

# Knowledge Maps and Research Networking

Uses, Examples and Possible Implementations

Abe Megahed, April 10, 2022

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  - Definitions, Use Cases, Available Systems
- **Systems Currently In Use at UW**
  - Academic Analytics, xDD
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# What is Research Networking?

“Research networking is about using tools to identify, locate and use research and scholarly information about people and resources. Research networking tools serve as knowledge management systems for the research enterprise.” - Wikipedia

- RN Tools:
  - Search - find items by keywords
  - Knowledge Graphs - show how research and people are connected.
  - Knowledge Maps - survey a map of the research landscape using a map metaphor

# Main Use Cases for Research Networking

- **For Investigators**
  - Discover potential collaborators
  - Identify funding organizations and grant opportunities
- **For Administrators**
  - Understand resource allocation
  - Assess performance and returns of investment (controversial)

# Available Research Networking Systems

- **Non-Commercial**

- **SaaS**

- KMap

- **Open Source**

- Vivo
- Harvard Catalyst

- **Commercial**

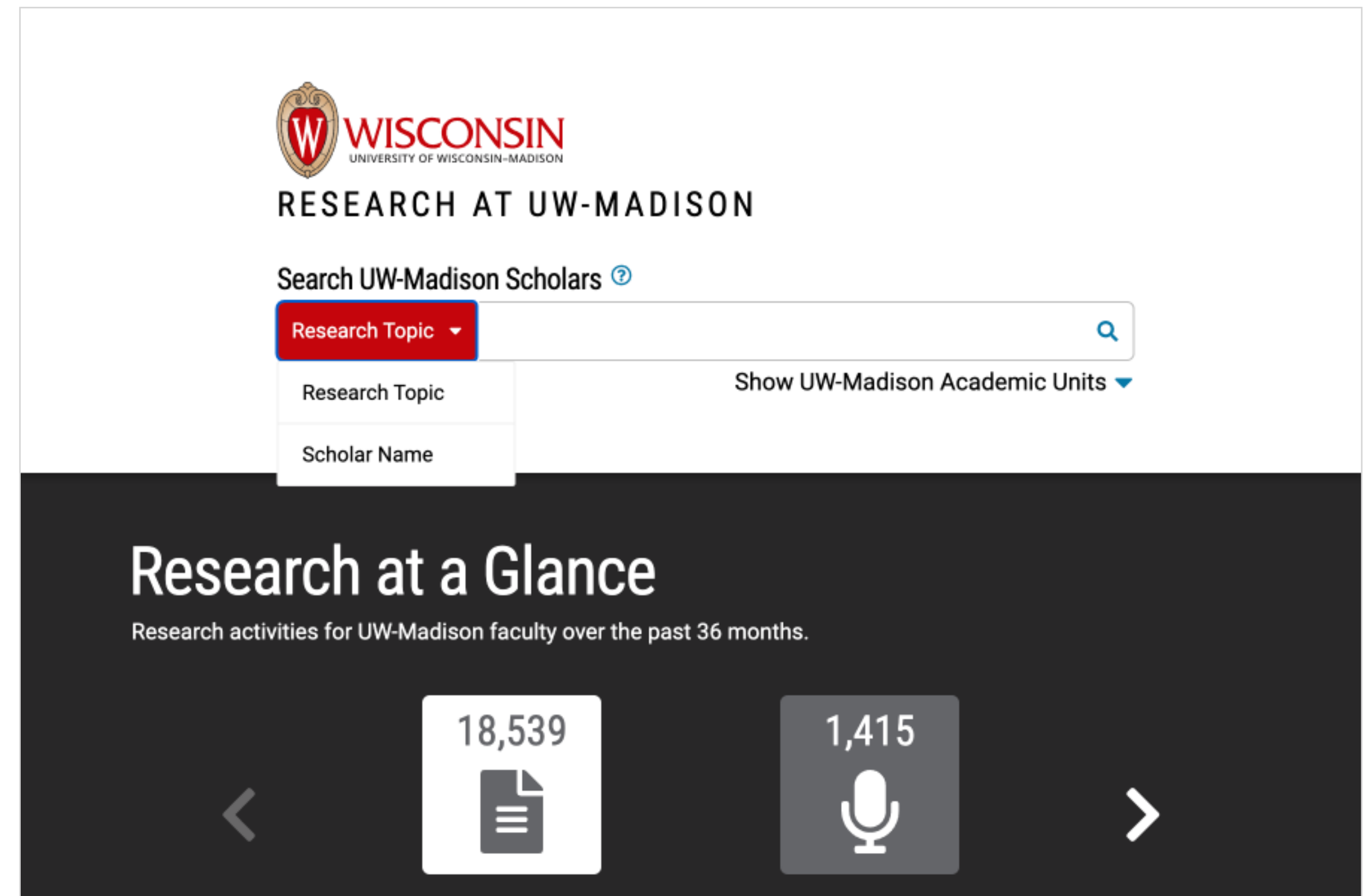
- Elsevier Pure
- Elsevier SciVal
- Mentis Profiles
- Academic Analytics

# Systems Currently In Use at UW

- **Academic Analytics**
  - Used for faculty, research, and collaboration insight
- **xDD**
  - Used for document search
  - Powered by HTConder high throughput computing

