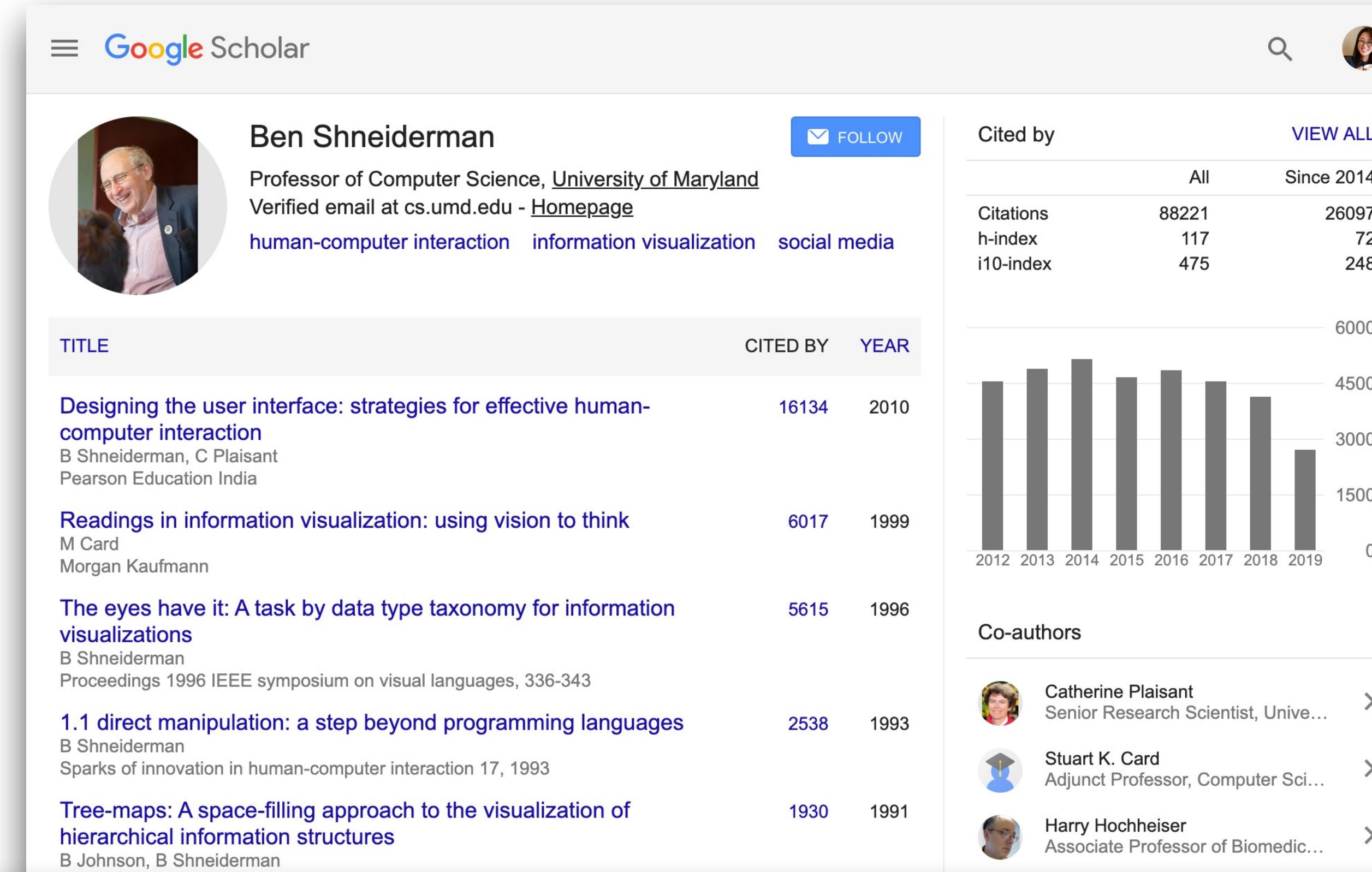


Influence Flowers of Academic Entities

Minjeong Shin, Alexander Soen, Benjamin T. Readshaw, Stephen M. Blackburn, Mitchell Whitelaw, Lexing Xie

Australian National University

Motivation



Academic Search Engines

Visualisation of Bib. data

Science of Science

Productivity

Number of papers published over time, by venue.

Collaboration

Coauthor list and networks.

Influence

Number of citations as proxy.

We visualise the **flow of influence** between academic entities.

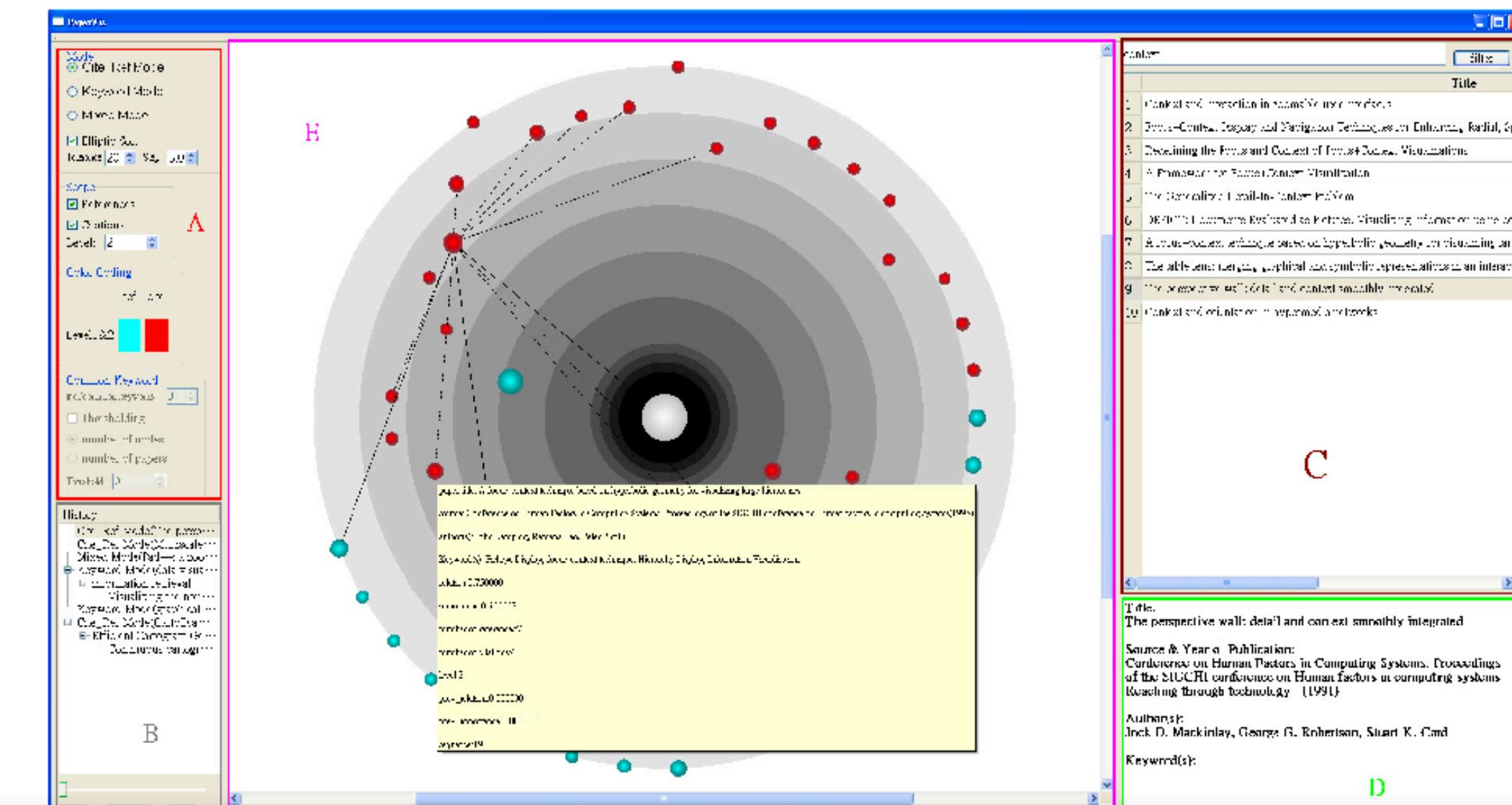
Motivation

Academic
Search
Engines

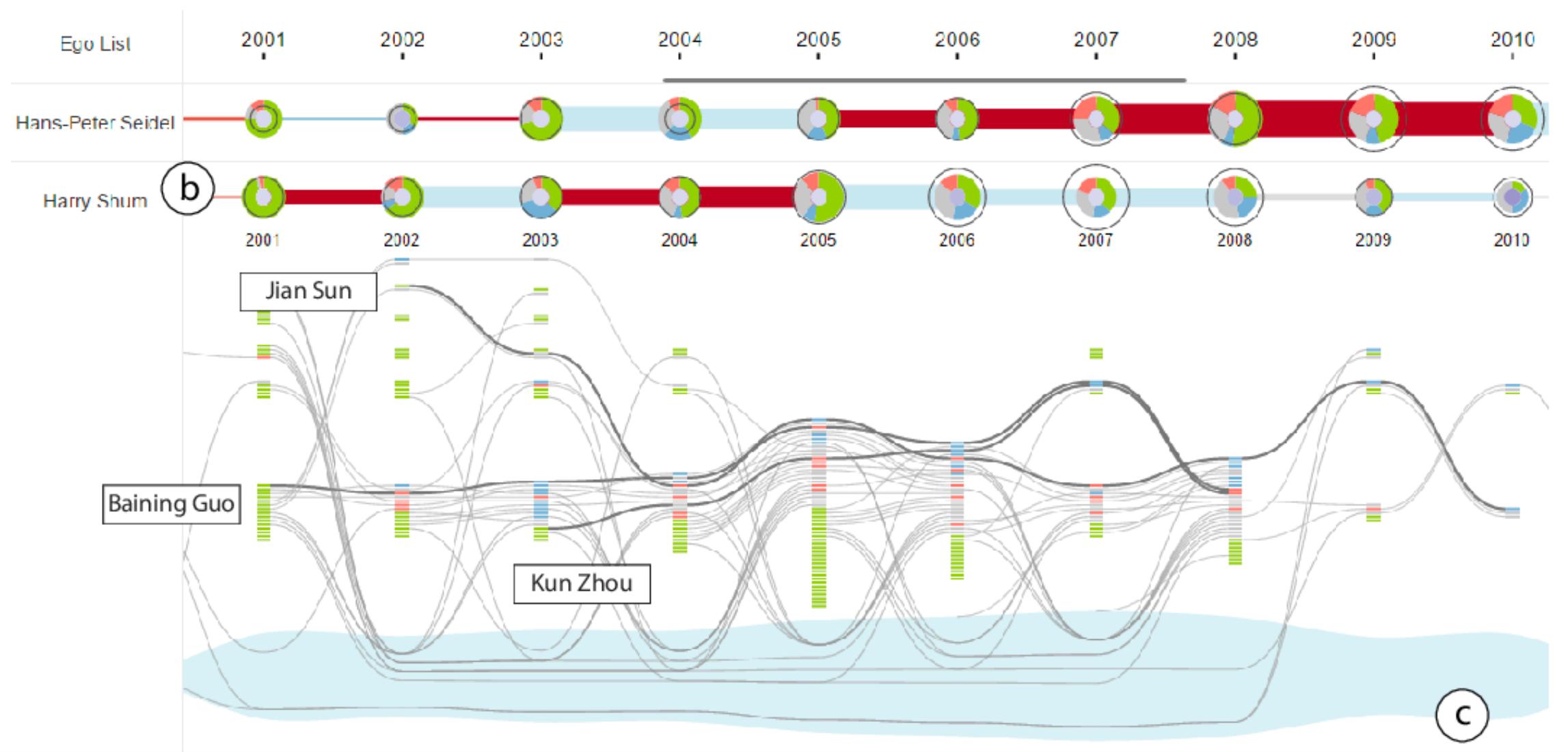
Visualisation
of Bib. data

Science of
Science

Paper Centric



Ego Centric



We propose a new visual metaphor for all academic entity types.

