest bibliometric research in the Nordic countries and beyond. This year the workshop had one additional goal, to create better links between the bibliometric research groups and their PhD students. The global pandemic made it impossible for PhD students to meet other researchers and create networks that are so important for their future careers. Therefore, this year's workshop had a special focus on creating networking opportunities

Photo courtesy of © Kim Holmberg

Photo courtesy of © Kim Holmberg

"As a small token of appreciation, the keynote speakers received a caricature of themselves, hand-drawn by a talented young artist, Alexander Ginlund." – Photos: courtesy of workshop organiser © Kim Holmberg

for PhD students and offered two travel grants for PhD students with "exceptionally promising and/or interesting abstract".

THREE KEYNOTE TALKS

We are extremely thankful to our three keynotes, that gave very timely and interesting presentations. Our first keynote speaker, Rodrigo Costas gave a talk titled "Novel scientometric perspectives for understanding science and society". In his talk he presented some new data sources for scientometric research and showed how the data could be used to tell stories about the people doing research, rather than focusing on their research publications. Our second keynote speaker, Frank Miedema, gave a talk titled "Transition to Open Science: why and how". Professor Miedema talked about the reward system in science and about why and how that needs to be changed. The third keynote speaker of the workshop, Cassidy Sugimoto, gave a talk titled "Metasciences: situating the past, imagining the future". In her talk Professor Sugimoto gave an overview of the history and the development of informetrics, finishing by discussing some of the future challenges, for instance challenges with data curation and the need for more centralized data infrastructures that would be accessible to everyone. As a small token of appreciation, the keynote speakers received a caricature of themselves, hand-drawn by a talented young artist, Alexander Ginlund.

THE PANEL DISCUSSION

For the first time in the history of the workshop, we had a panel discussion. A panel of representatives from Denmark, Finland, Norway, and Sweden, discussed under the title "The advantages and limitations of the Nordic bibliometric indicator". The Nordic bibliometric indicator is known as Den bibliometriske forskningsindikator (BFI) in Denmark, Julkaisufoorumi (JUFO) in Finland, Publiseringsindikatoren (NPI) or Tellekantene in Norway, and Norska listan or Norska modellen in Sweden. Denmark recently stopped producing the data and using it for performance-based funding. Norway is considering to stop using it for funding as well while continuing to collect data for the national research information