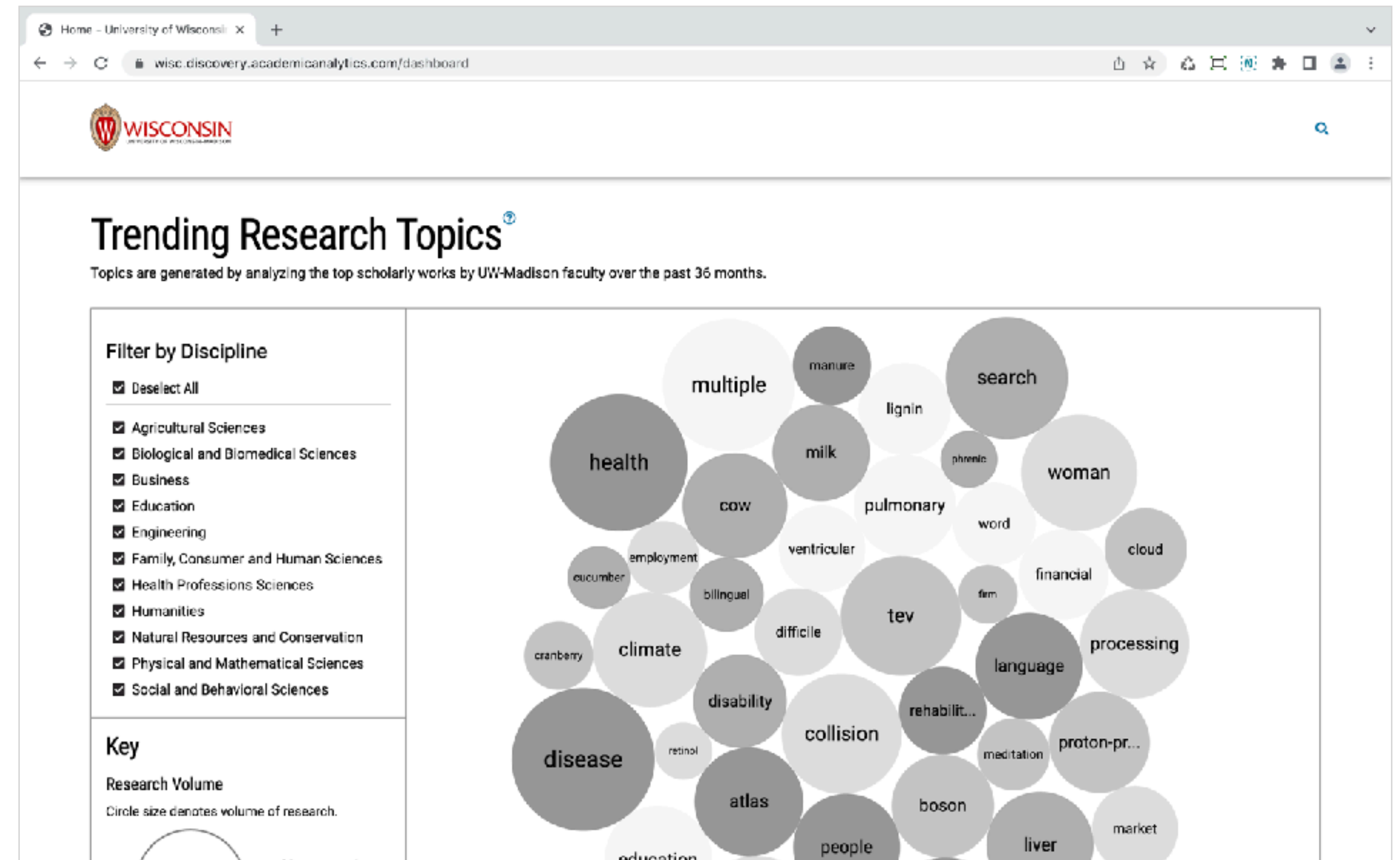
# Academic Analytics

- Founded in 2005
- ~75 employees
- Dashboard Features:
  - Search
    - Search by Topic
    - Search by Scholar
  - Overview



# Academic Analytics - Dashboard Overview

- Research at a Glance
  - Recent Articles
  - Recent Proceedings
  - Recent Grants
- Trending Topics





# Academic Analytics - Search By Topic

- Results:
  - Related Terms
  - Scholars
  - Recent Activity
  - Related Networks

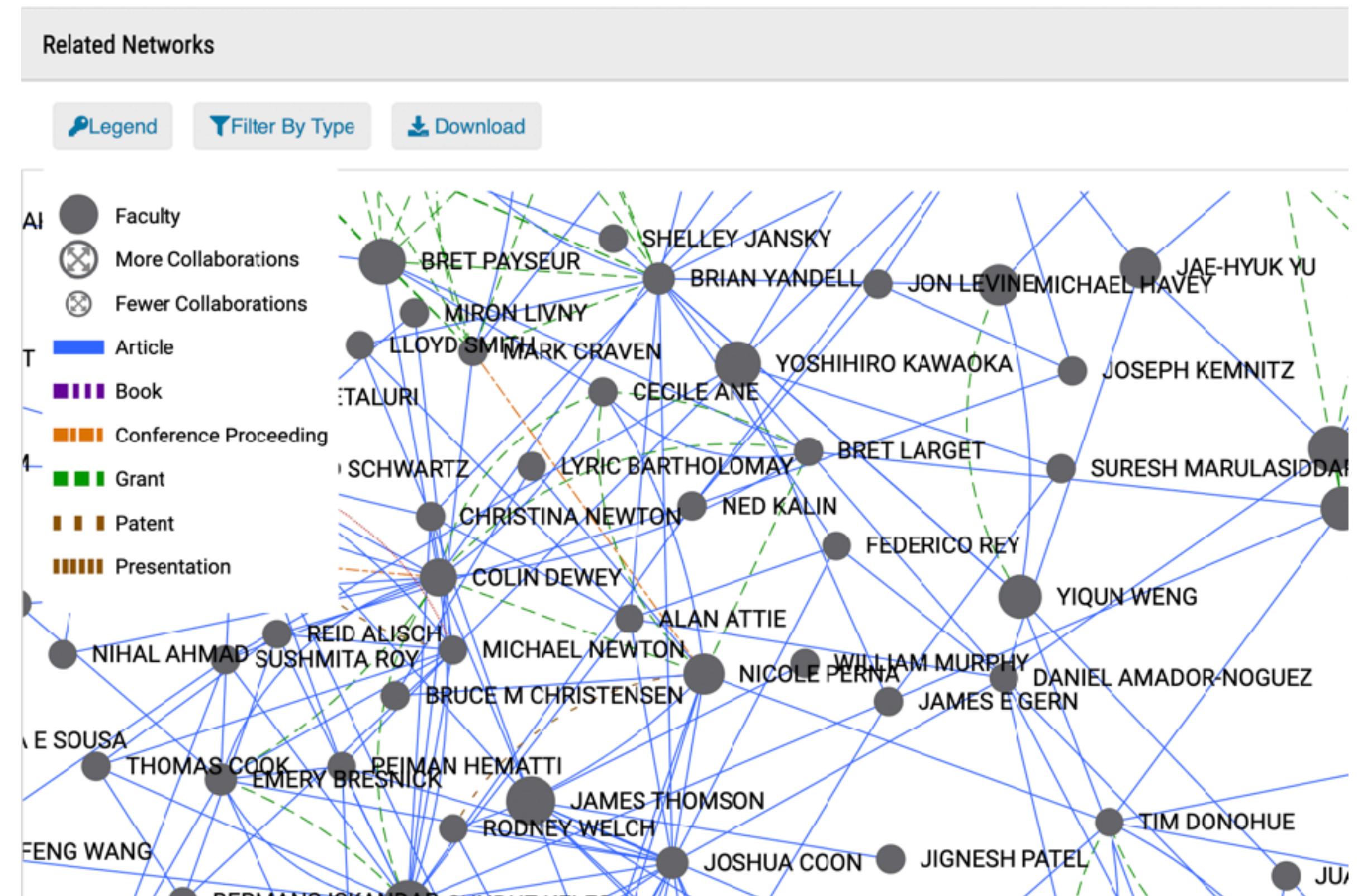
The screenshot shows a web browser displaying search results for 'genomics' on the 'Research at UW-Madison' platform. The page includes the university's logo and a search bar with 'genomics' entered. Below the search bar, the results are organized into several sections:

- Search Results for "genomics"**
- Terms Related to Your Search**: A list of related terms including metagenomics, nutrigenomics, pharmacogenomics, bioinformatics, genetics, genome, genomic analysis, metabolomics, proteomics, and transcriptomics.
- Scholars**: A table listing scholars and their associated works and networks.
- Recent Activity**: A section for recent activity, currently collapsed.