Motivation

Academic
Search
Engines

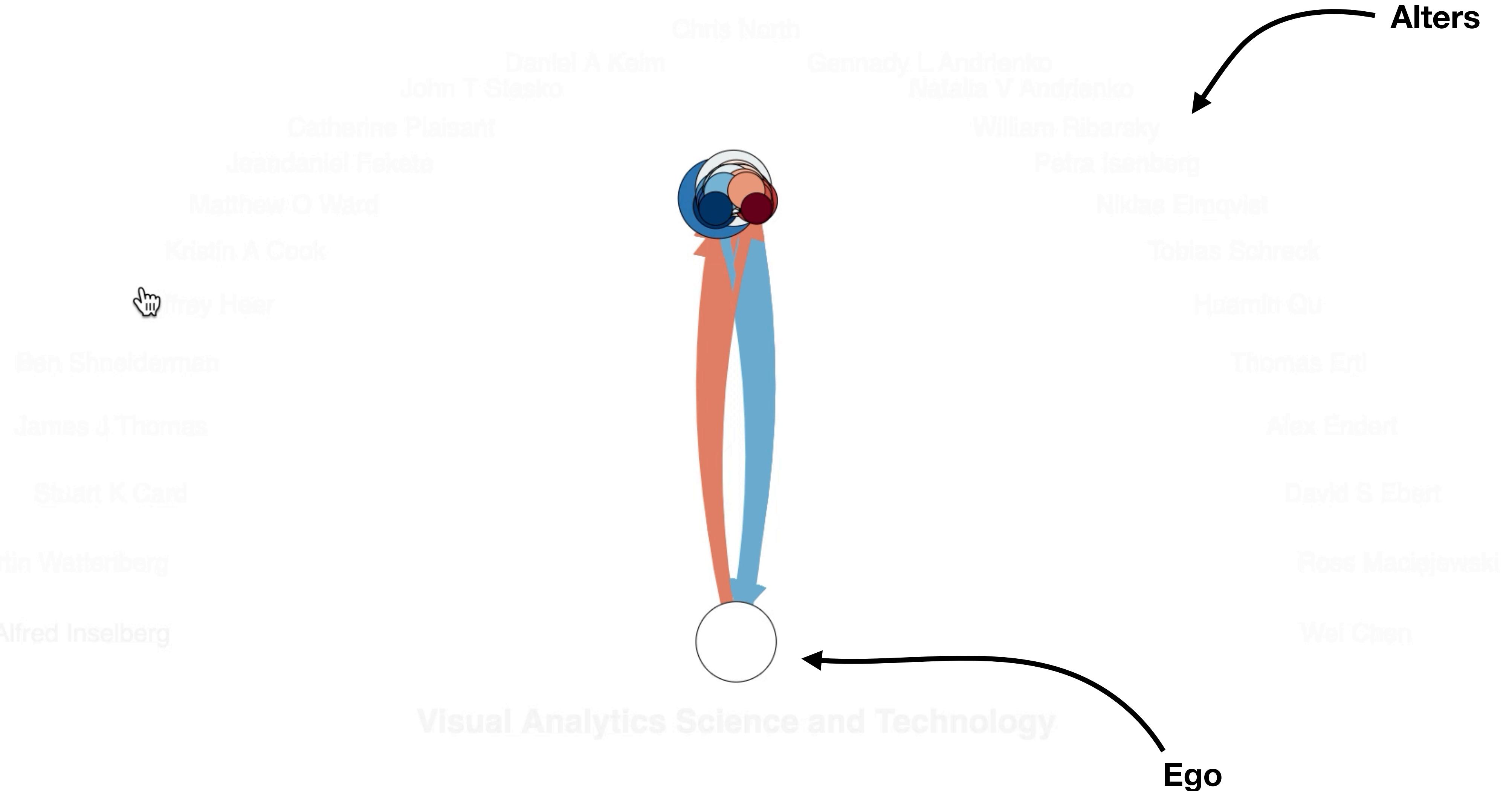
Visualisation
of Bib. data

Science of
Science

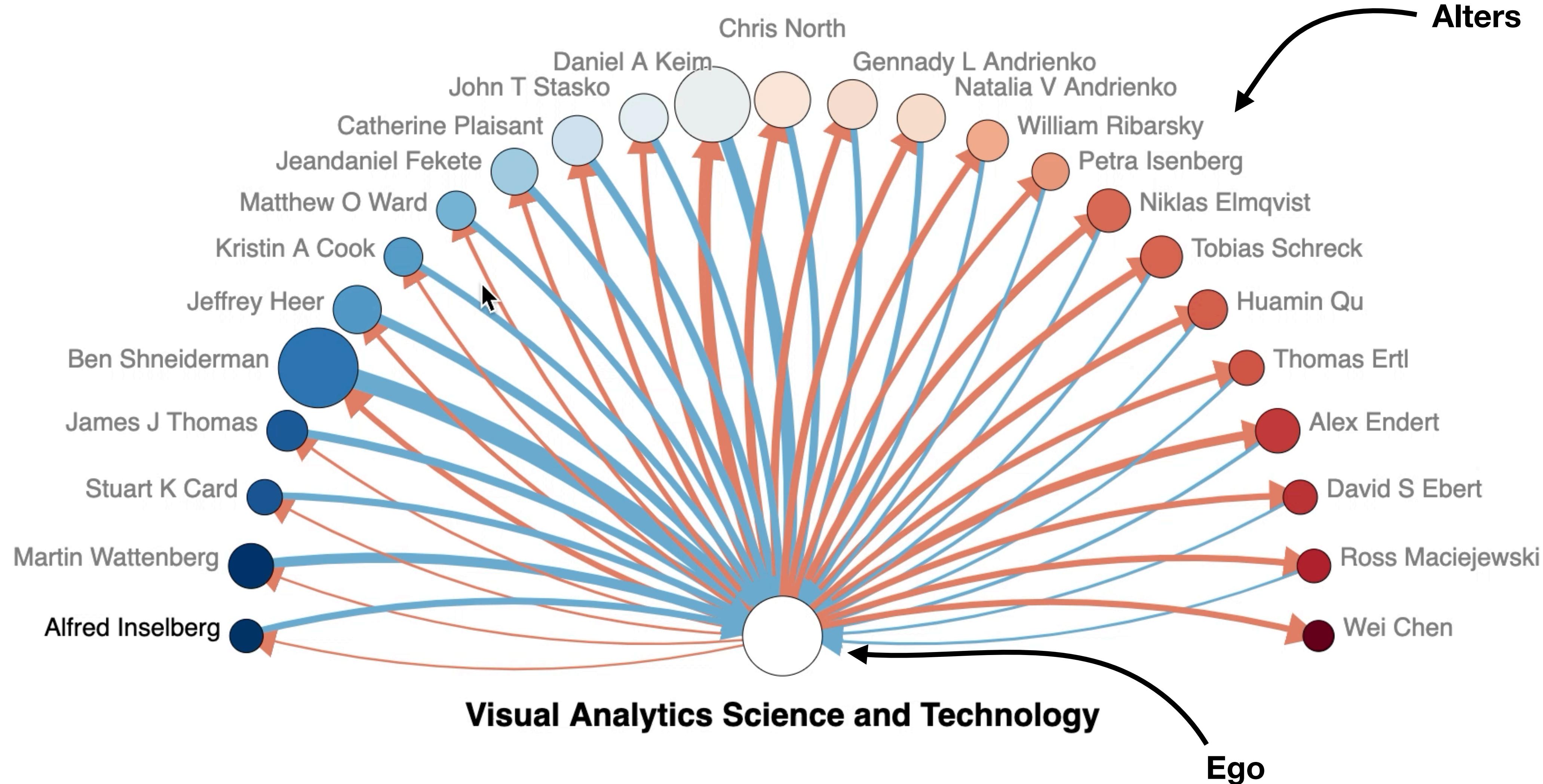
- The highest impact work in scientists' career. [Sinatra et al., Science 2018]
- Papers with delayed recognition phenomenon. [Van Rann, Scientometrics 2004]
- Trends in Computer science by fraction of keywords. [Hoonlor et al., CACM 2013]
- Correlation between scholars' impact and mobility. [Sugimoto et al, Nature 2017]
- Scientific impact and the team size. [Wu et al, Nature 2019]

We enable people to ask **data driven questions**
in **science-of-science**.