Photo courtesy of © Kim Holmberg

Photo courtesy of © Kim Holmberg

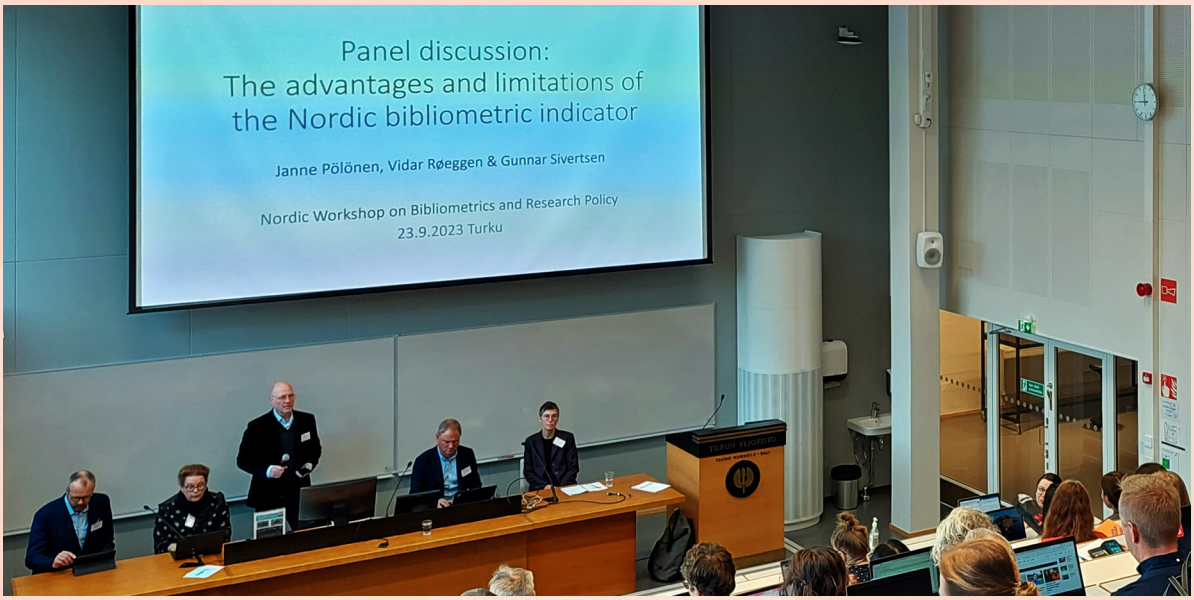

Photo courtesy of © Kim Holmberg

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system. As the use of other bibliometric data sources and indicators is increasing in academia, the panel discussed about the disadvantages and advantages of the Nordic indicator compared to the alternatives and about the consequences of possibly shutting down the Nordic indicator as a source of data and measurement. The panel discussion provided an overview of the current situation and use of bibliometric indicators in the Nordic countries. As a lot of things are happening on this front, hopefully we'll see a continuation of the panel discussion in future Nordic workshops.

THEMES OF THIS YEAR'S WORKSHOP

This year's workshop received a total of 38 abstract submission, of which 20 were accepted for oral presentation and 11 as posters. A total of 145 people from 21 countries were registered to the workshop. The topics of the workshop sessions ranged from Open Access in research assessment to citation analysis practices and United Nation's Sustainable Development Goals (SDGs), and from authorship patterns to altmetrics. One presentation focused the opportunities and limitations of incorporating open science initiatives in research assessment in the institutions of Nordic countries, while another presentation showed the extent with which different databases have indexed open access journals from Nordic countries. Another research presented showed the role of Open Access publications in increasing average citation frequency in low-income countries and developed countries. Statistical indicator models, quality-based models, multi-dimensional integrated models, and responsible research assessment guidelines in assessing the quality of research in the Nordic countries were brought up in different presentations. The workshop also proposed broadening the scope of research assessment by integrating new data sources and research intelligence tools for recog-

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Photo courtesy of © Balázs Schlemmer / schlemmerphoto.com

nizing scientific publication impact in various contexts. As the Nordic workshop has grown a lot over the last few years, so has the geographic spread of the topics presented at the workshop. This year the workshop saw presentations beyond the Nordic context, such as the presentation about the citation patterns in ancient Chinese literature and another one of the use of DOIs by Chilean researchers in Social Science and Humanities. The workshop also included, the already traditional *Poster minute madness,* where all poster presenters were given 60 seconds to present their poster, followed by a poster session where their posters could be viewed. The Book of Abstracts, and recordings of the keynote talks and the sessions are available on https://sites.utu.fi/nwb2022/.

SOCIAL PROGRAM

After the global pandemic, the social events of the workshop were perhaps more important than ever before. Besides the many opportunities to finally talk face-to-face with some old friends and colleagues, and to meet new friends, during the breaks between the sessions, the workshop hosted some organized social events. The City of Turku generously hosted a wine reception in the Town Hall on the first evening of the workshop. As tradition demands, the workshop dinner was hosted in a restaurant close to water, next to the beautiful Aura river that runs through the city of Turku.

THANK YOU!

The workshop was sponsored by Digital Science, Elsevier, Clarivate, SpringerNature, and MDPI. Without the generous support from the sponsors, we could not continue to keep the workshop free to everyone. We want to thank our sponsors once more for their continued support for the Nordic Workshop on Bibliometrics and Research Policy. We also want to thank all presenters and participants that made the workshop such a great experience. As we closed the workshop and said bitter-sweet goodbyes to everyone, we turned our eyes towards next year and Sweden. We are looking forward to NWB2023 in Gothenburg, Sweden (https://lib.chalmers.se/nwb2023).

THE ROUSSEAU NUMBER: AN INFORMETRIC VERSION OF THE ERDŐS NUMBER

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ABSTRACT: An informetric equivalent of the Erdős number is presented: the Rousseau number. Some properties are highlighted. This contribution honors Ronald Rousseau for his 73thbirthday. I prefer 73 above 75 since it comes earlier and since 73 is a prime number, a building block in mathematics.

INTRODUCTION

Paul Erdős (1913-1996) was a brilliant mathematician who collaborated extensively with colleagues, resulting in more than 1,500 papers and more than 500 different co-authors. This fact was the basis of the idea for the so-called Erdős number, a natural number associated with a person and defined as follows (see e.g. Glänzel and Rousseau (2005)): Erdős himself has Erdős number 0. All of his co-authors have Erdős number 1. All authors who co-authored a publication with an author with Erdős number 1 receive Erdős number 2, provided they do not have the Erdős number 1, and so on.