Scholars	Related Works	Related Networks
GUILHERME ROSA Animal and Dairy Sciences, Department of	112	49
KENT WEIGEL Animal and Dairy Sciences, Department of	90	50
FRANCISCO PENABARICANO Animal and Dairy Sciences, Department of	44	13
DAVID SCHWARTZ Chemistry, Department of	64	16

# Academic Analytics - Related Networks

- Nodes:
  - Faculty
- Links:
  - Articles
  - Books
  - Conference Proceedings
  - Grants
  - Patents
  - Presentations



# Academic Analytics - Search By Scholar

- Department Affiliations
- Program Affiliations
- Awards
- Publications

The screenshot shows a web browser window displaying the Academic Analytics search results for Brian Yandell. The browser's address bar shows the URL: `wisc.discovery.academicanalytics.com/scholar/stack/279782/BRIAN-YANDELL?unitId=28673&unitType=2`. The page header features the University of Wisconsin-Madison logo and the text "RESEARCH AT UW-MADISON". A search bar on the right is labeled "Search UW-Madison Scholars" and contains the text "Scholar Name" and "Brian Yandell". Below the search bar is a link "Show UW-Madison Academic Units". The main content area is divided into two columns. The left column displays the scholar's name "BRIAN YANDELL" and title "PROFESSOR". Below this, there are sections for "Department Affiliations" (Statistics \*), "Program Affiliations" (Horticulture, Plant Breeding and Plant Genetics, Statistics), and a "Research Summary" section. The right column contains two expandable sections: "Awards" and "Publications". The "Awards" section shows a table with columns "Date" and "Work", listing a "New Leadership Academy Fellow" award from the University of Utah in 2015. The "Publications" section shows a table with columns "Date" and "Work", listing an article titled "Interventions to Disrupt Coronavirus Disease Transmission at a University, Wisconsin, USA, August–October 2020" published in "Emerging Infectious Diseases" in 2021.

**BRIAN YANDELL**  
PROFESSOR

**Department Affiliations**  
[Statistics \\*](#)

**Program Affiliations**  
[Horticulture](#)  
[Plant Breeding and Plant Genetics](#)  
[Statistics](#)

\* primary affiliation

**Research Summary** ▲  
I study systems genetics to unravel the complex relationships between observable traits (such as flowering time or clinical signs of diabetes) and molecular signals (mRNA expression, protein and metabolite levels, etc.). This work includes model selection for gene mapping (QTL), expression hotspot analysis and causal phenotype models. My research interests have evolved into a broader perspective on data science. I now direct the *comprehensive American Family Incomes Data*.

**Awards** Expand

Date	Work
2015	Award New Leadership Academy Fellow Governing Organization: University of Utah

**Publications** Expand

Date	Work
2021	Article Interventions to Disrupt Coronavirus Disease Transmission at a University, Wisconsin, USA, August–October 2020 Journal: Emerging Infectious Diseases [10806040], Vol 27, Issue 11



# Academic Analytics - Search By Scholar

- View Collaborations
- Research Interests
- Similar Scholars
- Key Terms

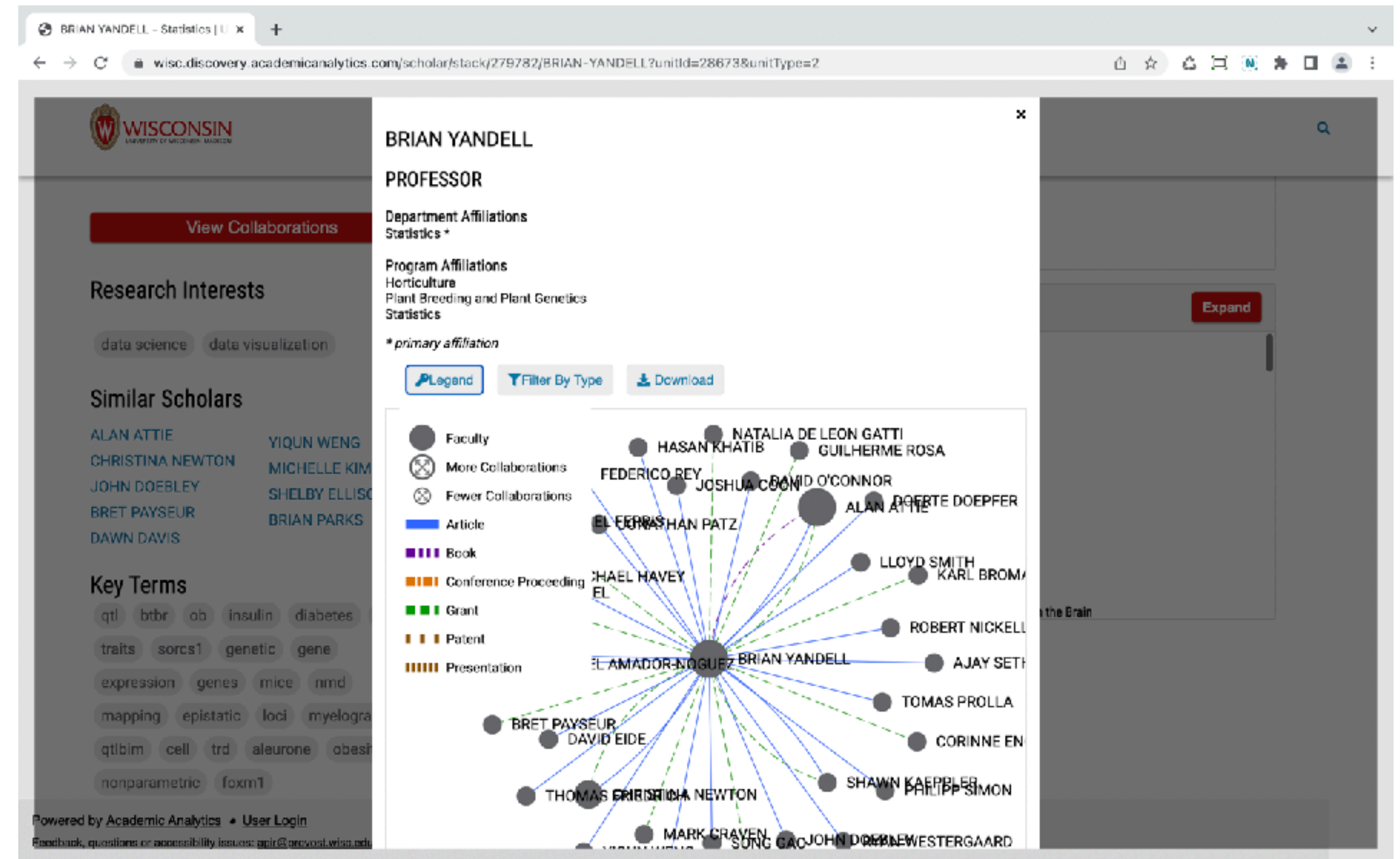
The screenshot displays the Academic Analytics web application interface for a scholar's profile. The browser address bar shows the URL: `wisc.discovery.academicanalytics.com/scholar/stack/279782/BRIAN-YANDELL?unitId=28673&unitType=2`. The page features the University of Wisconsin-Madison logo and a search icon. The main content area is divided into several sections:

- View Collaborations:** A red button at the top left of the main content area.
- Research Interests:** A section with two tags: `data science` and `data visualization`.
- Similar Scholars:** A list of names in two columns: ALAN ATTIE, CHRISTINA NEWTON, JOHN DOEBLEY, BRET PAYSEUR, DAWN DAVIS, YIQUN WENG, MICHELLE KIMPLE, SHELBY ELLISON, and BRIAN PARKS.
- Key Terms:** A collection of tags including `qtl`, `btbr`, `ob`, `insulin`, `diabetes`, `trait`, `traits`, `srcs1`, `genetic`, `gene`, `expression`, `genes`, `mice`, `nmd`, `mapping`, `epistatic`, `loci`, `myelography`, `qtlbim`, `cell`, `trd`, `aleurone`, `obesity`, `nonparametric`, and `foxm1`.
- Grants, Patents and Clinical Trials:** A section with an **Expand** button. It lists two grants:
  - 2021 Article:** Applying hierarchical resource selection concepts to solving crop damage caused by birds.
  - 2020 Grant:** Statistical Modeling with DHS COVID-19 Response Team (CRT). Agency: WISCONSIN DEPT OF HEALTH SERVICES. Total Amount: \$50,000. Duration: 10/1/20 - 12/30/20. Scholars: Show all, BRIAN YANDELL - (PI).
  - 2020 Grant:** Enabling Nanoplatfoms for Targeted In Vivo Delivery of CRISPR/Cas9 Ribonucleoproteins in the Brain.

The footer contains the text: "Powered by Academic Analytics • User Login" and "Feedback, questions or accessibility issues: [apir@provo.st.wisc.edu](mailto:apir@provo.st.wisc.edu)".

# Academic Analytics - Collaborations

- Nodes:
  - Faculty
- Links:
  - Articles
  - Books
  - Conference Proceedings
  - Grants
  - Patents
  - Presentations

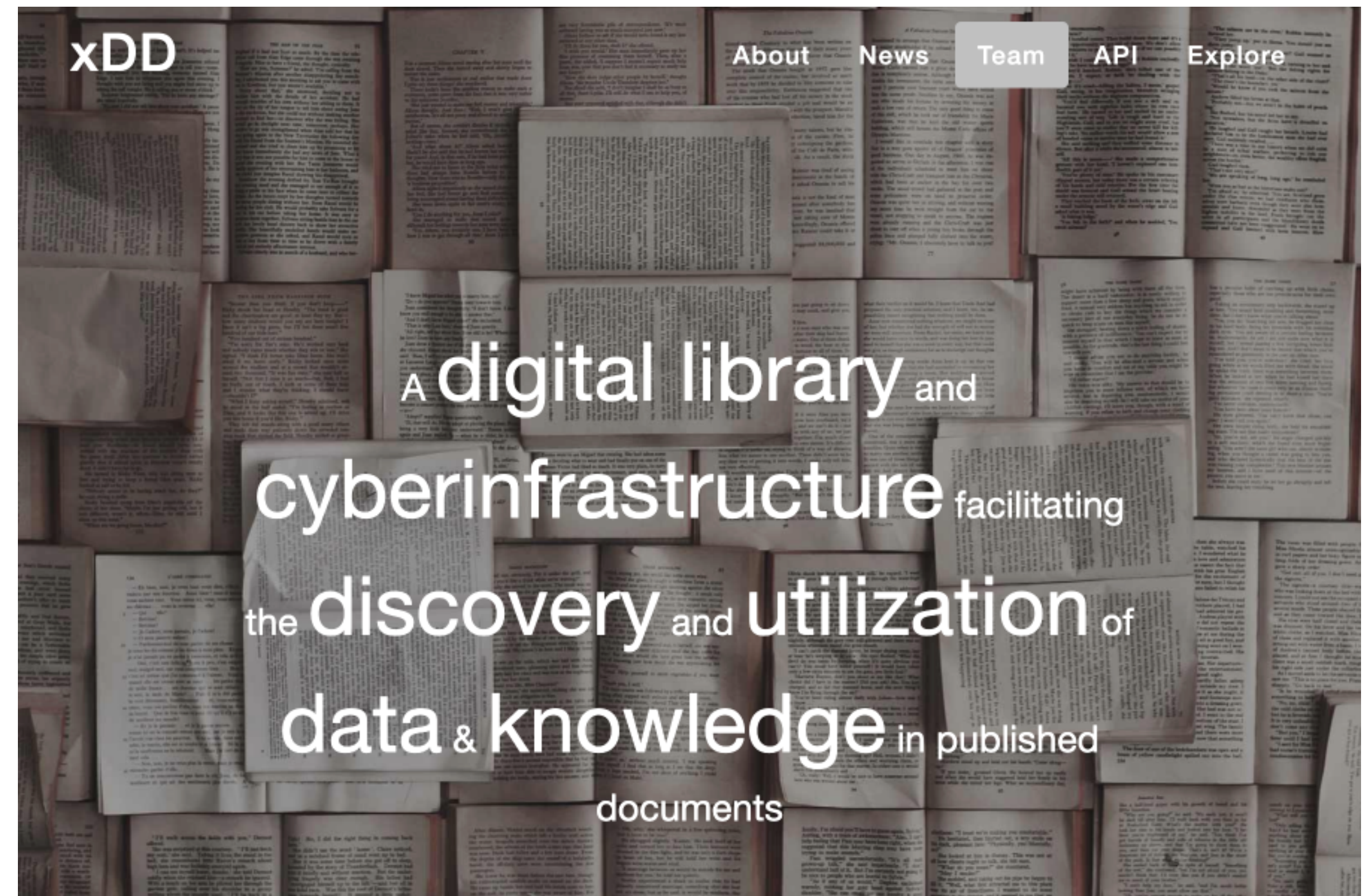






<https://xdd.wisc.edu>

- Document Search (Deep Dive)
- Covid Document Search
- Uses HTC to process documents
- Team:
  - Leadership
    - Shannon Peters, Miron Livny
  - Implementation
    - Ian Ross, Daven Quinn
    - Abe Megahed (Search UI)



# xDD Search

- Search by:
  - Snippets
  - Articles
  - Journals
  - Publishers
  - Terms
  - Dictionaries

xDD

AboutNewsTeamAPIExplore


Search xDD

SearchSnippetsArticlesJournalsPublishersTermsDictionaries




Article

A

Author




Options



Q Search

About





# xDD Search Results

- Simple List View
  - No visual indication of correlation or connection of results.

xDD

AboutNewsTeamAPIExplore




xDD Search Results

Search: category: articles, author: Brian Yandell




Q Search Again

Showing 26 results




1. [Kernel Smoothing](#)

 Technometrics published by Informa UK Limited in 1996,  pages 75-76  Yandell, Brian S.

