Mapping the Intersection of Science & Philosophy

[Extended Abstract — Poster]

Jaimie Murdock
Indiana University
School of Informatics &
Computing
jammurdo@indiana.edu

Robert Light
Indiana University
School of Library &
Information Science
lightr@indiana.edu

Colin Allen
Indiana University
College of Arts & Sciences
colallen@indiana.edu

Katy Börner
Indiana University
School of Library &
Information Science
katy@indiana.edu

ABSTRACT

This poster presents what we believe to be the first attempt to empirically measure and visualize the cross-pollination of the science and philosophy through citation patterns. Using the Stanford Encyclopedia of Philosophy as a proxy for the philosophical literature, we plot SEP citations onto the UCSD Map of Science to highlight areas of science which overlap with philosophical discussion. An outline of further studies is also discussed.

Categories and Subject Descriptors

I [**Applied Computing**]: Arts and Humanities; II [**Human-centered Computing**]: Scientific Visualization

General Terms

Visualization, digital humanities, science of science

1. INTRODUCTION

Despite C.P. Snow's infamously pessimistic (and controversial) assessment of the gulf between the two cultures of science and the humanities [4], there is, in fact, a long history of cross-pollination. Philosophy provides a particular nexus of such interactions, with philosophers seeking to understand and often exploit the knowledge produced by science while scientists sometimes turn to philosophers for ideas or analysis. But where in particular have philosophers turned their attention to science, or scientists to philosophy? One way to answer these questions is to look at the citation practices of each community, identifying references to the scientific literature in works by philosophers, and references to the philosophical literature in works by scientists.

Here we provide an example of the first of these approaches, mapping papers cited in the Stanford Encyclopedia of Philosophy (SEP)[1] onto the UCSD map of science [1]. The SEP serves as a proxy for philosophy as a whole by virtue of its comprehensive treatment (over 1400 articles comprising almost 15 million words) of the discipline of philosophy.
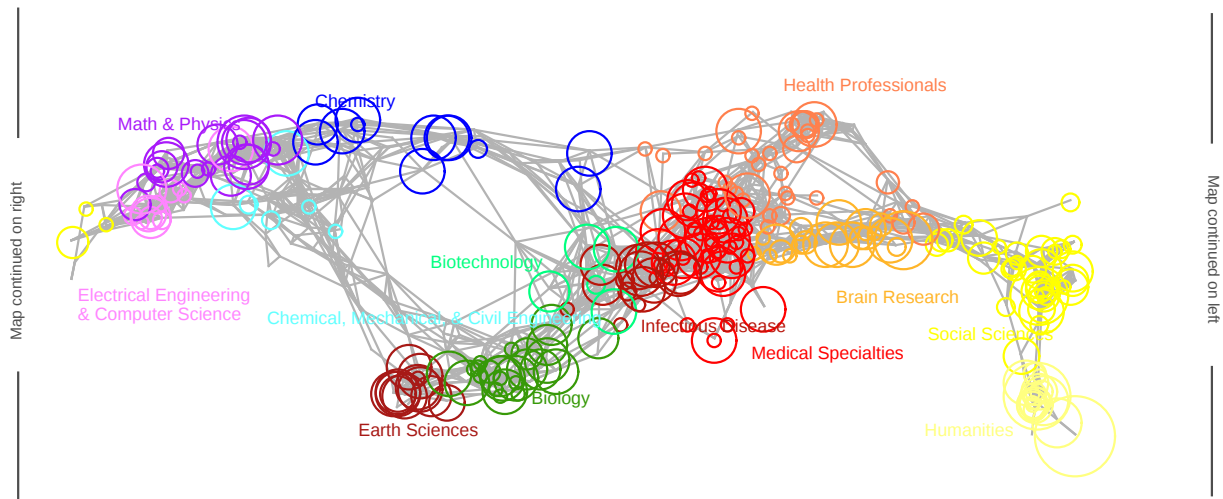
The USCD map is built from article level data from Thompson Reuters' Web of Science and Elsevier's Scopus. Scientific journals, classified by subject area, are considered more similar to each other in proportion to the number of citations they contain to each other. For any set of journals represented in the UCSD map, one can compute the number of SEP citations to those journals. Thus we can measure the influence of various science areas in the SEP. By overlaying a representation of the number of "citation hits" from the SEP bibliographies into the various regions of the UCSD map, it is possible to visualize which areas of science have received relatively more or relatively less attention from philosophers.

Do philosophers pay more attention to biology or physics? Geology or anthropology? Initial answers to these questions can only be provided by the analysis of large data sets. However, this represents only a start point for the Digging by Debating project. To realize our goal of exploiting large datasets in support of traditional humanities research, we need to develop computational methods that will assist scholars in the humanities more directly. Scientometric and text mining methods can suggest hypotheses, but unless these are linked to more powerful tools for semantically rich textual analysis and critical work, the role of these methods is limited to early stages of an investigation. The Digging by Debating project aims to fill this niche. High-level maps of the interaction between science and philosophy suggest places to look for more details about those interactions. How exactly, for instance, do scientific studies get used to support philosophical arguments? Identifying the places where those interactions are happening is the first step towards more detailed work on the exact nature of the interactions.

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[1] http://plato.stanford.edu/

Figure 1: Philosophical content on the UCSD Map of Science. The size of each circle corresponds to the number of SEP editorial areas citing material from the UCSD Map of Science subdiscipline (minimum: 0, maximum: 43). The color of each circle corresponds to one of 13 disciplines identified by the map of science.

2. METHODS

To generate this representation of philosophical content on the map of science, we took a dataset of 36,129 citations from the SEP parsed into BibTeX citation format. Using the Sci^2 Tool [3], citations with the type "article" were then matched to UCSD Map of Science subdisciplines using the "journal" field. However, as some areas of philosophy cite the sciences more heavily than others (e.g., bioethics), plotting the number of journals cited by the SEP for each subdiscipline results in a skewed map that does not reflect the reach of a science across the whole philosophical literature.

To control for this effect, we examined how many of the 43 SEP editorial areas reference a journal, rather than how many journals are referenced across the whole SEP. This is a measure of how ubiquitous the topic is in philosophy. For example, scientific studies in the area of *speech recognition* are discussed in the philosophical areas of *philosophy of cognitive science, philosophy of language, and philosophy of mind.* Of the 554 subdisciplines, 275 contained a publication cited by at least one SEP article. As a control, the UCSD subdiscipline of *psychology & philosophy* was cited by at least one article in all 43 SEP editorial areas. This relationship between subdisciplines and SEP editorial areas on the UCSD Map of Science overlay shown in Figure 1.

3. FUTURE WORK

Further studies investigating the intersection of philosophy and the sciences will map three additional spaces: 1) Philosophical content on the map of science, as seen by science. 2) Scientific content on the map of philosophy, as seen by philosophy. 3) Scientific content on the map of philosophy, as seen by science.

To create a map of philosophical content as seen by science (1), we will take the papers from the Scholarly Database[2]

and align them with papers in the PhilPapers index[3]. Areas with high numbers of publications appearing in the PhilPapers index will have higher philosophical relevance.

For the latter two maps, we will need to create a base map of philosophy using similar methods, drawing on expertise from the InPhO project in computational representations of philosophy [2]. For scientific content as seen by philosophy and scientific content as seen by science, we would be use the same datasets, but instead plotting the results on the different topography.

4. ACKNOWLEDGMENTS

5. REFERENCES

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