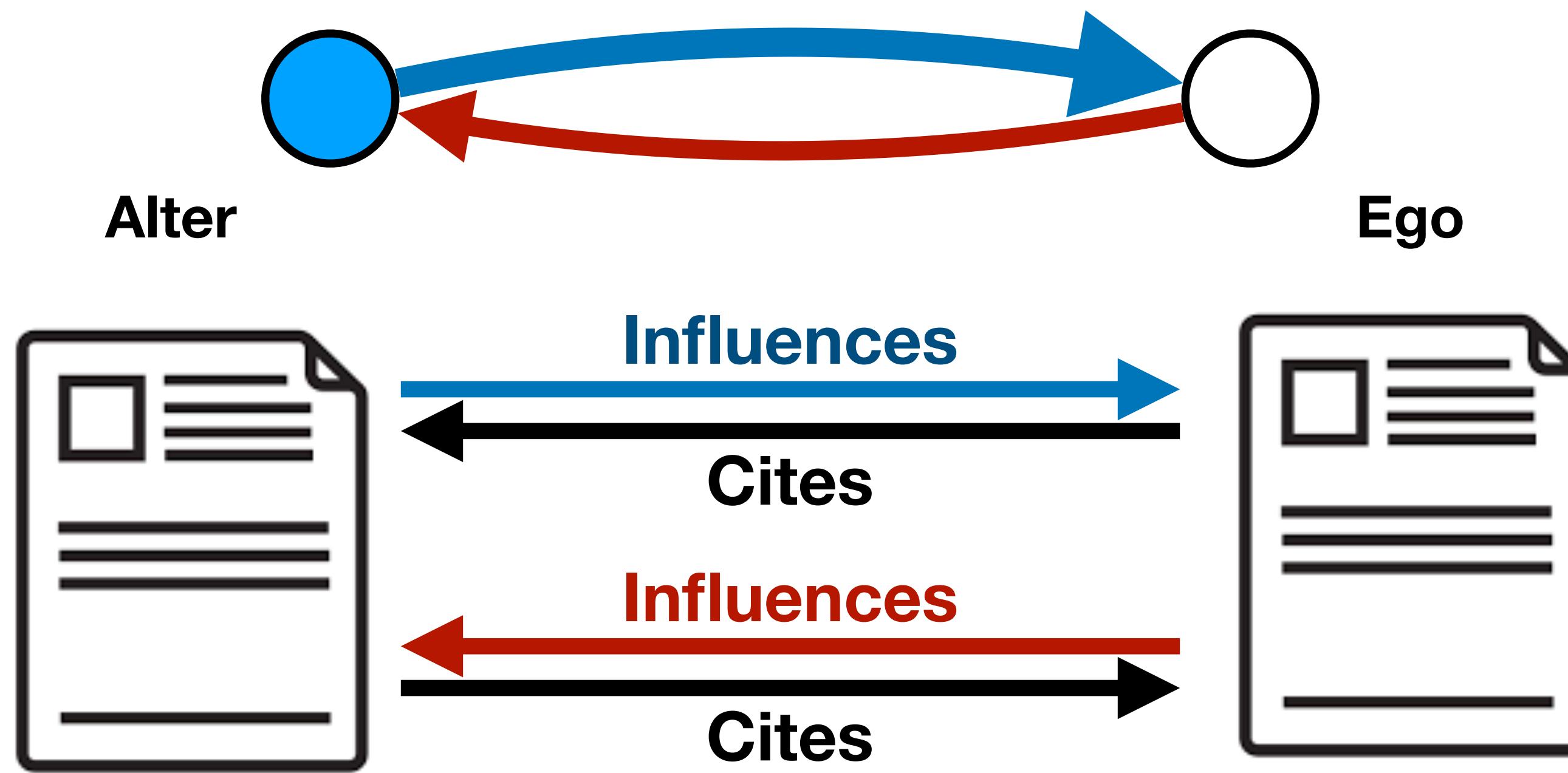
The Influence Flower



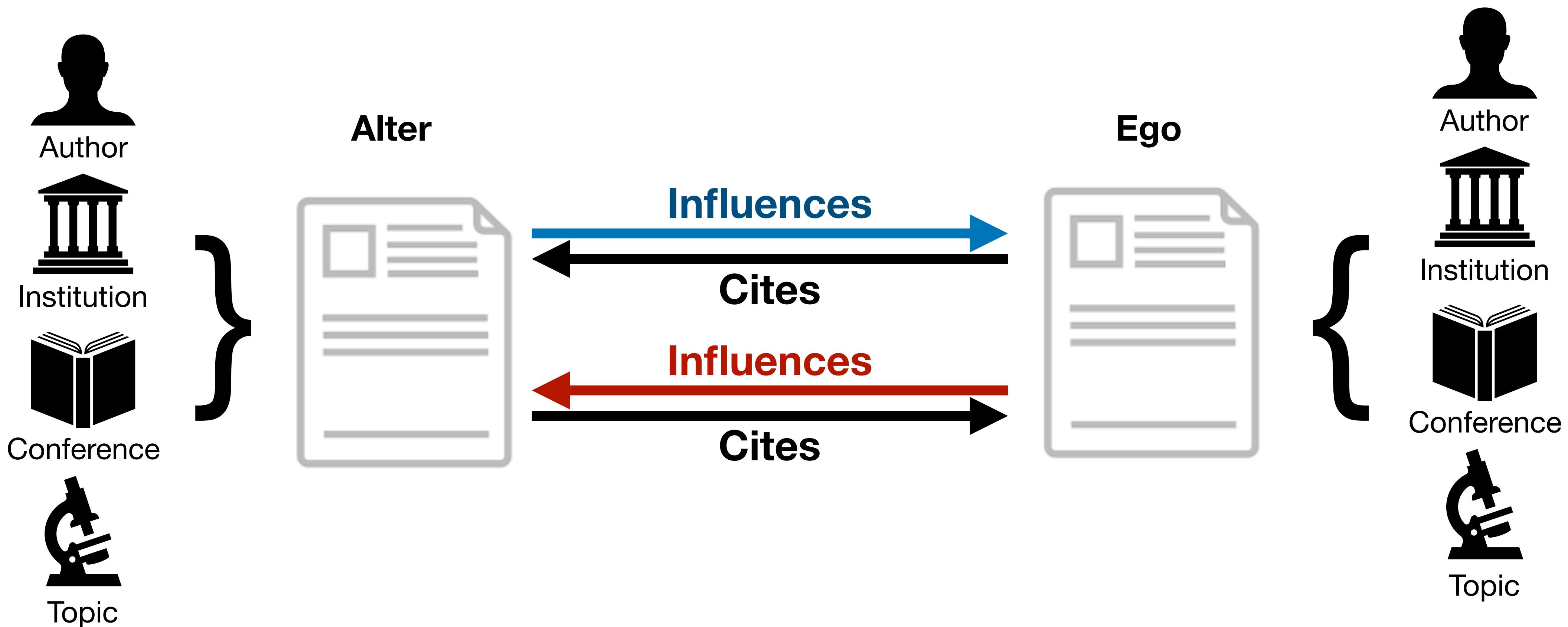
The Influence Flower



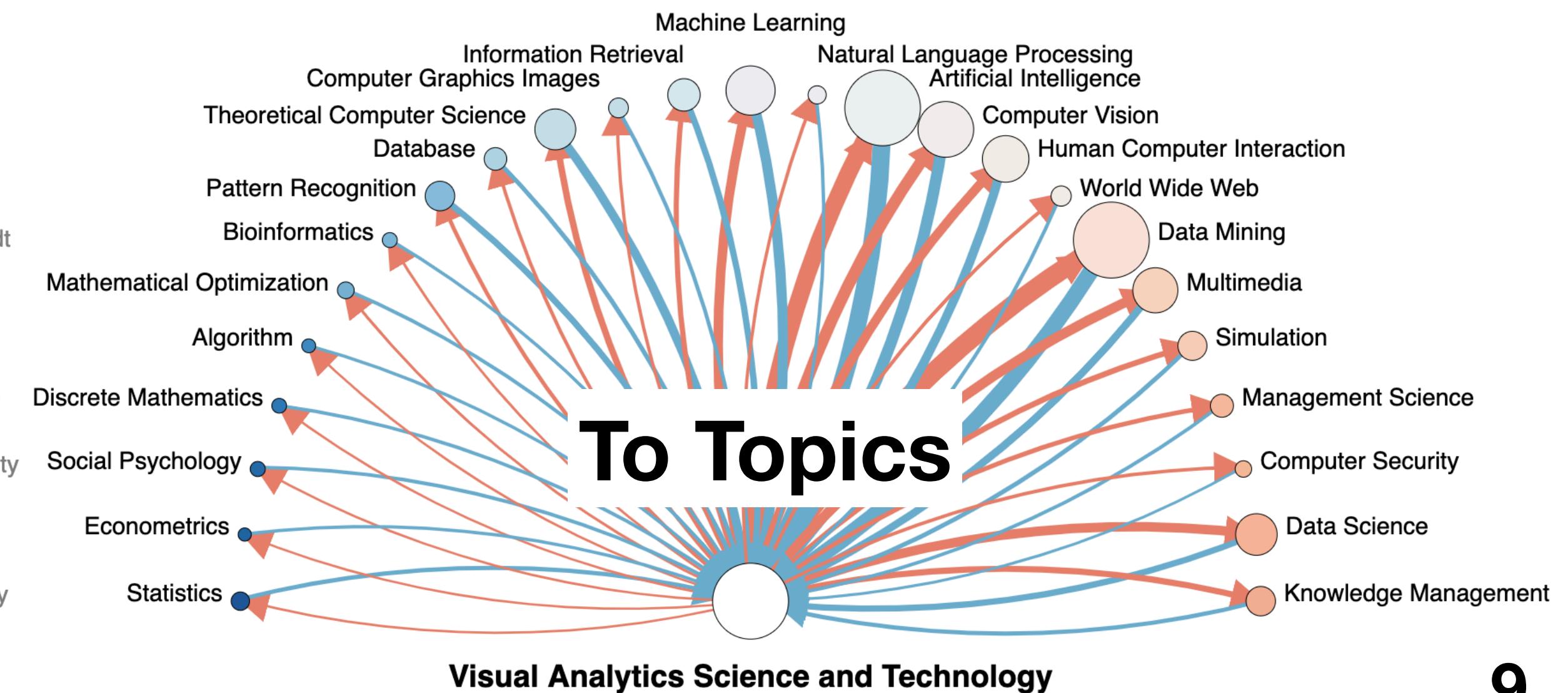
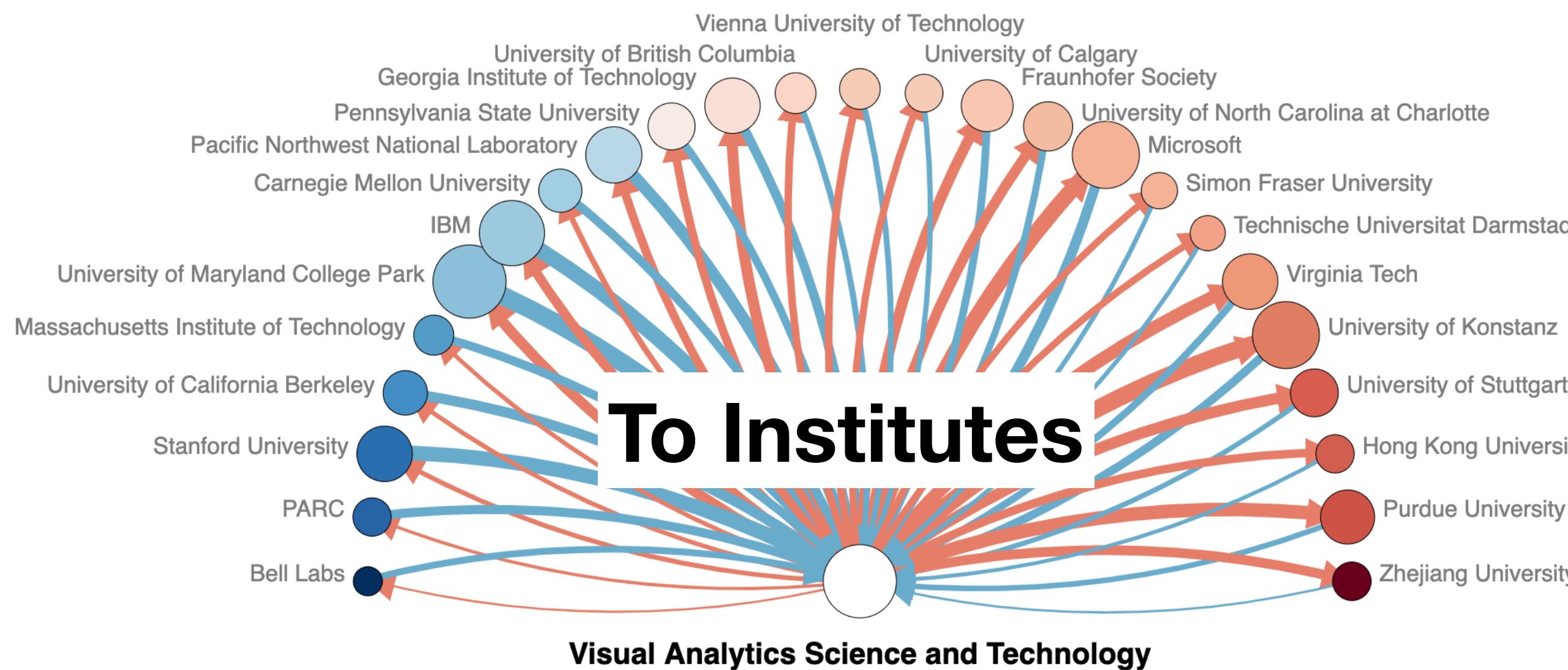
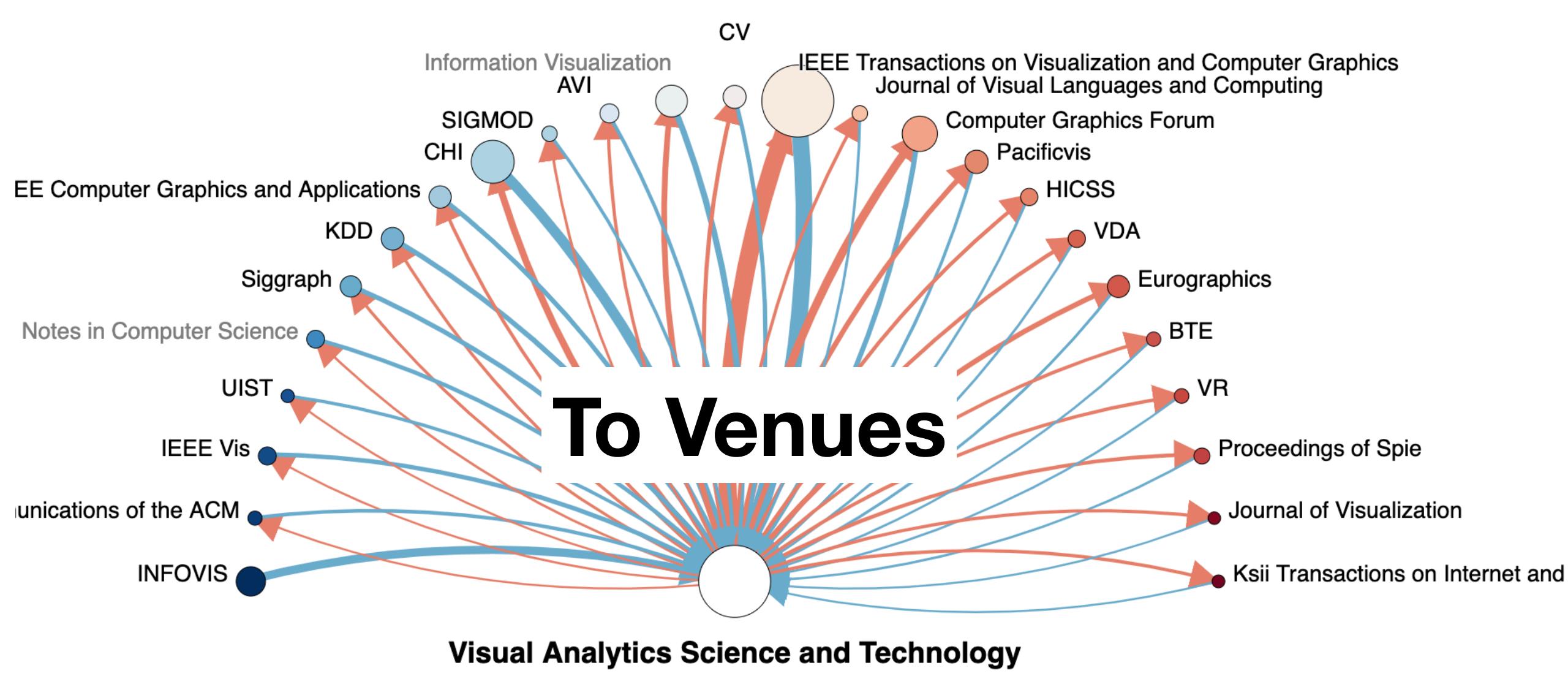
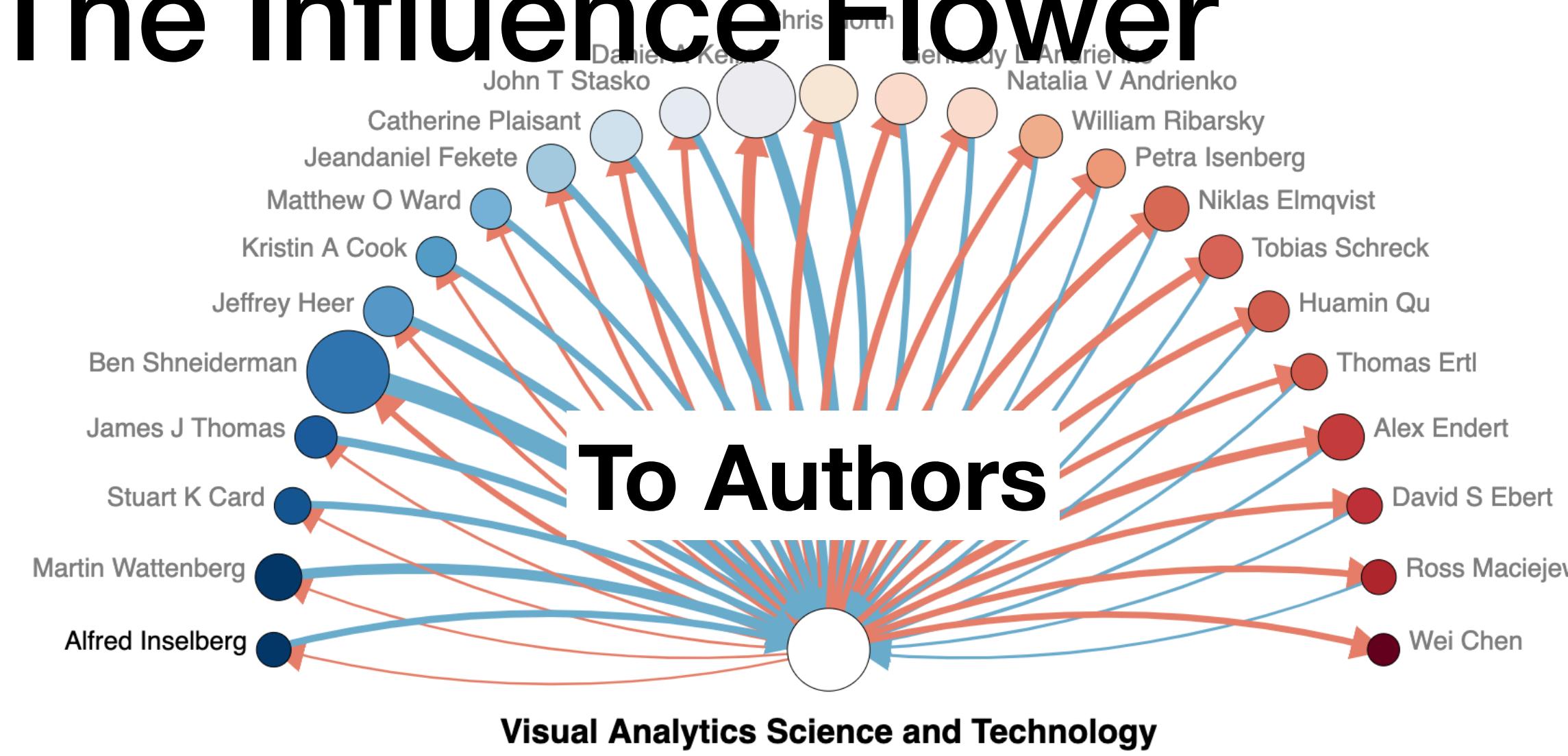
The Influence Flower