2. [Jump Detection in Regression Surfaces](#)

 Journal of Computational and Graphical Statistics published by Taylor and Francis in 1997,  pages 332-354  Qiu, Peihua; Yandell, Brian

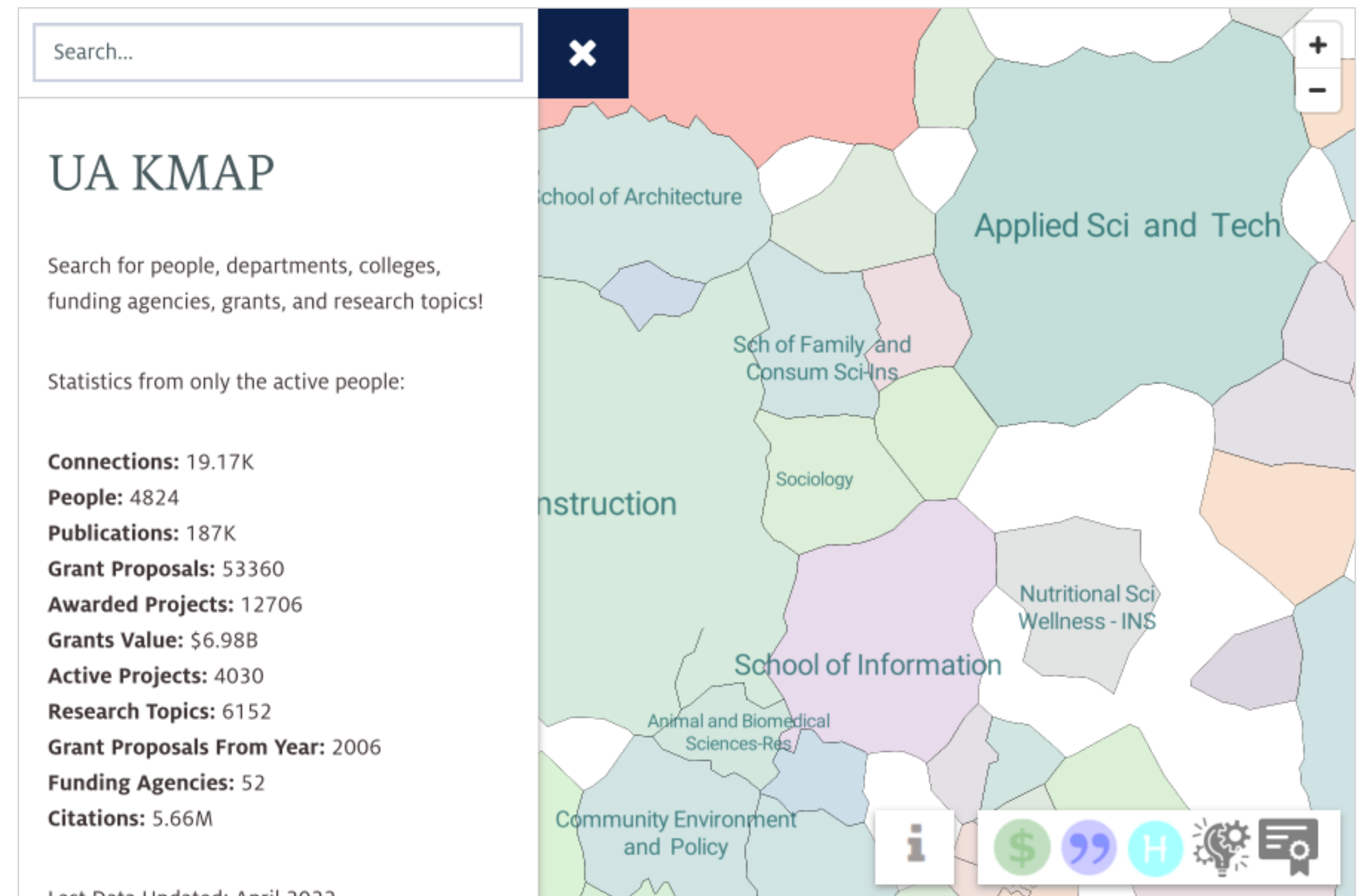
3. [Algorithms for multidimensional semiparametric glm's](#)

 Communications in Statistics - Simulation and Computation published by Informa UK Limited in 1988,  pages 295-312  Yandell, Brian S.



