Methodologies for Visualizing Publication Impacts and Collaborations at a Research Institute

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Introduction

The Information Services Office (ISO) at the National Institute of Standards and Technology (NIST) analyzed the impact of NIST's peer-reviewed forensic journal literature through citation analysis and network visualizations. This initial study identified collaborations and areas of greatest impact for forensic research at NIST. ISO shared its study results in a poster session at a conference for forensic researchers.

The methodology and skills ISO developed for this project have wide applications beyond the initial study. The methodology can be used for similar studies in other disciplines. In addition, as a result of this study, ISO has developed broader applications for data visualizations and markets these to researchers at NIST, increasing our visibility and ability to support NIST research. By participating in a customer poster session, ISO gained experience and insight into its customers' research and publication processes. Other libraries can apply these types of analyses and visualizations to serve customers in a variety of fields.

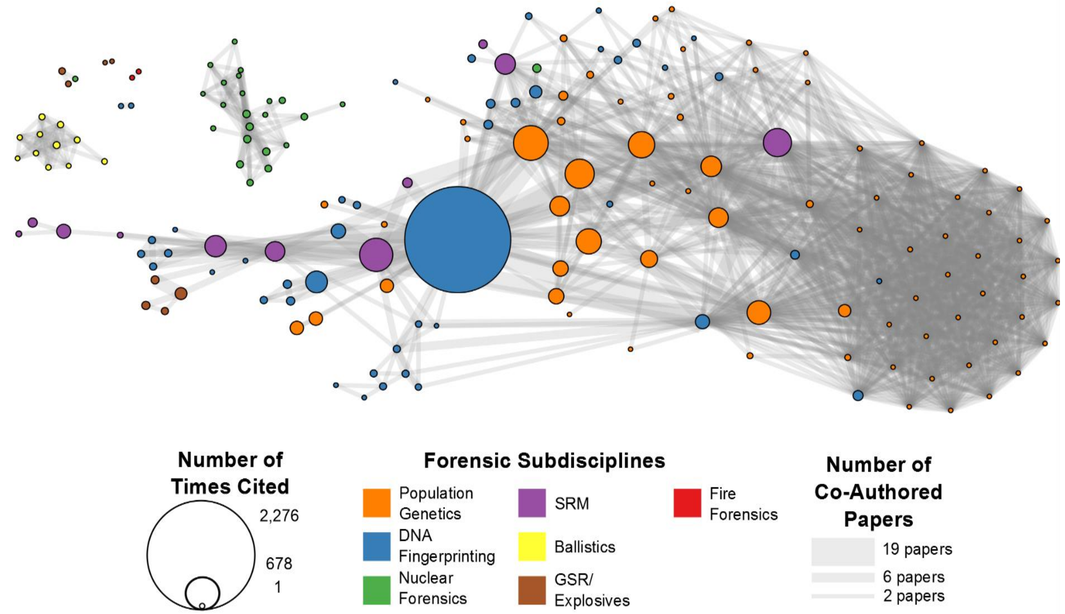
Methodology

A Web of Science (WoS) database search identified NIST forensic publications. ISO's iterative WoS search strategy used a variety of forensic-related keywords and included knowledge of forensic publishing at NIST.

A network structure was created using Sci^2 to extract a co-author network from the WoS search results, which was then visualized using Gephi. Authors (represented by circles in the visualization) were connected to collaborators (via lines) and arranged using Gephi algorithms. Gephi functions allowed resizing the nodes and lines based on the number of citations and collaborations, respectively. Subdisciplines for the network were assigned manually by studying the underlying papers for each author and identifying their predominant research field.

Interpreting the Visualization

This co-author network shows the collaboration between authors who have published two or more papers together. Each node represents an author, NIST or non-NIST, who has co-authored with a NIST scientist, and is sized to represent the number of citations the author has received. The largest node in the center of the network represents the primary forensic author at NIST.



The network visualization easily identifies co-authors who work in independent clusters, such as those in ballistics and nuclear forensics, as seen at the left side of the visualization. Individuals who co-authored only two articles appear as the 25+ nodes clumped and equidistant to each other on the right side of the visualization. Subdiscipline information added to each author node allows the visualization to show the interdisciplinary relationships and frequent collaborations of authors in different fields, such as those in population genetics, DNA fingerprinting, and Standard Reference Materials (SRMs).

Impacts and Other Applications

When the results of ISO's study were shared during the Forensics@NIST 2014 conference held at NIST in December 2014, researchers expressed a keen interest in the analysis. The co-author network visualization, in particular, captured their attention.

ISO's analysis of forensic publications led to other ISO studies requested by NIST researchers that include the following:

- expanding the analysis beyond NIST publications to overall trends in the forensic literature
- applying the methodologies to publications and data in other scientific disciplines
- interpreting the visualizations to identify research gaps.

Next Steps or Lessons Learned

Sharing ISO analysis results and methodologies in a scientific venue outside of the library and information science fields has opened new doors to ISO. NIST scientists are now seeing ISO staff as collaborators and not just support staff helping with literature reviews, book and journal requests, and ready reference questions.

To meet customer expectations, ISO will continue to develop its analysis and visualization skills beyond the tools used in this study. As researchers ask for similar studies, ISO will develop the data visualization skills of additional staff to accommodate the growing number of customer requests.

For More Information

To download a copy of this poster and others from ISO staff, use this QR code or visit nist.gov/nvl.

Special Libraries Association Annual Conference, Boston, MA June 2015