

Advanced AI and scientific publications: Early evidence from mathematics

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Summary

- Over the last few months, the number of submissions to mathematics journals has greatly increased and will likely increase even further in the near future.
- The traditional peer review process cannot keep pace with this growth without substantial changes; journals' responses and new policies should be monitored closely.
- The most likely explanation is the use of advanced AI systems which can produce papers much faster than before; a particular concern is the possible use of AI without adequate human checks of correctness.
- Among other effects, these drastic changes could distort the distribution of research funding based on publication counts. Two significant risks are the incentive for industrially rapid AI-assisted production, and the increasing difficulty of publication even for valuable research.
- Although our observations concern mathematics, they might provide an early indication of broader general changes for research.

ADVANCED AI SYSTEMS can already produce mathematical results and greatly accelerate the preparation of research manuscripts. This is already putting standard peer review procedures under severe strain. The panel is also concerned about how this may affect future research and the distribution of research resources. While we do not object to responsible AI-assisted research, these systems may be used to increase publication counts without adequate human checks of correctness, originality, and scientific value. Any funding mechanism that depends strongly on publication volume, as opposed to adequately accounting for scientific quality, may become increasingly vulnerable.

Based on the partial evidence currently available to us, many mathematical journals are already under severe pressure from a rapid increase in the number of submis-

sions. In particular, the standard careful assessment of relevance and correctness by human experts cannot scale anywhere near as fast as submission volume is increasing. Even if AI were only used responsibly, the corresponding increase would put pressure on the currently available resources for the peer review system. Although we do not yet have access to a statistically rigorous survey on this matter, the informal evidence available to us is sufficiently strong and widespread within mathematics to cause serious concern, and there are good reasons to expect the situation to become more difficult in the near future.

Some journals are already responding through changes to AI policies or restrictions on submissions. We therefore recommend continuously monitoring these responses, including changes in editorial policies and practices. In the near future, the Publication Forum should reassess its recommendations and classification practices as the publication landscape evolves.

More broadly, we believe that the Finnish Government should take immediate steps to review what research funding incentives measure and reward, and how these incentives need to change. Funding and evaluation systems that depend too strongly on publication volume risk rewarding the rapid production of papers, possibly incentivising careless use of AI. Unequal access to powerful AI systems and computing resources may further widen disparities between researchers and institutions. Furthermore, a likely reaction from journals is that desk rejection rates will greatly increase, making publication considerably more difficult even when the content is scientifically valuable; this aspect should also be taken into account when evaluating and rewarding research.

For technical reasons, mathematics is among the first research fields to strongly experience these disruptive effects. However, we expect that other disciplines, including statistics, may encounter similar pressures over the coming months and years, and therefore we believe that developments currently visible in mathematics may provide an early indication of broader changes ahead.

Mathematics and Statistics Panel, Publication Forum