The Influence Flower



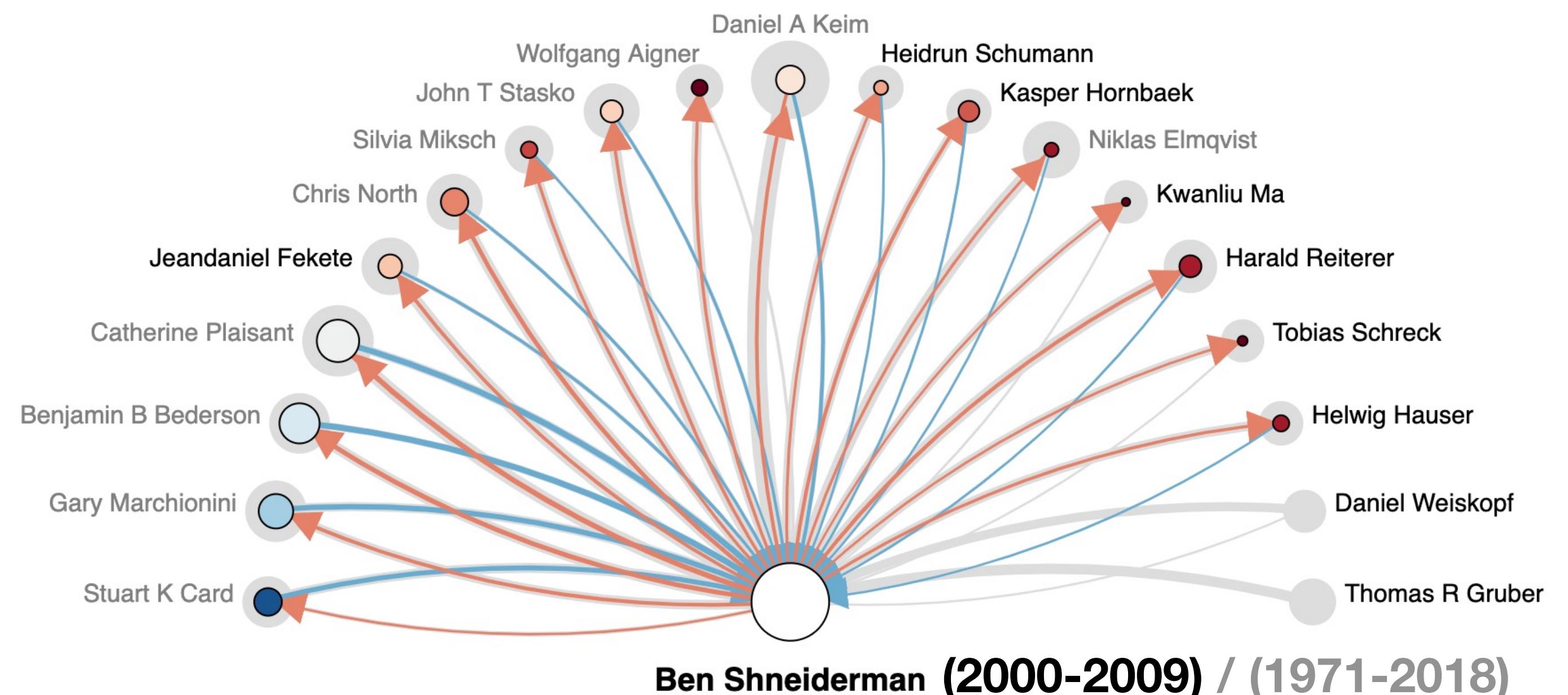
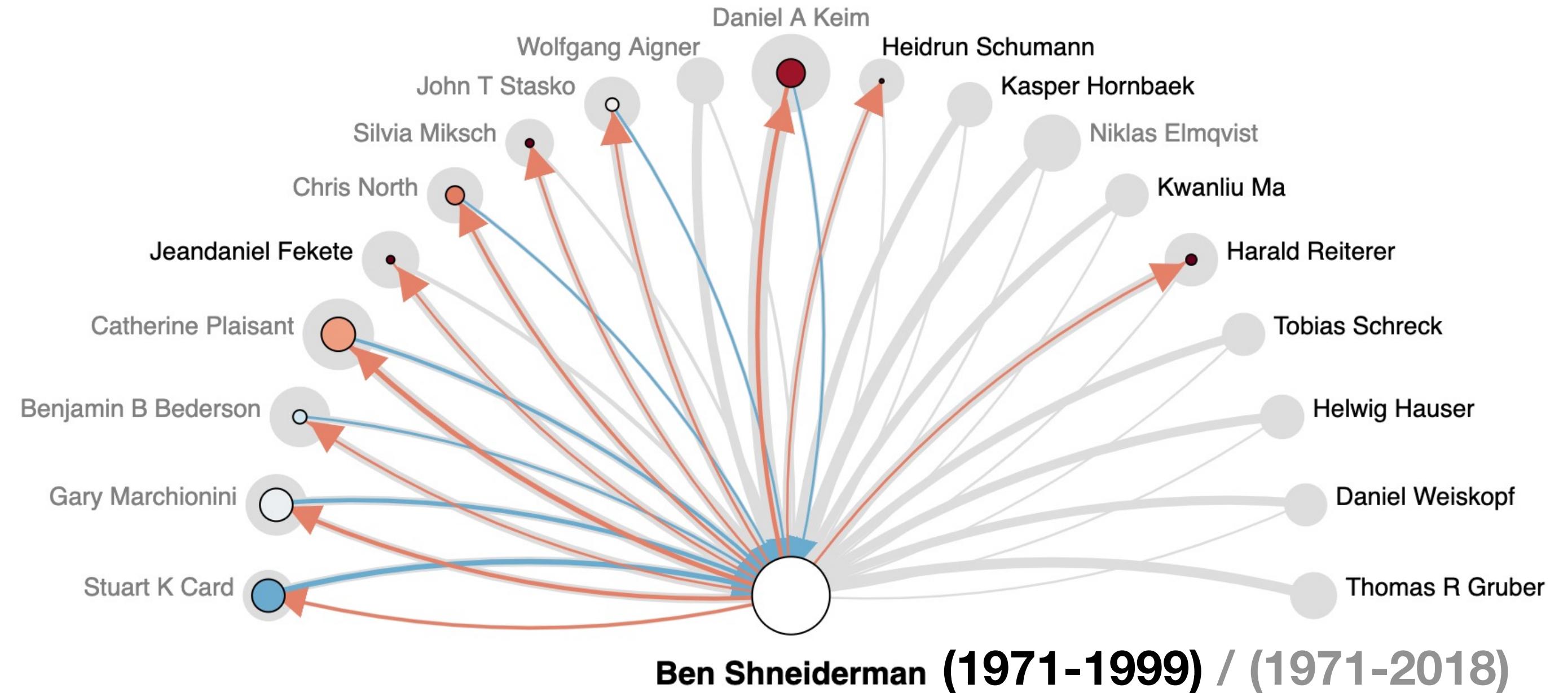
The Influence Flower



Comparing Flowers

The anchor flower as the reference

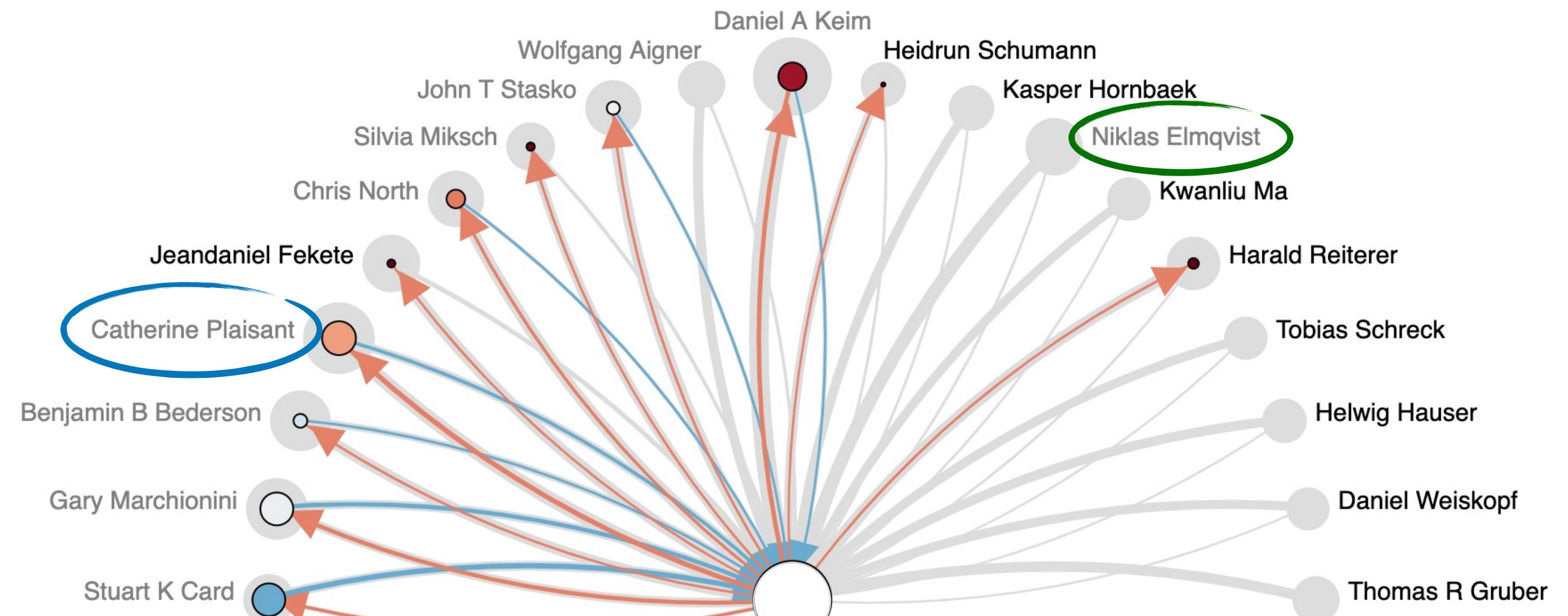
- **Anchor flower:** greyed out
Contrast flower: colour on top
 - The time period of the anchor is the entire time range of the ego.
 - Node size and edge weight is calculated by the relative influence score.



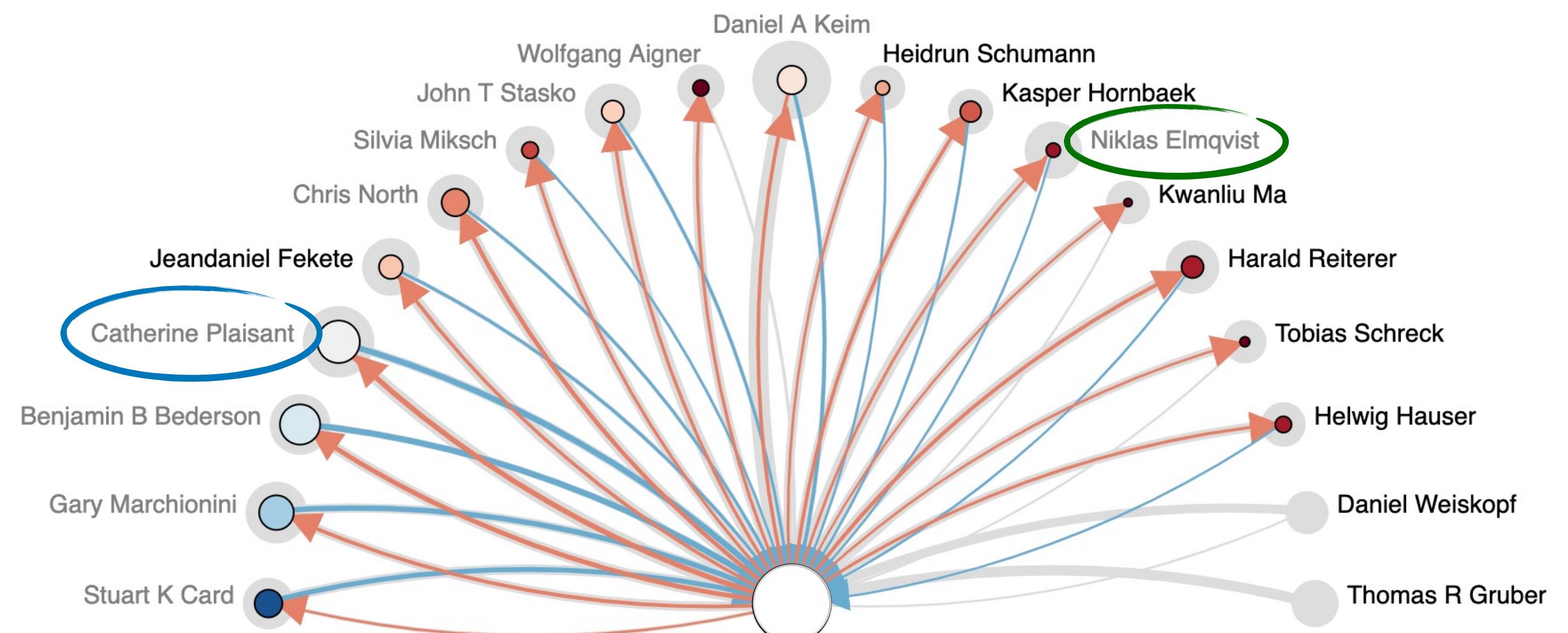
Comparing Flowers

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Ben Shneiderman (1971-1999) / (1971-2018)



Ben Shneiderman (2000-2009) / (1971-2018)

Table of Contents

- 1 Motivation
- 2 The Influence Flower
- 3 Dataset
- 4 The Influence Map System
- 5 Case Studies

Visit
[Influencemap.ml](https://influencemap.ml)
to create
your own
Influence Flower!

