An exploration on the frontier of energy industry using DOE user facility data

Chunjuan Luan julielcj@163.com Dalian University of Technology

It is of great significance, both theoretically and practically, to conduct a study on the frontier of energy industries. Most previous studies on detecting industrial frontiers were conducted by analyzing data of scientific papers or patents; whereas in this research we adopt a brand-new perspective by employing the statistical data of Projects fostered by Scientific User Facility Program, US Department of Energy (US DOE), to explore the frontiers of energy industries. It would be more valid and effective on one hand, new and more focused on the other. It is an attempt of Altmetrics from a perspective of methodologies.

Research data in this study has been taken from the official website of the US DOE (Energy 2017). We have chosen data from all the 27881 projects fostered by the Basic Energy Science Program, or BES, in the Scientific User Facility Program run by the Office of Science in the US DOE, to conduct analysis of innovators and frontier topics of energy industry, by employing statistical methods and visual software of VOSviewer. nt erroribus, omnium menandri te eos. An consulatu appellantur concludaturque eum.

We select the column of "Home Institution Name" among data of the 27881 projects fostered by the BES to conduct the data processing and statistical analysis, and extracted those home institutions with over 300 projects, and take them as the innovators in the frontier of energy industries (Table 1).

Table 1 Top 10 innovators in the frontier of energy industries

Rank	Home Institution Name	count	prop
1	Argonne National Laboratory (ANL)	3058	10.97%
2	Oak Ridge National Laboratory (ORNL)	1232	4.42%
3	SLAC National Accelerator Laboratory SLAC	1056	3.79%
4	Lawrence Berkeley National Laboratory	884	3.17%
5	University of Chicago	834	2.99%
6	Stanford University	818	2.93%
7	Brookhaven National Laboratory (BNL)	781	2.80%
8	Northwestern University	720	2.58%
9	University of California – Berkeley	551	1.98%
10	Stony Brook University	356	1.28%

Previously, the visualized analysis on the subjects of industrial frontiers were conducted by means of the database of SCI as provided by the data platform of the web of science (Volk, Hansen et al. 2012, Mathews, Hu et al. 2014), or patent data (Mathews, Hu et al. 2014). Here, we select the title of Projects of BES Program to capture the frontiers of energy industry.

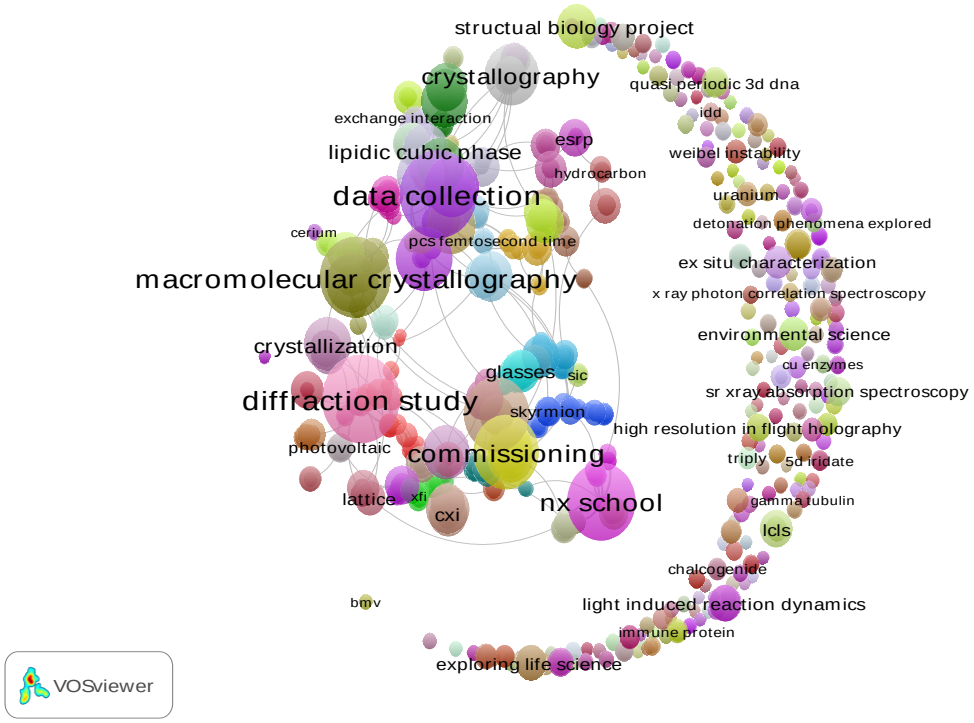

Figure 1 The frontier topics of energy industry

The high occurrence key words in the frontier of energy industries include diffraction study, data collection, macromolecular crystallography, NX school, National School on Neutron and X-ray Scattering, Beamline Commissioning, and so on.

Most of previous investigations on detecting industrial frontiers were conducted by analyzing data of scientific papers or patents; whereas in this research we have been taking a brand-new perspective by using the statistical data from the projects in the Scientific User Facility Program supported by the BES Program of US DOE to explore the technological frontiers of energy industries. From a theoretical perspective, this is an attempt based on the theory and conceptions of "Scientific Innovations". This exploration is a type of Altmetrics, and it surly will serve as an important compliment and development to the data resources and methodology of Scientific Statistics.