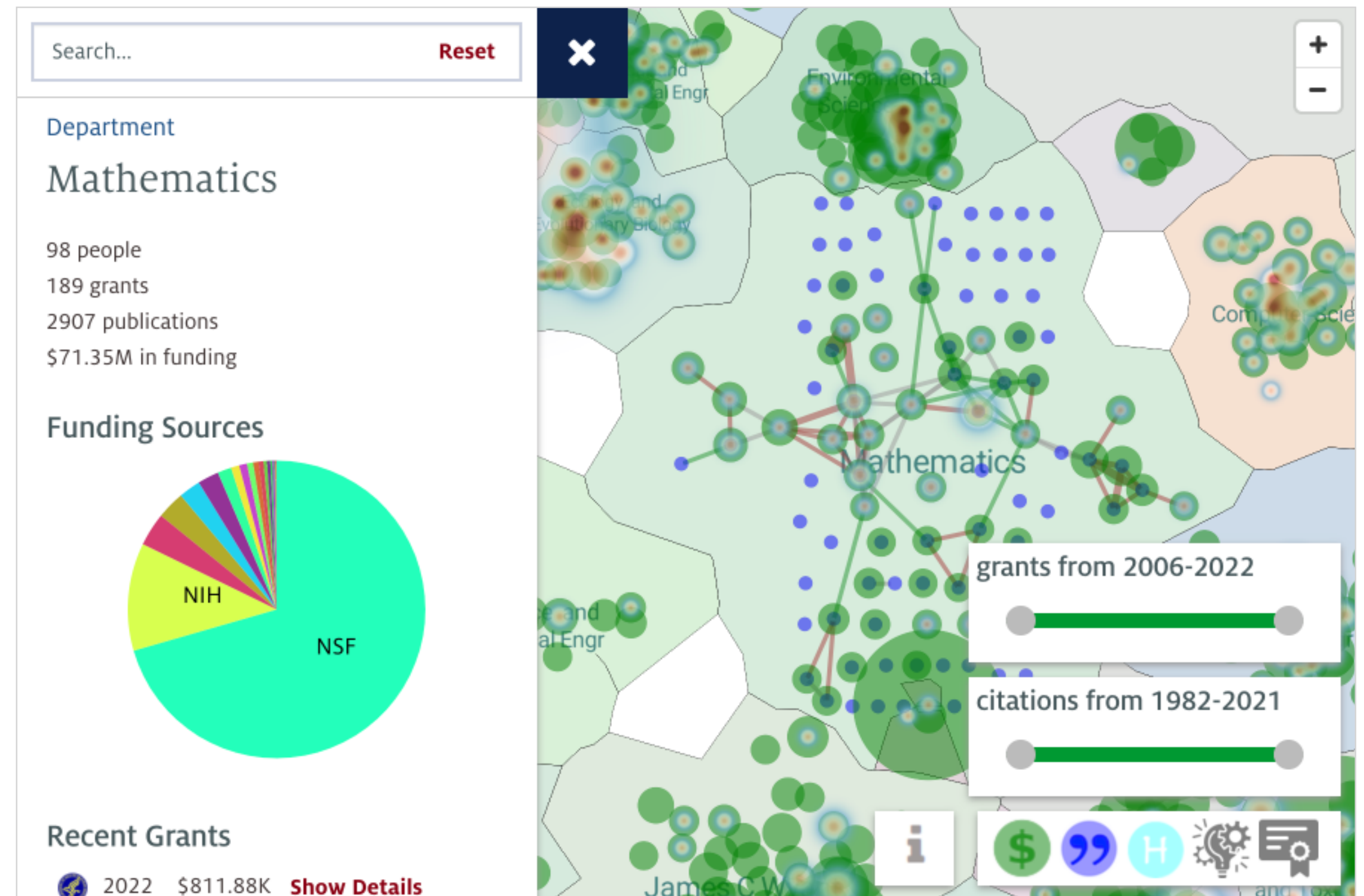
# KMap

- Developed at University of Arizona
- In development since 2015
- Offered as a SaaS model
- Displays base map as a polygon based map instead of as a graph
- Search by:
  - Department
  - Researcher



# KMap - Department View

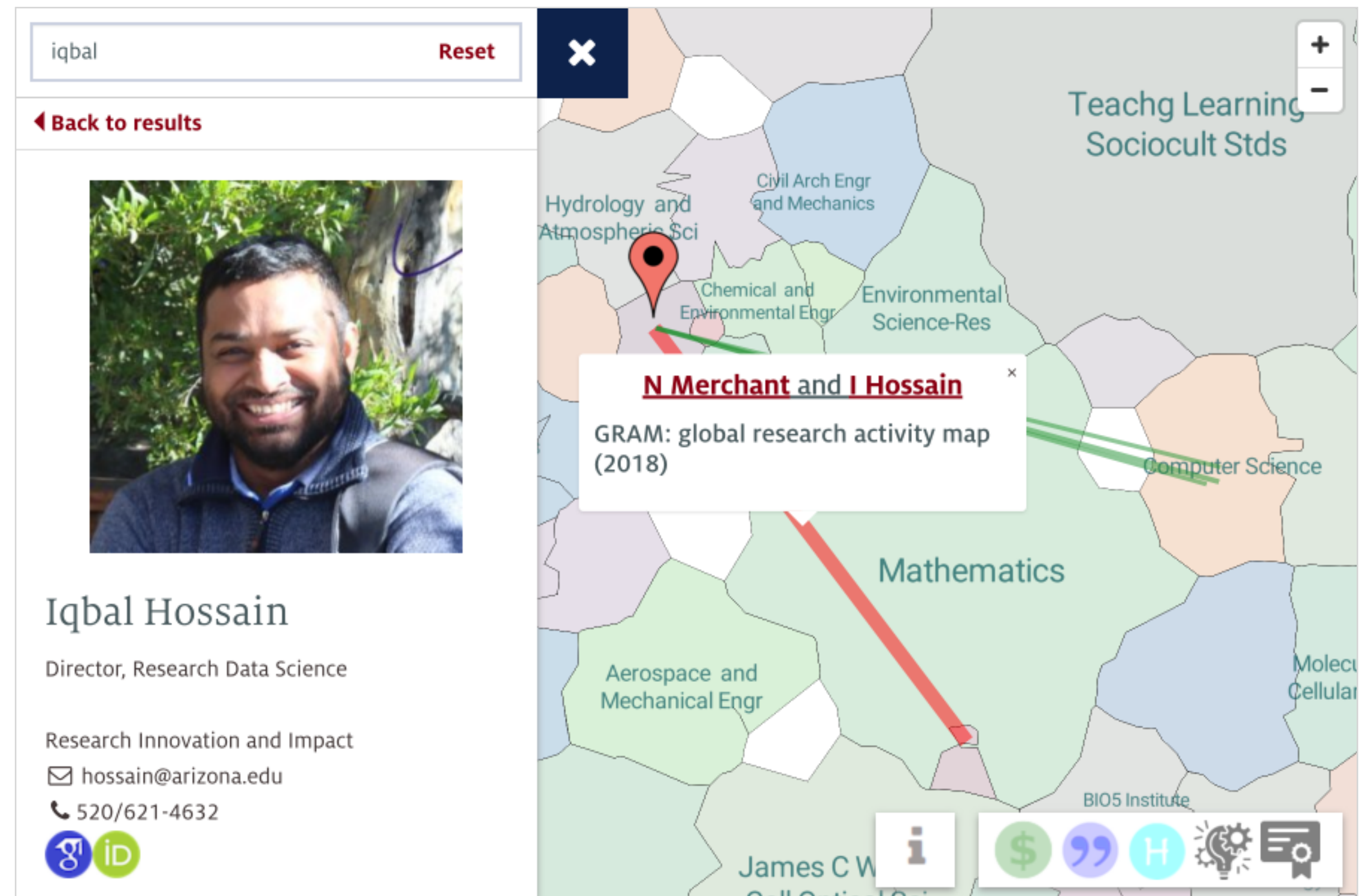
- View department members
  - Chart view
  - Sidebar list view
- View funding chart
- View overlays for
  - Funding
  - Citations (Heat Map)
  - H-index