For example my Erdős number is 3 because I co-authored with Bellow who co-authored with Dvoretzky who co-authored with Erdős and no shorter paths exist. Erdős numbers are not limited to mathematicians. For instance, Albert Einstein has Erdős number 2. Lists of mathematicians, physicists, chemists and even medicine scientists and their Erdős numbers can be found on the Internet, see https://en.wikipedia.org/wiki/List_of_people_by_Erd%C5%91s_number.

It is somewhat surprising that there exists an equivalent of the Erdős number in the field of motion pictures: the Bacon number, relating to the American actor Kevin Bacon. The same definition as the Erdős number can be given for the Bacon number, now replacing co-authors by co-actors. One can make a critical remark here: unlike mathematics (where only co-authors make a mathematical publication), in motion pictures, a film has more collaborators than just actors (e.g. the director,...) and hence, instead of only using actors in the definition of the Bacon number, one should use (e.g.) the names in the title of a motion picture for a more natural definition of the Bacon number. Since this is outside the scope of this paper (and journal) we leave it here as it is.

It is well-known that all these numbers are "surprisingly" small (i.e. smaller than one would expect). This is linked with the so-called "Small World Phenomenon" in social networks where (e.g. in the world) "strangers are linked through a short chain of acquaintances" hereby finding that, for any two persons A and B in the world one needs, on the average, only chains of acquaintances of length 6 to make the connection between A and B, called "Six Degrees of Separation" – see also Kleinberg (2004), Rousseau, Egghe and Guns (2018).

Such A-numbers (relating to a person A) can, of course, be defined for any person A, provided A has links (as e.g. described above) to other persons and this can be defined in any field, besides the already mentioned fields of mathematics and motion pictures. Since A-numbers, in general, can be defined in networks (graphs), as studied e.g. in informetrics, it is therefore surprising that there has not been defined an A-number for an informetrician A. This will be done in the last section of this note, but first, in the next section, we will define the A-number in general (weighted) networks and we will also present some elementary properties.

THE A-NUMBER IN NETWORKS

A network (see Egghe and Rousseau (1990), Egghe (2005), Rousseau, Egghe and Guns (2018) – just to mention 3 books in informetrics) – also called a graph – is a pair of finite sets (V,E) consisting of points (vertices, nodes) in V and links (edges, arcs) between vertices, say (A,B) $\in$ E (in this order) with A,B $\in$ V. In this note we will mainly deal with social networks, where e.g. nodes are persons and edges are links between them (friends, co-author (or actor) – ship, ...). But nodes in a social network can also be papers (linked e.g. through references or citations) or even cities linked by roads as edges.

We will say that a network is directed if, for A,B $\in$ V, the order in the edge (A,B) $\in$ E matters. Example: A cites B (in a paper) and then we have the edge (A,B) in this order (since it differs from (B,A) which might not even exist as e.g. in the case that A and B are articles). If the order in the edge (A,B) does not matter (mathematically: (A,B) = (B,A)) we talk about an undirected network. Example: A is co-author of B, hence B is also co-author of A. We can also talk of a collaboration network. Henceforth in this note we will only work with this type of network (V,E).

If, to each node (A,B) $\in$ E, a value w(A,B) > 0 is attached (with w: E $\rightarrow$ R^+), we say that the network (V,E) is weighted. These weights can be 1 in which case we talk about an unweighted network (as a special example of a weighted network!): therefore, all our assertions for weighted networks also apply to unweighted networks. A path in a network from A $\in$ V to B $\in$ V is a sequence in V: A=C(0), C(1), ... C(n-1), C(n)=B and edges (C(i-1),C(i)) $\in$ E, $\forall$ i=1,...,n with n $\in$ N. For n=1 we have that (A,B) $\in$ E. A network is called connected if, for all A,B $\in$ V, there exists at least one path from A to B. We henceforth suppose that we have a connected network (and will omit the adjective "connected"). This is an evident assumption: in collaboration studies one can only look at connected networks (or at the connect-

ed subgraphs in case the graph (= network) is not connected). Denote w(i)= w(C(i-1),C(i)), the weight of the edge (C(i-1),C(i)) in the above path. Then we say that

$$\sum_{i=1}^{n} w(i)$$

is the length of this path. In an unweighted network this length is simply n = the number of edges from A to B in this path. We define a shortest path between A and B as a path of minimum length. A synonym is a network geodesic between A and B. Obviously such a network geodesic is not necessarily unique but its length is, called the geodesic distance between A and B, denoted d(A,B) and where we define d(A,A)=0, for all A ∈ V. That d is indeed a distance on V is proved in the next Proposition (see also Goddard and Oellermann (2010)).

