

Using Research Data to Enhance University-Industry Collaborations

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Brief overview

Government funding agencies, commercial vendors, and others are developing a variety of analytical tools to use data to better understand the basic and applied research being done at universities, government labs, and industry. Topics of prominence is a new method that calculates approximately 100,000 distinct research areas spanning the spectrum from humanities to social sciences to hard sciences and biomedical research. The specificity and granularity of these topics allow smaller research institutions in particular to better understand and focus on areas of research strength and excellence in a way that looking at broader categories (such as Chemical Engineering or Software Development) does not. This approach also allows topics that are interdisciplinary in nature to be analyzed, including the top authors and institutions at a country or global level. The analysis provides a prominence score, which gives a means to better understand the current momentum of a topic, including the level of current interest and level of research funding available for that topic. Using the topics analysis can be of particular value to smaller institutions by providing better information about where they can best compete and excel on the basis of their research portfolios with larger or better-funded institutions. It also allows for more data-driven decision-making related to areas for potential research investment.

Use in U-I engagements outside of major metropolitan areas

Quantitative analysis can support the decision-making process of senior researchers and administrators at smaller institutions or at larger institutions working in rural or smaller metro areas. Smaller metro areas have particular challenges attracting industry partners due to location and/or misperception of what the institution has to offer. A few large and well-known institutions may get the benefit of the doubt, but all other contenders must bring compelling data to the table. A number of large corporations report that working with smaller institutions is more productive and pleasant from their perspective than some of the larger and more bureaucratic universities. In order to prove this, however, the smaller institutions must be given a chance to do so by the company.

Key features

- Machine learning-based analytical tools are increasingly being used by governments, industry, and academia to better understand the global R&D landscape and how they compete.
- Topics of prominence is one new way to use advanced semantic technologies, natural language processing and text and data mining to classify the global corpus of research literature into around 100,000 distinct research topics.
 - o These topics can be interdisciplinary in nature, and do not follow the traditional, and often outdated, “categories of research” that historically were assigned top-down by journal classification code. Instead, topics are calculated bottom-up using a direct citation analysis of over 600 million cited-cited by pairs. This method has proven to yield a very good topic fit for the 100,000 topics; the research areas generated are well-recognized by specialists in the particular domain.

This toolkit is a product of the May 21-23, 2019 event hosted by UIDP and the University of Arkansas, “University-Industry Engagement Outside Major Metropolitan Areas and Megacities: Identifying Issues and Finding Solutions.”



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- o The topics are specific enough that they can identify highly applied areas of research that can be directly linked to key manufacturing and technological capabilities that are of direct interest to industry partners. This characteristic can be used to analyze which specific areas of research might be of highest interest to an industry partner.

Key takeaways

- We have the capability to **capture very specific areas of research** across the full spectrum of research fields—many of them interdisciplinary areas--through analysis of topics of prominence.
- A **prominence score**--a measure of the current momentum of a topic--strongly correlates with the overall level of funding available for each topic. For example, Zika virus and perovskite solar cells are two areas with very high prominence currently.
- The **accuracy of the topics has been extensively tested** with researchers in a wide variety of fields, and the topic fit, top authors, and top institutions have been validated by those researchers. More information on the academic papers that fully describe the methodology are noted below.

Resources required

Machine learning tools are required to use quantitative analysis to understand the current momentum of a topic. One example, using topics of prominence analysis, requires a subscription to SciVal, which uses data from Scopus to drive its analytical engine; however, a Scopus subscription is not required to use the tool. The product can be tested on a trial basis by institutions prior to any subscription in order to determine if the tool meets the analytics needs of the institution.

Best practice examples

A number of large universities, rankings agencies, and government agencies globally use a range of analytical tools including SciVal to analyze research performance, including the University of California Office of the President, the University of Tokyo, and the Times Higher Education Global University rankings. There is a variety of use cases for these analytical products that universities use currently, which can be explored further with customer consultants who have expertise with the product.