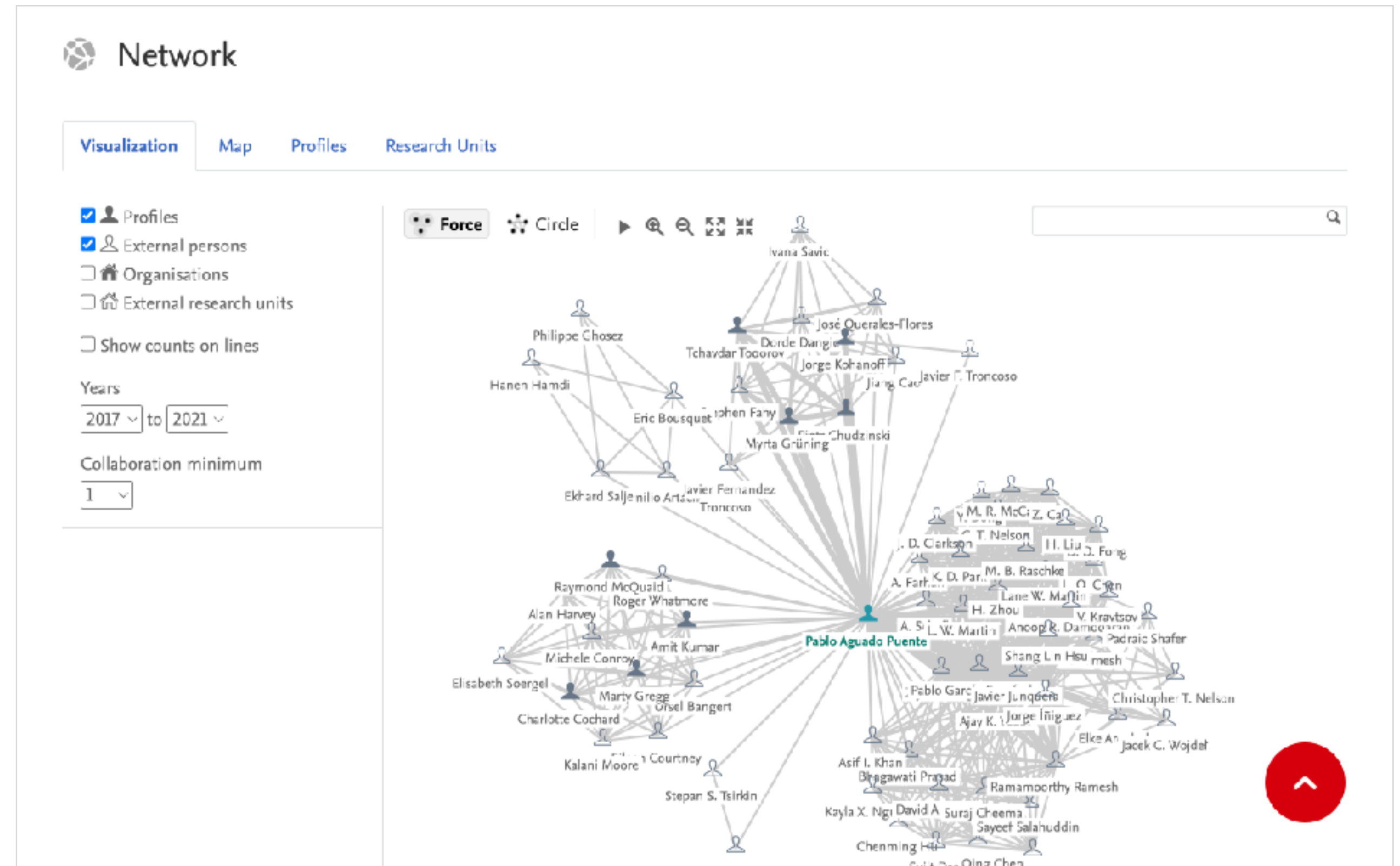
# KMap - Researcher View

- View researcher's department / location on base map
- View collaborators
- View publications
  - Links between collaborators on chart view
  - List of publications in sidebar



# Elsevier Pure

- 250 implementations
- Provides graph visualization
- Similar to Academic Analytics
- Nice tools for pruning graphs by number of collaborators



# Shortcomings of Existing UW Systems

- No clear (map based) overview of people, research, or funding.
- Existing systems are not discoverable.
- Existing systems combine the software and the data / knowledge graph into a single monolithic system.
- There are concerns over the accuracy and completeness of the AA graph data (search for “Academic Analytics Rutgers” for details).

# Proposed Solutions

- **KMap**
  - Would need to import data into system - probably only feasible for a department level system
  - Would need to work out SaaS agreement
- **Commercial Systems (Elsevier Pure etc)**
  - Licensing
- **Hybrid Approach**
  - Use existing database / knowledge graph
  - Add map view on top of existing system

