On ranking and classification of research journals covering mathematics

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June 25–26, 2022,
EMS Council Meeting,
Bled, Slovenia
It is not unusual that research agencies, universities, etc. use journal rankings implicitly or explicitly in connection with money distribution. However, in recent years one gets a feeling that more and more non-mathematical journals are listed under Mathematics and are very successful in competing with best mathematics journals. For instance among the top 4 mathematics journals ranked by Scimago a typical mathematician would recognise only 1 title.

<table>
<thead>
<tr>
<th>Title</th>
<th>Type</th>
<th>SJR</th>
</tr>
</thead>
<tbody>
<tr>
<td>IEEE Transactions on Pattern Analysis and Machine Intelligence</td>
<td>journal</td>
<td>8.269</td>
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<tr>
<td>Annals of Mathematics</td>
<td>journal</td>
<td>6.677</td>
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<td>Science Robotics</td>
<td>journal</td>
<td>6.569</td>
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<tr>
<td>Molecular Systems Biology</td>
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<td>6.523</td>
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We decided to check how many of the about 1700 journals, listed and ranked under Mathematics by Scimago are covered by zbMath. The diagram presents the ratio newrank/oldrank for the remaining journals, sorted by increasing rank.

The Scimago journal data is available at their web-page. Information about zbMath was provided by Olaf Teschke. The matching was done via ISSNs.

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Top 100 and top 20

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The righthand side of the curve is falling.

Possible interpretation: Scimago has lower standards than zbMath.
Conclusions

Less than 70% of journals that Scimago classifies as “Mathematics” are covered by zbMath. Among the top 20 journals about 50% are covered by zbMath, among top 100 journals about 60% are covered by zbMath.

Possible interpretation: Low percentage of overlap clearly indicates that it is not mathematical community but somebody else that tells the world what is- and what is not mathematics.
Possible interpretations

The rising beginning of the curve may have at least two possible interpretations:

- In the eyes of bureaucrats, non-mathematicians in some national agencies, the work of mathematicians published in some journals that are not dedicated entirely to mathematics is valued higher than the same work published in best mathematical journals.
- The work of non-mathematicians on non-mathematical subjects may freely compete against genuine mathematical work.
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An obvious interpretation of the falling curve on the righthand side seems to indicate higher criteria for inclusion of serials on the list of zbMath.
There is more! The fields

It turns out that about 200 or over 10% of serials covered both by zbMath and Scimago are not classified under any subfield of Mathematics by Scimago. Here are falling top frequencies of the scientific fields of these jointly covered journals.

80 Computer Science
70 Engineering
57 Physics and Astronomy
40 Economics, Econometrics and Finance
40 Arts and Humanities
21 Decision Sciences
14 Multidisciplinary
13 Business, Management and Accounting
10 Social Sciences
5 Neuroscience
5 Materials Science
4 Psychology
3 Earth and Planetary Sciences
3 Chemical Engineering
There is more! The subfields.

32 Physics and Astronomy (miscellaneous)
21 Economics and Econometrics
17 Mechanical Engineering
17 History and Philosophy of Science
15 Control and Systems Engineering
14 Software
14 Philosophy
14 Multidisciplinary
14 Computer Science Applications
13 Mechanics of Materials
13 Management Science and Operations Research
13 Information Systems
11 Computer Science (miscellaneous)
11 Artificial Intelligence
10 Finance
10 Condensed Matter Physics
9 Economics, Econometrics and Finance (miscellaneous)
7 History
There is more! The subfields.

7 Electrical and Electronic Engineering
6 Social Sciences (miscellaneous)
6 Nuclear and High Energy Physics
6 Engineering (miscellaneous)
6 Computer Networks and Communications
6 Computational Mechanics
5 Astronomy and Astrophysics
4 Materials Science (miscellaneous)
4 Hardware and Architecture
4 Decision Sciences (miscellaneous)
3 Statistics, Probability and Uncertainty
3 Signal Processing
3 Management Information Systems
3 Cognitive Neuroscience
3 Business, Management and Accounting (miscellaneous)
Possible interpretations

- Clearly, mathematicians publishing their work in wider areas of Computer Science, Engineering, Physics and Astronomy, Economics, etc. are not credited for contributions of Mathematics to these scientific fields.
- It is perhaps surprising to see that Scimago does not recognise any connections between, say, Econometrics or Operations Research to Mathematics.
Main Conclusions

- One gets the feeling that non-mathematicians are infiltrating the ranks of mathematicians, taking their students, their projects and their jobs.
- Mathematicians working on some applications of maths to science are diverted from mathematics.
Possible solutions

• Maybe we could suggest that only one scientific (sub)field is considered “Primary” and ranking are published only for primary fields and subfields.
• It would be advisable that experts appointed by EMS (and IMU) be involved in classification of mathematical research journals.