Proposition 1: d is an metric (distance) and hence V,d, is a metric space.

Proof: We have to prove the following three properties of a metric (for A,B,C ∈ V):

(i) d(A,B) = 0 if and only if A = B
(ii) d(A,B) = d(B,A)
(iii) d(A,B) ≤ d(A,C) + d(C,B), the so-called triangle inequality.

For (i), if A=B, then d(A,B) = d(A,A) = 0 by definition. If A ≠ B then any path between A and B (which exists by assumption) has at least one edge with a positive weight, hence d(A,B) > 0 being at least the minimum of these finite number of positive weights. (ii) is clear since (A,B) = (B,A) in a collaboration network and since w is a function on E. For (iii) we have that, going from A to B via C is one way of making a path from A to B. Since d(A,B) is the length of the smallest path from A to B, (iii) is clear.

Definition: In a network (V,E), for A ∈ V, we define the A-number of B ∈ V as the geodesic distance d(A,B) between A and B.

Note that this definition depends on the weights in the network. So, here, we give an explicite definition of d(A,B):

$$d(A,B) = \min \{ \sum_{i=1}^{n} w(i) \ \| \ (C(j))_{j=0,\ldots,n} \text{ is a path between A and B in V} \} \quad (1)$$

(hence C(0) = A and C(n) = B).

We note the following trivial Lemma:

Lemma: for all A,B ∈ V:

$$d(A,B) = \min \{ \sum_{i=1}^{n} d(C(i-1),C(i)) \ \| \ (C(j))_{j=0,\ldots,n} \text{ is a path between A and B} \} \quad (2)$$

Proof: ≥ in (2) is clear since, for all i=1,...,n: d(C(i-1),C(i)) ≤ w(i) since the path (C(i-1),C(i)) with length w(i) is only one path between C(i-1) and C(i). Now we prove the opposite inequality ≤ in (2). For every path C(0)=A, C(1), ..., C(n-1), C(n)=B between A and B and for all i=1,...,n, we – possibly – extend this path by adding vertices between C(i-1) and C(i) that yield a geodesic between C(i-1) and C(i). Denoting this new path again by $(C(j))_{j=0,\ldots n}$ we have that its length is given by

$$\sum_{i=1}^{n} d\left(C(i\text{-}1),C(i)\right).$$

Hence, by definition of d(A,B): ≤ is proved in (2). Hence (2) is proved.

Examples

(i)

If we take w(i) = 1 for all i=1,...n we obtain

$$A_B =: d(A,B) = \min \{n \parallel (C(j))_{j=0,...n} \text{ is a path between A and B } \} \quad (3)$$

being the classical definition of e.g. the Erdős number of B, in case A = Erdős =: E

(ii)

Now we replace w(i) = 1 in (i) by

$$w(i) = \frac{1}{\#\left(C(i-1),C(i)\right)} \quad (4)$$

for i=1,...n : 1 divided by the number of links in the edge (C(i-1),C(i)). For collaboration this means the number of times C(i-1) and C(i) have collaborated with each other (e.g. co-authored publications). This is a very logical weighted variant of (i) since it takes the strength of collaboration into account. Now, by (1) and (4):

$$A'_B =: d'(A,B) = \min \{ \sum_{i=1}^{n} \frac{1}{\#\left(C(i-1),C(i)\right)} \parallel (C(j))_{j=0,...n} \text{ is a path between A and B } \} \quad (5)$$

We have the following easy Proposition:

Proposition 2: For all A,B,C ∈ V:

(i)

$A_B = 0 \Leftrightarrow A = B$ (6)

$A_B = B_A$ (7)

$A_B \leq A_C + C_B$ (8)

$A_B \leq A_C + B_C$ (9)

(ii)

$A'_B = 0 \Leftrightarrow A = B$ (6')

$A'_B = B'_A$ (7')

$A'_B \leq A'_C + C'_B$ (8')

$A'_B \leq A'_C + B'_C$ (9')

(iii)