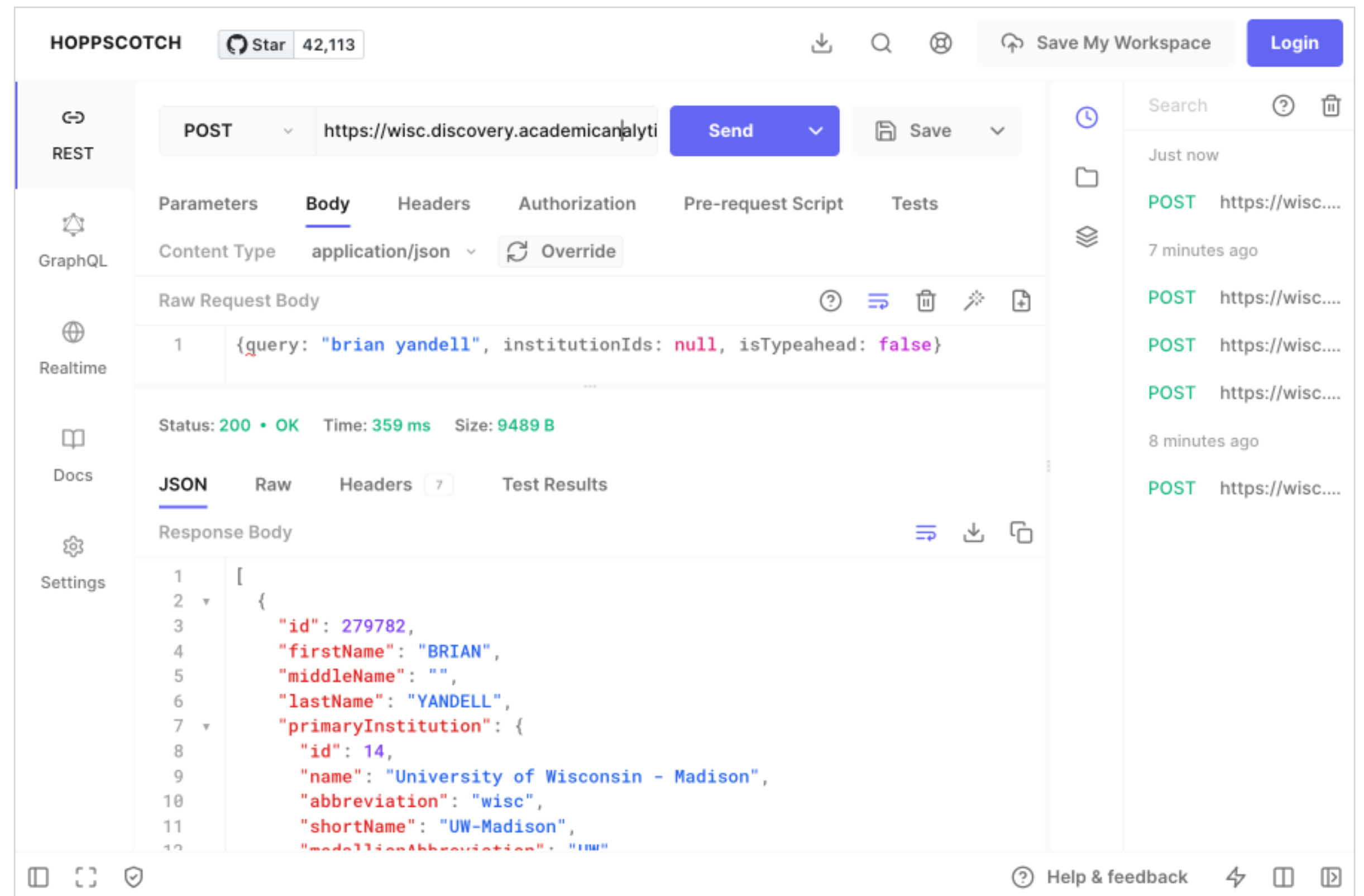
# Hybrid Approach

- Use existing database / knowledge graph where possible
- Add map overview on top of existing system
- Create API layer to pull and combine data from existing knowledge graphs
  - Google Scholar
  - Academic Analytics
- Use existing application views / display elements where possible
- We could potentially open source the API layer if there is interest.



# Academic Analytics API

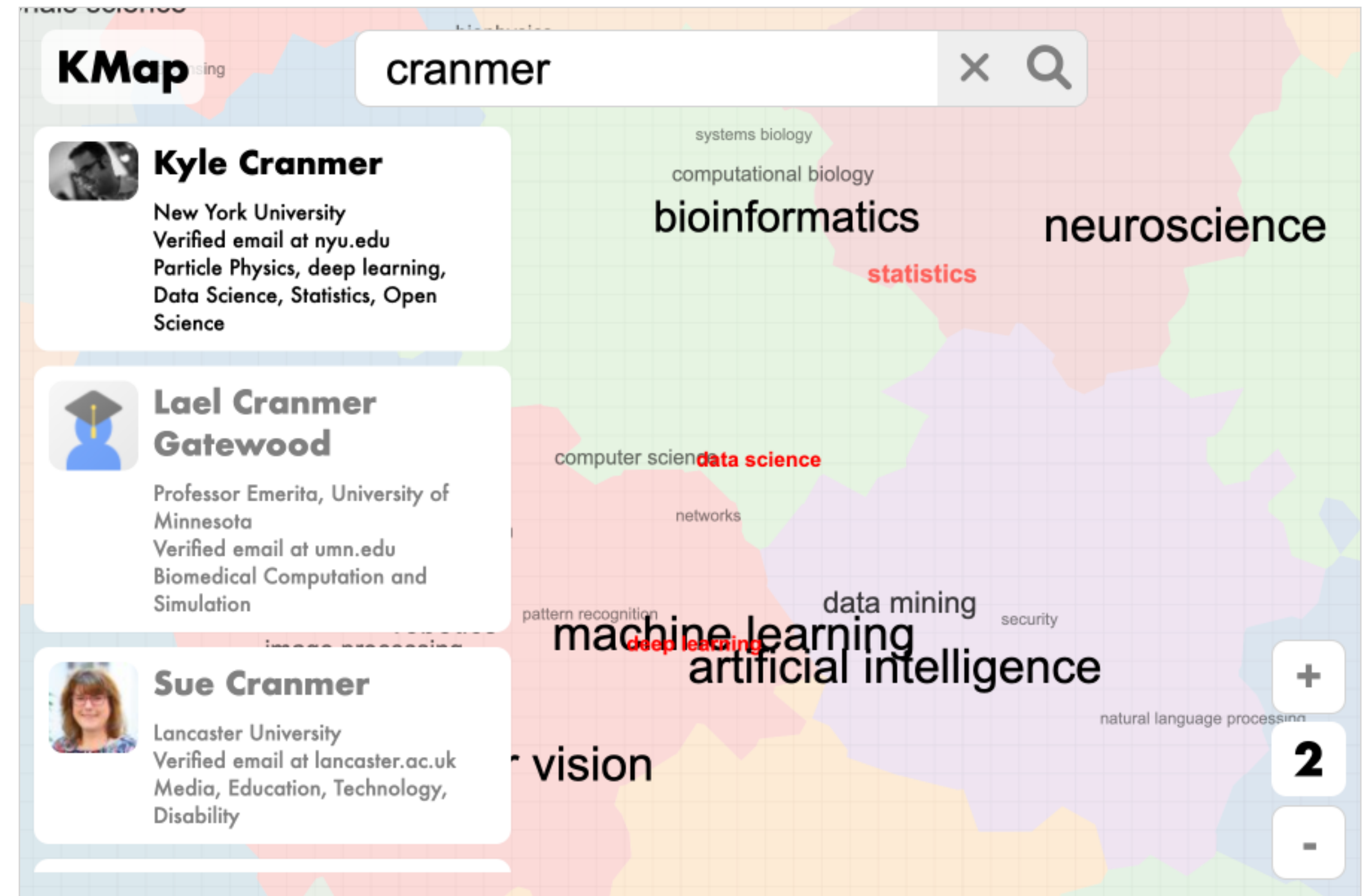
- API spec does not appear to be published
- It's discoverable through the application.
- It looks like we can call it from other domains / web apps.
- Example:  
<https://wisc.discovery.academicanalytics.com/api/people/279782>





# DIY / Hybrid Approach Concept Prototype

- Uses base map from KMap project.
- Pulls and parses data from Google Scholar knowledge graph.
- <http://www.abemegahed.com/private/kmap/>



# Discussion

- Goals
- Solutions / Strategy
- Next steps / Milestones

# Links

- [https://en.wikipedia.org/wiki/Comparison\\_of\\_research\\_networking\\_tools\\_and\\_research\\_profiling\\_systems](https://en.wikipedia.org/wiki/Comparison_of_research_networking_tools_and_research_profiling_systems)
- <https://kmap.arizona.edu>
- <https://wisc.discovery.academicanalytics.com/dashboard>
- <https://xdd.wisc.edu>