Microsoft Academic Graph

- The current Influence Map system is based on a snapshot taken on 2018-06-29.
It includes scientific papers published **from 1800 to 2018**.



176 million
Publications



1.2 billion
Citations



212 million
Authors



52 thousand
Venues



25 thousand
Institutions

- MAG includes 230K research topics (ver. 2018-06-29)
We use 294 level 1 topics to measure topical influence.

(ex) Level 1 topics
for Psychology

▲ Topic browser

Top Level > Psychology

Filter Topic

Pedagogy Social psychology

Psychiatry Psychoanalysis

Clinical psychology

Developmental psychology Applied psychology

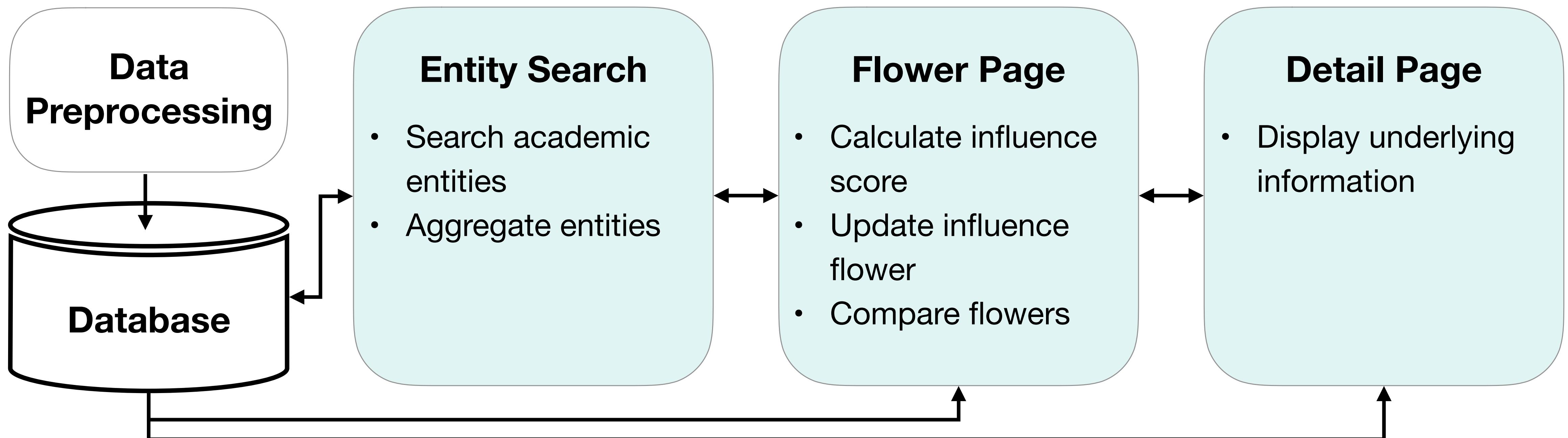
Mathematics education Neuroscience

Cognitive psychology Psychotherapist Communication

Criminology Cognitive science

The Influence Map System

- An interactive web app for searching and curating influence flowers.



The Influence Map System

Entity Search

- Search academic entities
- Aggregate entities

Flower Page

- Calculate influence score
- Update influence flower
- Compare flowers

Detail Page

- Display underlying information



👤 John L. Hennessy

Papers: 171, Citations: 23711, Institution: Stanford University



👤 John Hennessy

Papers: 8, Citations: 216, Institution: Massachusetts Institute of Technology



👤 John Hennessy

Papers: 17, Citations: 142, Institution: Princeton University



👤 John Hennessy

Papers: 42, Citations: 93, Institution: Jet Propulsion Laboratory



👤 John L. Hennessy

Papers: 36, Citations: 907, Institution: National Academies



👤 John Hennessy

Papers: 1, Citations: 46, Institution: Trinity College, Dublin



👤 John W. Hennessy

Papers: 9, Citations: 404, Institution: Stanford University



👤 John Hennessy

Papers: 8, Citations: 216,
Institution: Massachusetts
Institute of Technology

👤 John L. Hennessy

Papers: 171, Citations: 23711,
Institution: Stanford University

👤 John L. Hennessy

Papers: 36, Citations: 907,
Institution: National Academies

Name your flower...

Go

The Influence Map System

Entity Search

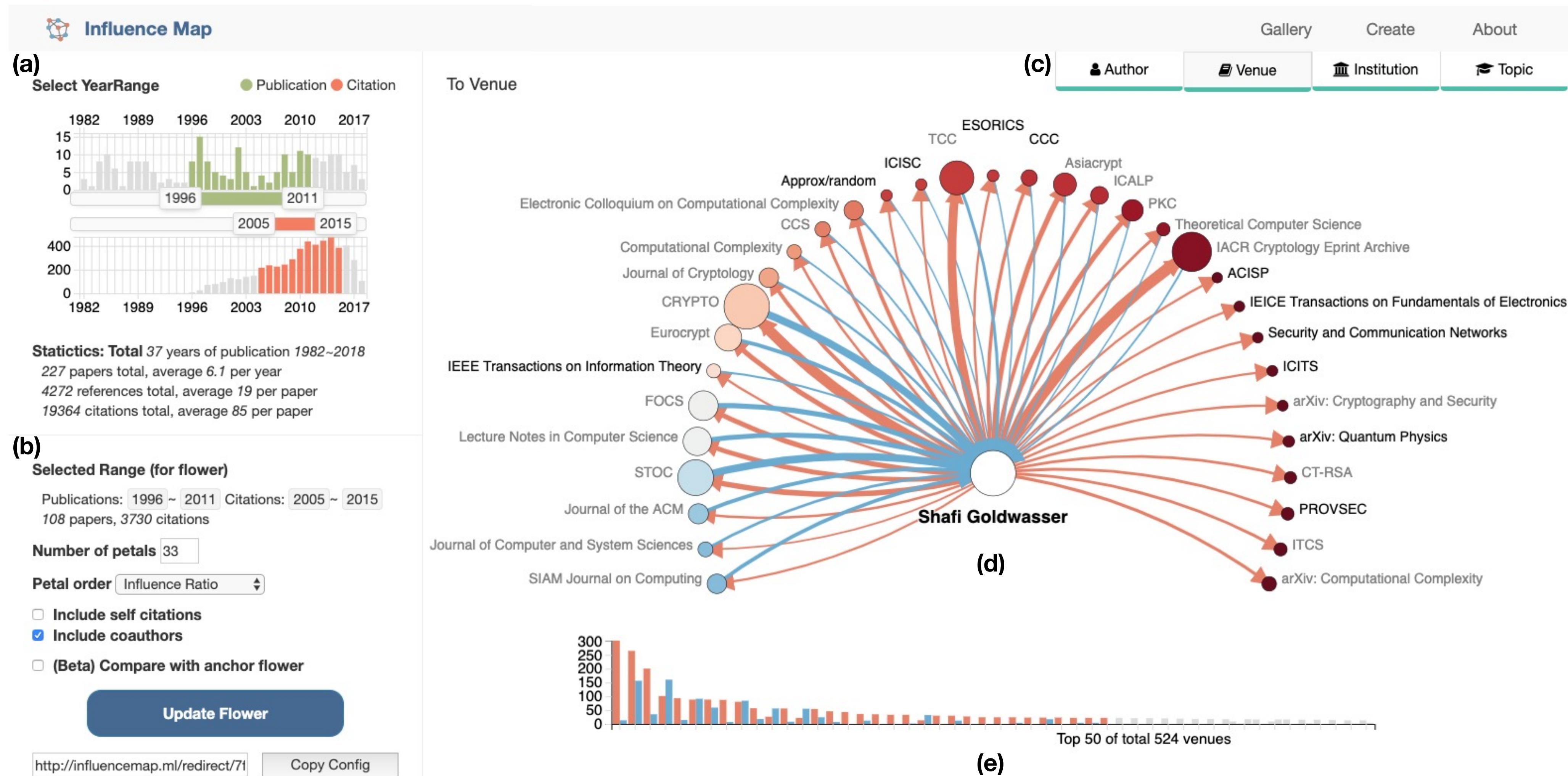
- Search academic entities
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Flower Page

