

Breakthrough Paper Indicator 2.0: improving the accuracy of outstanding papers prediction by using interdisciplinarity, geographical diversity, and prestige measures of citations

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We report progress on new developments in the breakthrough paper indicator, which allows early detection of candidate breakthroughs based on dynamics of publication citations and certain qualitative characteristics of citations. In the first stage our forecasting model selects a group of papers with a strong citation potential. The second stage takes into consideration three additional parameters to characterize quality of citing papers: geographical diversity, subject area interdisciplinarity, and prestige.

Geographical diversity assumes that a truly breakthrough discovery will be widely recognized by different research groups in different countries. As a proxy of geographical diversity, we collected addresses of all citations and distinguished them on a country level. Interdisciplinarity measures journal subject categories diversity of citing papers using combination of several indicators, including richness, Shannon index, Simpson index, and Stirling-Porter-Rafols index. The final characteristic of citing papers – prestige – is distinct from popularity. In our definition, popularity of a publication is measured by the total number of citations received over a certain period of time, while the quantitative measure of prestige is the journal impact factors of citing papers. Our findings from the development of this breakthrough paper indicator can be used to inform research portfolio management practices.