$A'_B \leq A_B$ (10)

$$A'_B \leq \frac{1}{\#\left(A,B\right)} \quad (11)$$

Proof: (i) and (ii) follow from Proposition 1. (10) follows since in (4), #(C(i-1),C(i)) ≥ 1. Finally (11) follows by the following argument: Suppose first that A and B did not collaborate directly. Then #(A,B) = 0 and (11) is trivial. Suppose now that A and B collaborated directly. Then

$$\frac{1}{\#(A,B)}$$

is one number in (5) of which A'_B is the minimum (since (A,B) is one path from A to B). Note that in this particular case,

$$A'_B \leq \frac{1}{\#(A,B)} \leq 1.$$

To make a distinction between A_B and A'_B in words one could say that A_B is the classical, unweighted A-number of B while A'_B is the weighted A-number of B.

Illustration: A has 2 publications co-authored with B and B has 4 publications co-authored with C. Then $A_B = B_C = 1$, $A_C = 2$, $A'_B = ½$, $B'_C = ¼$ and $A'_C = ½ + ¼$ in which case (8), (9), (8') and (9') are equalities.

Remark: (10) and (11) cannot be combined for two reasons:

$$\frac{1}{\#(A,B)} \leq A_B$$

is false if #(A,B) = 0 and A_B exists (e.g. for A = Erdős, B = Egghe). But also

$$A_B \leq \frac{1}{\#(A,B)}$$

is false in any case where #(A,B) > 1 (since $A_B = 1$).

THE ROUSSEAU NUMBER

Ronald Rousseau is a well-known prolific informetrician and mathematician who has published just over 500 official publications, a top number in informetrics. What is even more top is his number of different co-authors in these publications which is larger than 250. Also, around 350 of his publications are co-authored (i.e. around 70 %). These high numbers were the basis of the idea of your author to – officially – introduce the Rousseau number in our field (officially since, in principle, anyone can be attributed an own number in a similar way as the Erdős number is attributed to Paul Erdős). So we hereby define the Rousseau number R_A of author A as $d(R,A) = R_A$ as in (3) and the weighted Rousseau number R'_A of an author A as $d'(R,A) = R'_A$ as in (5).

So, $R_R = 0$ and $R_A = 1$ for all authors A who co-authored with Rousseau, including your author. Reserving E for Erdős and Eg for Egghe we hence have $R_{Eg} = 1$ but, since Egghe and Rousseau collaborated so much (resulting in (at this time) 73 joint publications) we have that $R'_{Eg} = 0.014$ bringing Egghe very close to Rousseau without ever being at a distance 0 (this is only the case for Rousseau himself).

Using formulae (8), (9), (8') and (9'), we can establish relationships between the Rousseau number and (e.g.) the famous Erdős number. Since $E_{Eg} = 3$ and $R_{Eg} = 1$ we have that $E_R \leq E_{Eg} + R_{Eg} = 3 + 1 = 4$ (by (9)) so that Rousseau's Erdős number is (at most) 4 (and probably equal to 4). Hence all the authors A who collaborated with Rousseau directly have Erdős number $E_A \leq 5$. We must acknowledge that the calculation of the exact A'_B numbers is much more complicated than the A_B ones since we need to know, for all collaborators in every

edge between A and B, the number of joint publications! But even if we do not have the complete data, the inequalities (8') and (9') and (10) are handy for an upper estimate of A'_B. Indeed, since Egghe has 2 publications with Bellow we have that, by (5), $E'_{Eg} \leq 2.5$ only using that Bellow and Dvoretzky and Dvoretzky and Erdős have at least one publication together. It then follows from (9') and (10) that $E'_R \leq E'_{Eg} + R_{Eg} \leq 3.5$ without more work. Of course, using the extra knowledge that $R'_{Eg} = 0.014$ we obtain, by (9') that $E'_R \leq E'_{Eg} + R'_{Eg} \leq 2.514$. Hence, without further work, we have that $E'_A \leq 3.514$ for all co-authors of Rousseau.

Your author considers the introduction of the Rousseau number in informetrics as an original and well-deserved present for Rousseau's 73th birthday. Of course, if the reader prefers 75, he/she might remember this paper in 2024. I preferred 73 above 75 since 73 is the closest prime number to 75 and since, for mathematicians, prime numbers are superior to composite numbers such as 75.

I hope this paper convinces the reader that Rousseau is the Erdős of informetrics.

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