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The Influence Map System

Entity Search

- Search academic entities
- Aggregate entities

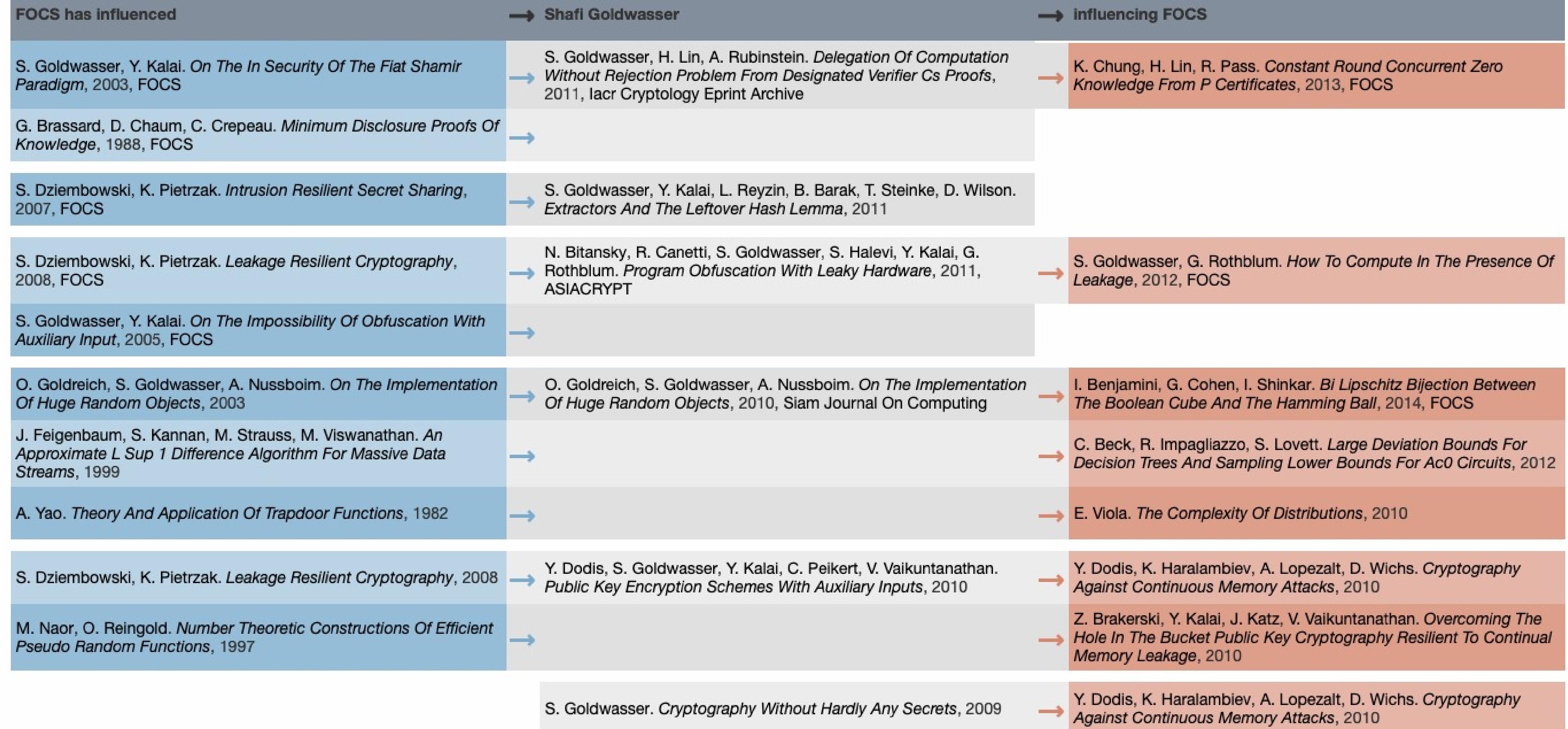
Flower Page

- Calculate influence score
- Update influence flower
- Compare flowers

Detail Page

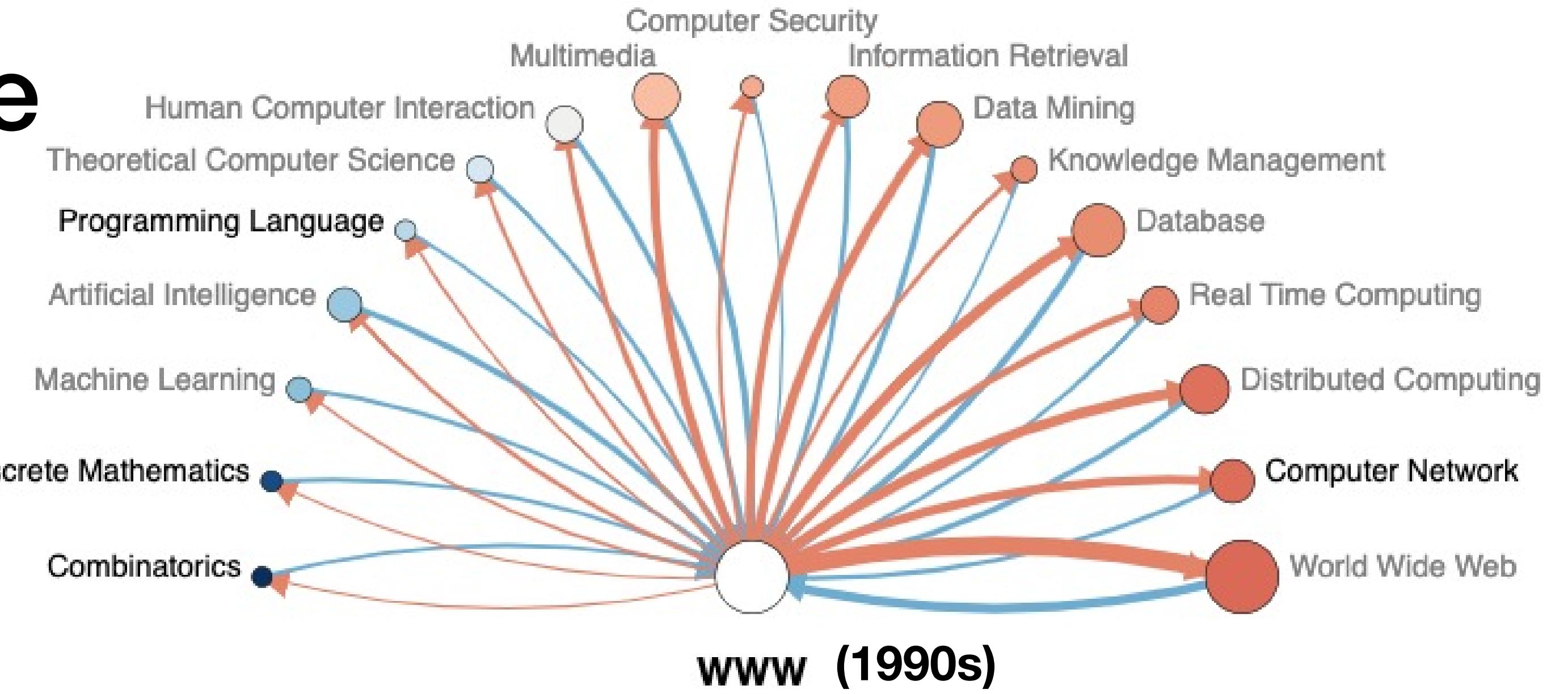
- Display underlying information

FOCS



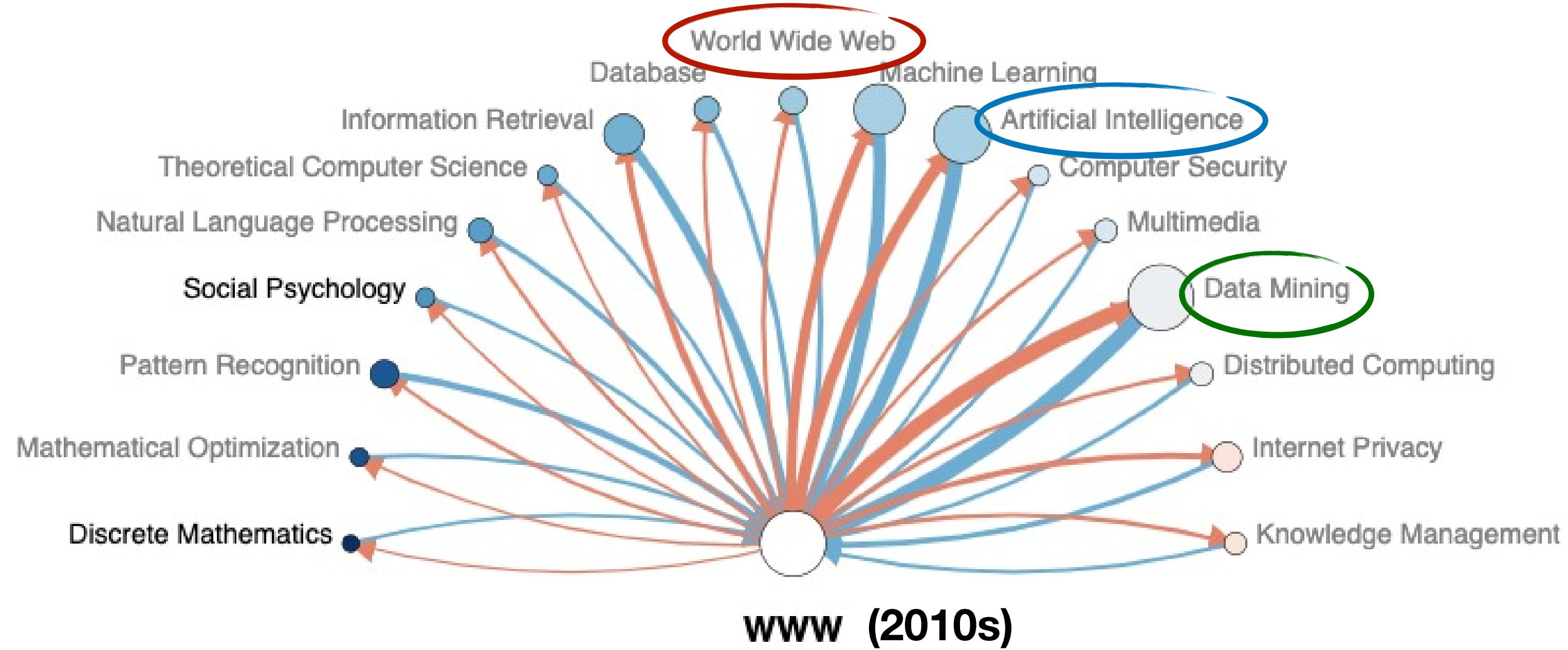
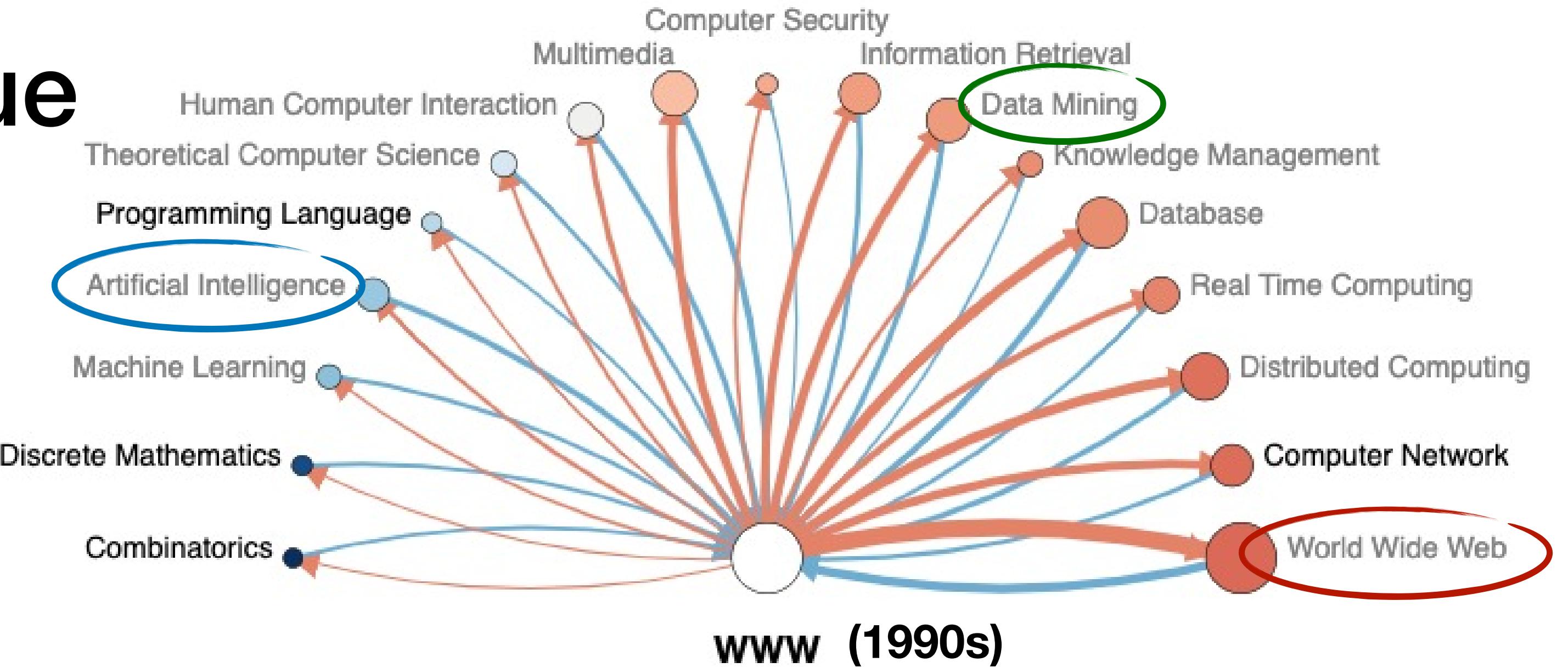
Trend change of a venue

A series of Influence Flowers
to examine the change in
topics over time in WWW.

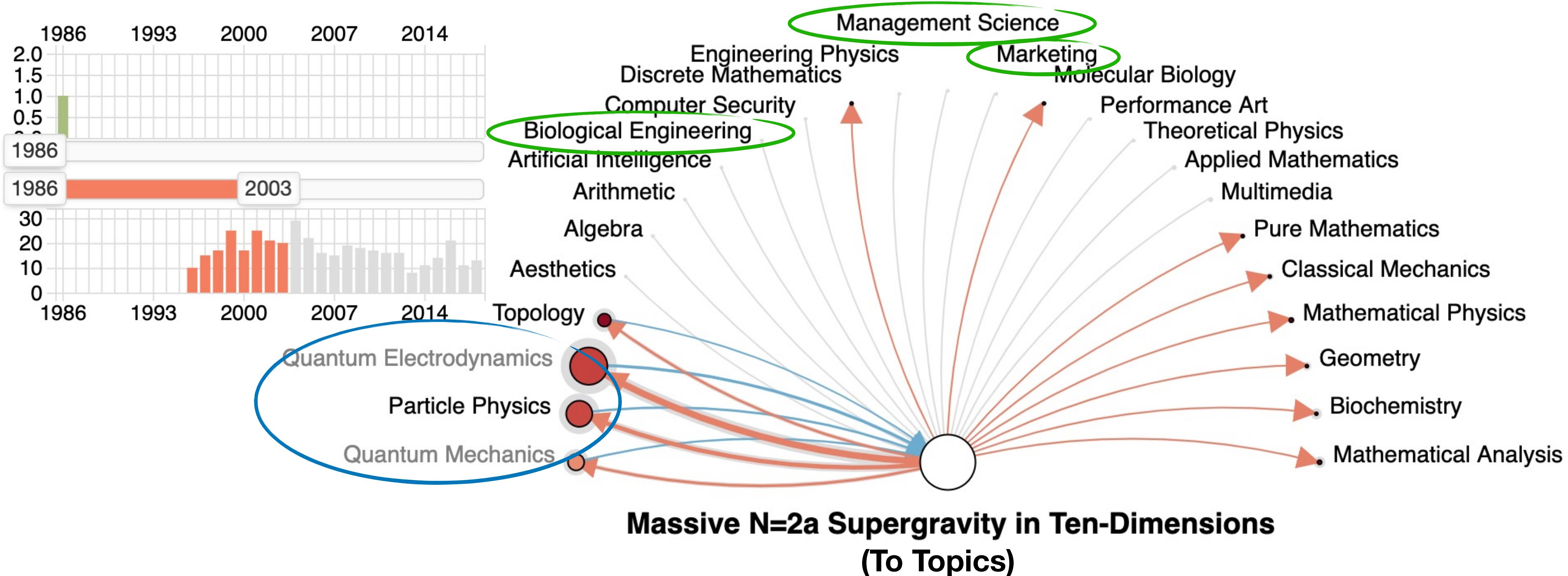


Trend change of a venue

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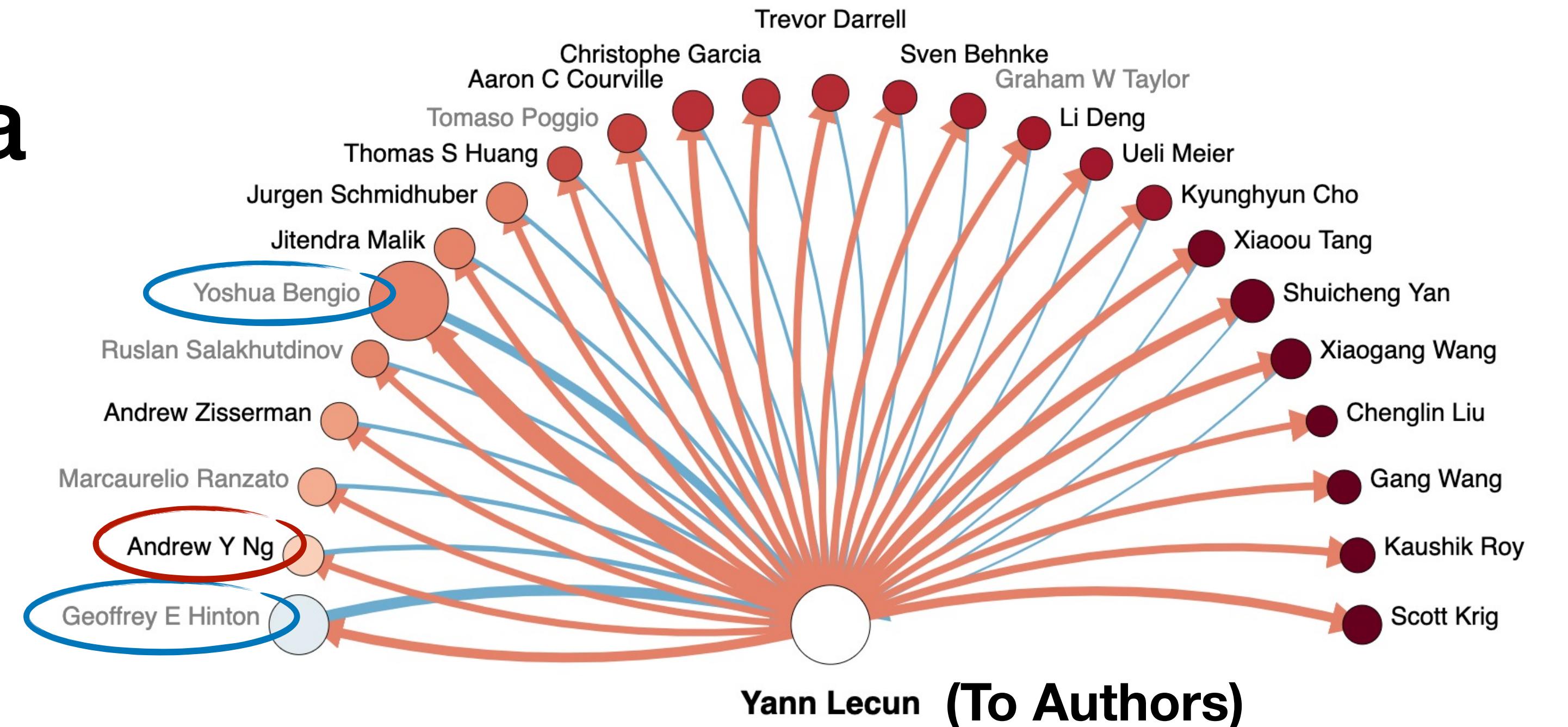
A paper with delayed recognition



Influence Map provides the visualisation of
delayed time, volume of attention and changes in the influence profile.

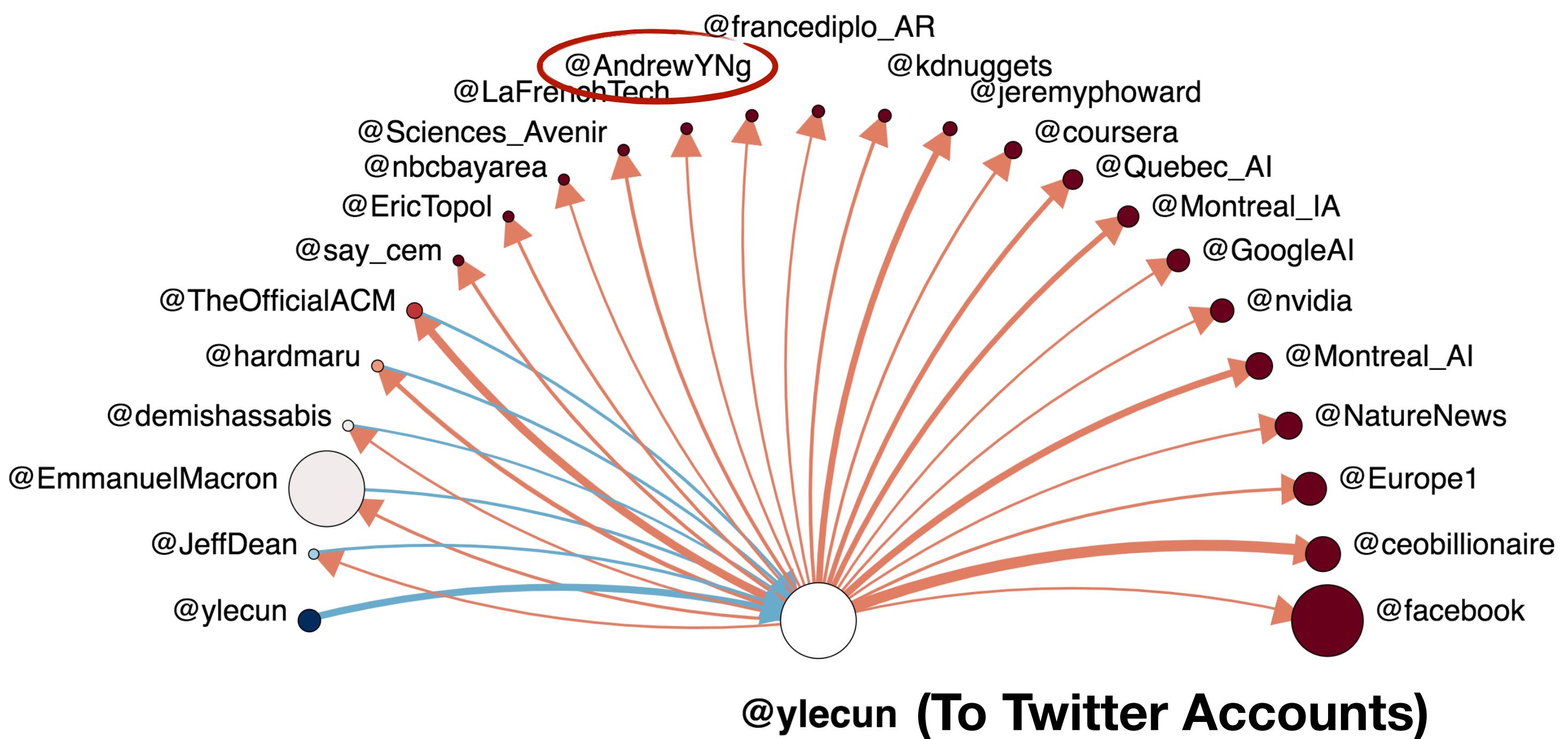
Beyond academic data

The Influence Flower metaphor can be applied to data outside of academic graphs.



Edge: Influence made by retweets, mentions and replies.

Node: Number of Twitter followers.



Summary

🔍

People

- Turing Award Winners
- ANU Researchers
- Fields Medalists
- Nobel Prize Winners

Organisations

Projects

Venues

People

Turing Award Winners

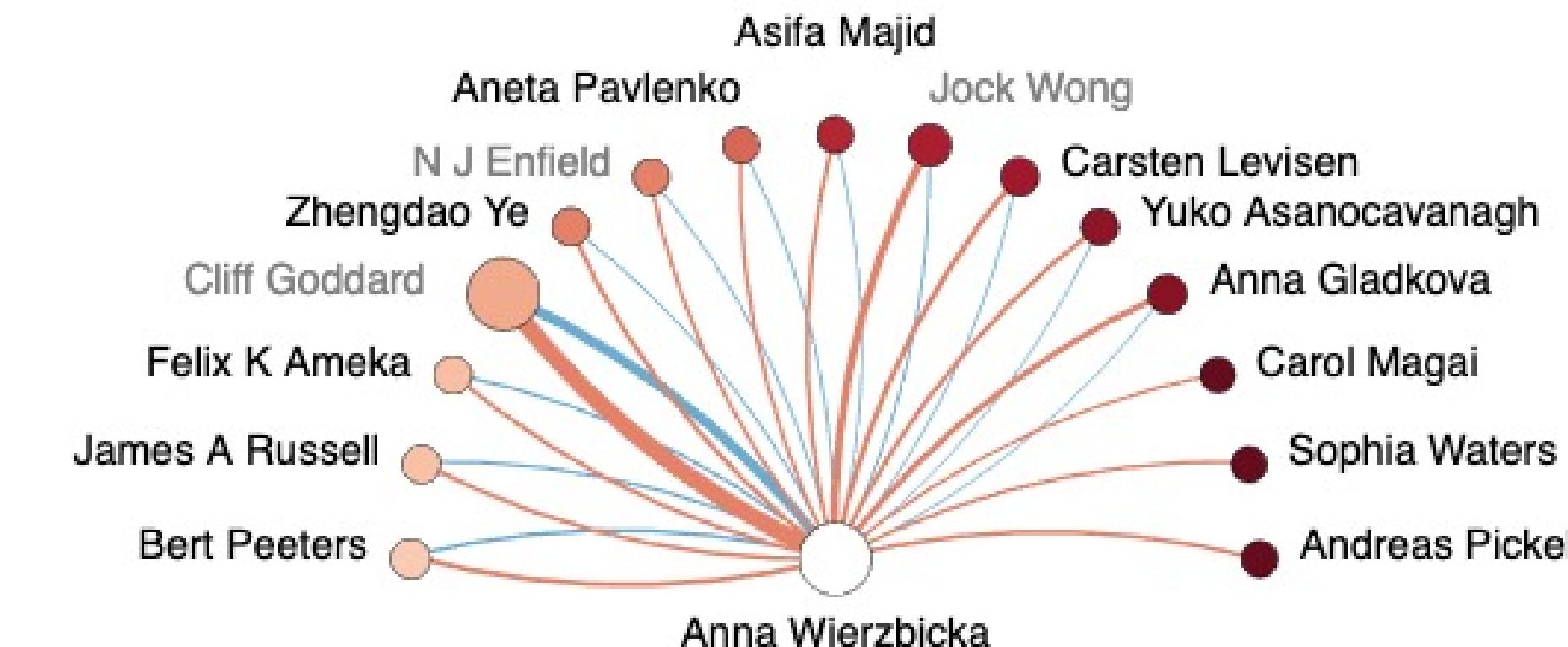
 ALAN J PERLIS 1966	 MAURICE V. WILKES 1967	 RICHARD W. HAMMING 1968	 MARVIN MINSKY 1969	 JAMES HARDY WILKINSON 1970
 JOHN MCCARTHY 1971	 EDSGER WYBE DIJKSTRA 1972	 CHARLES WILLIAM BACHMAN...	 DONALD ERVIN KNOTH 1974	 ALLEN NEWELL 1975
 HERBERT ALEXANDER SIMON...	 DANA STEWART SCOTT 1976	 MICHAEL O. RABIN 1976	 JOHN BACKUS 1977	 ROBERT W FLOYD 1978
 KENNETH E. IVERSON 1979	 C. ANTONY R. HOARE 1980	 EDGAR F. CODD 1981	 STEPHEN ARTHUR COOK 1982	 DENNIS M. RITCHIE 1983
 KENNETH LANE THOMPSON...	 NIKLAUS E. WIRTH 1984	 RICHARD MANNING KARP 1985	 JOHN E HOPCROFT 1986	 ROBERT ENDRE TARJAN 1986
 JOHN COCKE 1987	 IVAN SUTHERLAND 1988	 WILLIAM MORTON KAHA 1989	 FERNANDO J CORBATO 1990	 ARTHUR JOHN ROBIN GORELL MILNER...
 BUTLER W LAMPSON 1992	 JURIS HARTMANIS 1993	 RICHARD EDWIN STEARNS 1993	 DABBALA RAJAGOPAL REDDY...	 EDWARD A FEIGENBAUM 1994
 MANUEL BLUM 1995	 AMIR PNUELI 1996	 DOUGLAS ENGELBART 1997	 JAMES NICHOLAS GRAY 1998	 FREDERICK BROOKS 1999
 ANDREW CHI-CHIH YAO 2000	 KRISTEN NYGAARD 2001	 OLE-JOHAN DAHL 2001	 ADI SHAMIR 2002	 LEONARD MAX ADLEMAN 2002

Influence Gallery: <http://influencemap.ml/browse>

The Influence Map project maps the flow of intellectual influence for academic entities.

- Influence Many
- Interactive fits
- Reproducible results

Author

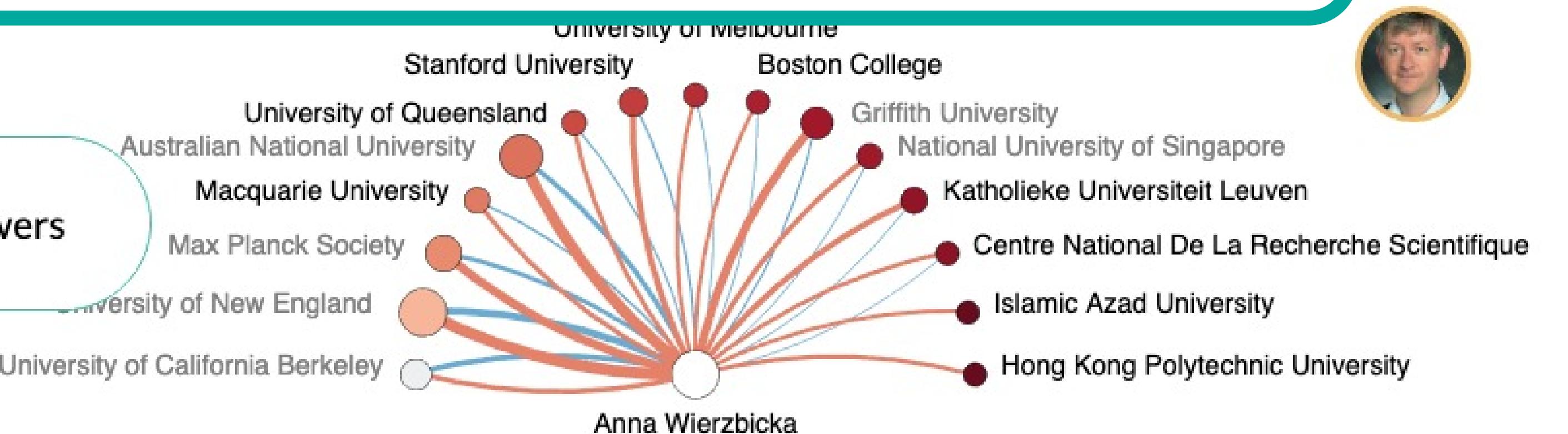


- Influence Map: <http://influencemap.ml/>
 - Interactive figures in papers: <http://influencemap.ml/vast19>
 - Reproducible code: <https://github.com/csmetrics/influencemap>

more

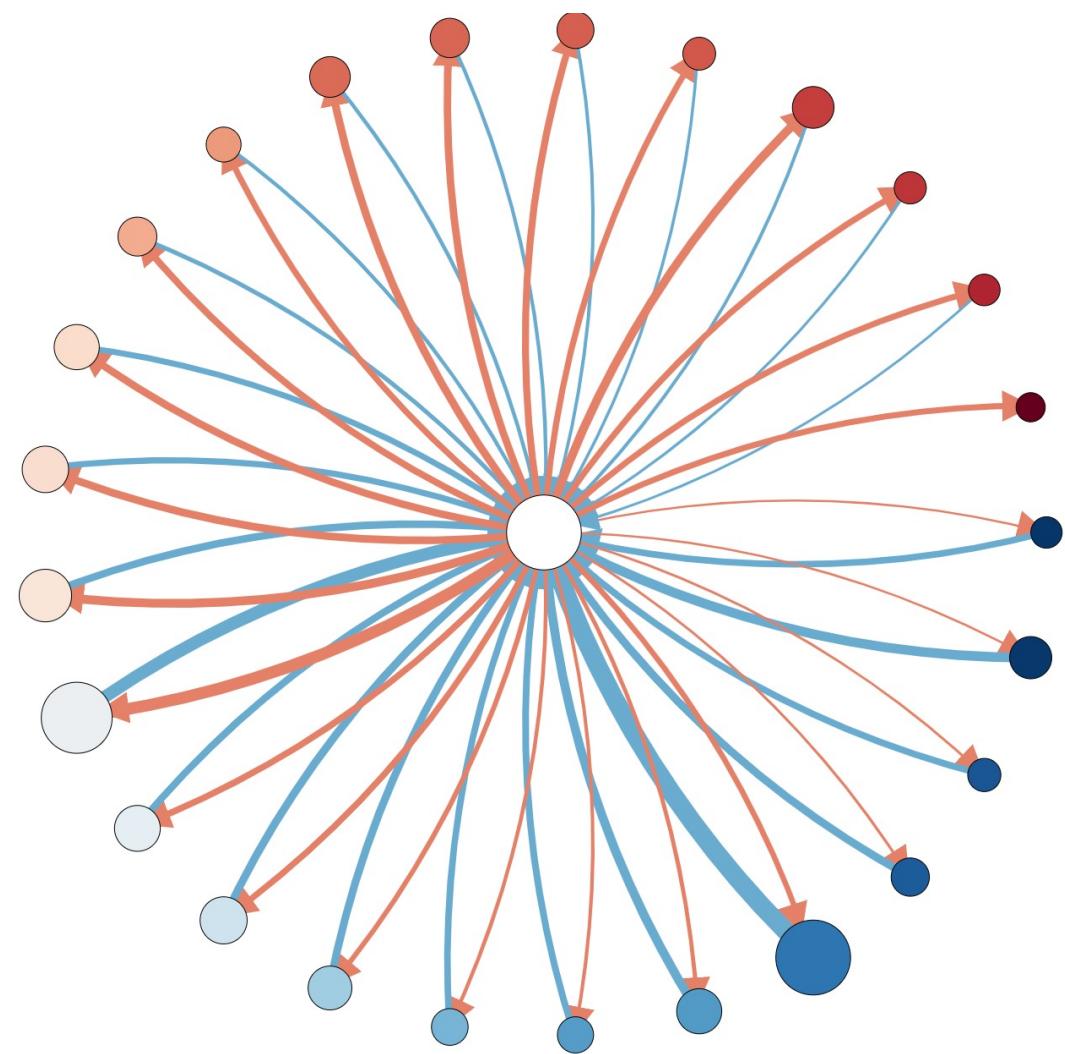
Flower Gallery

Create new flowers

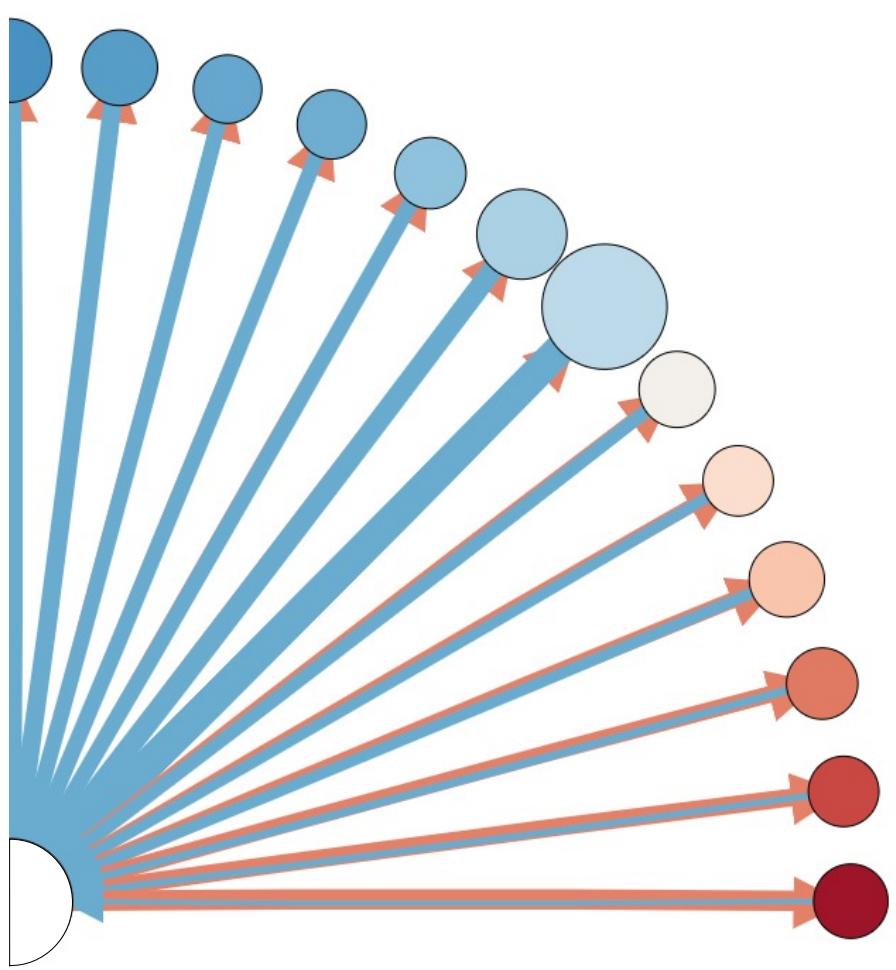


Backup slides

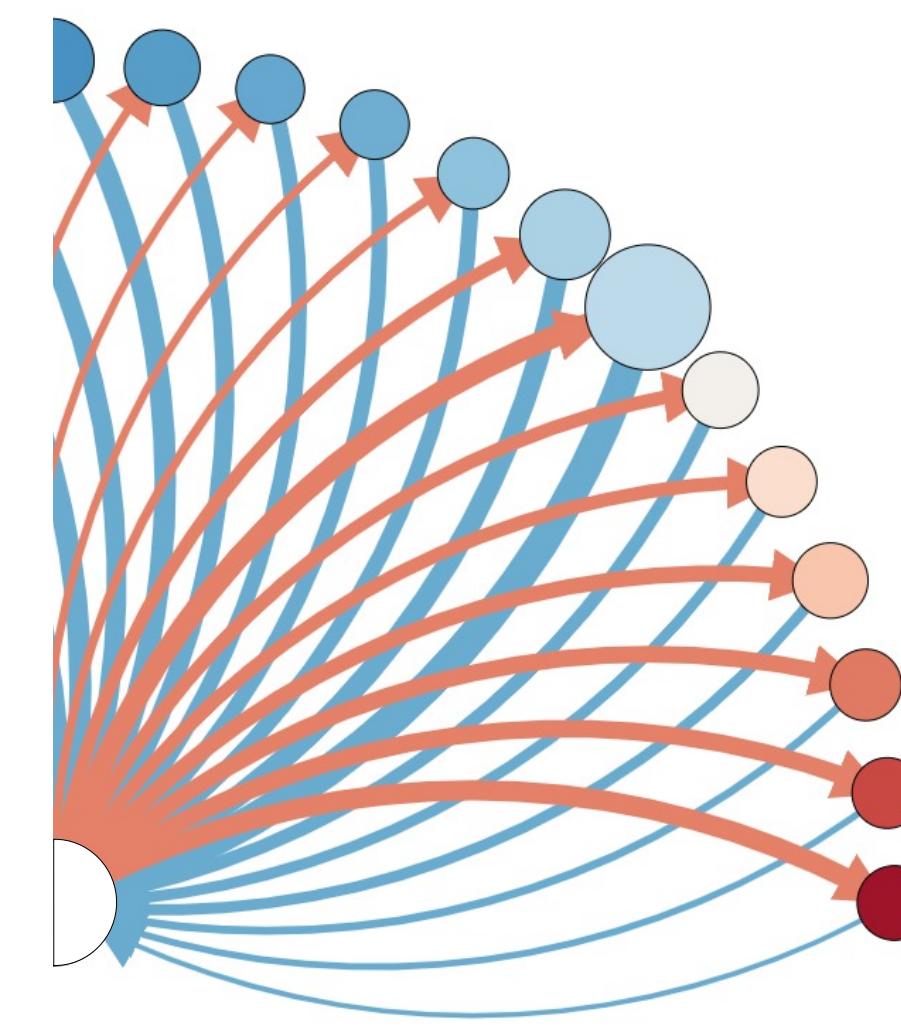
Design Alternatives



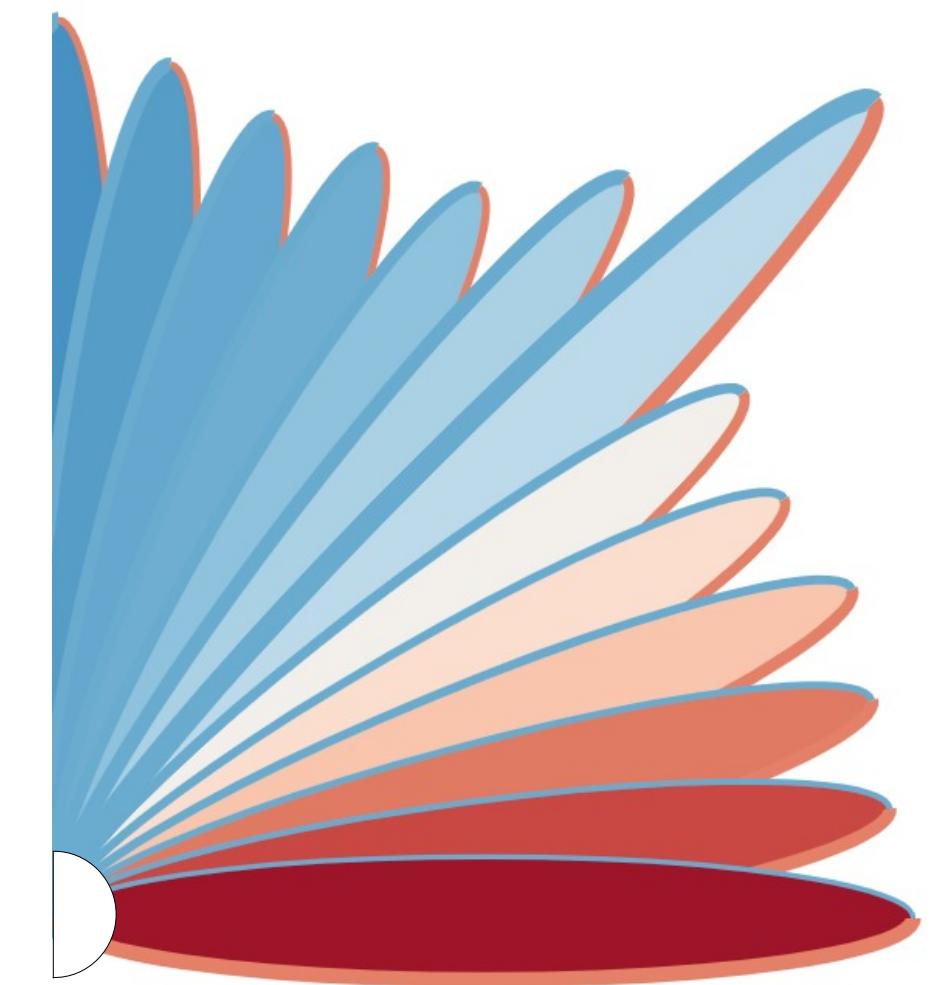
(a) Full circle



(b) Straight edges



(c) Wider petals

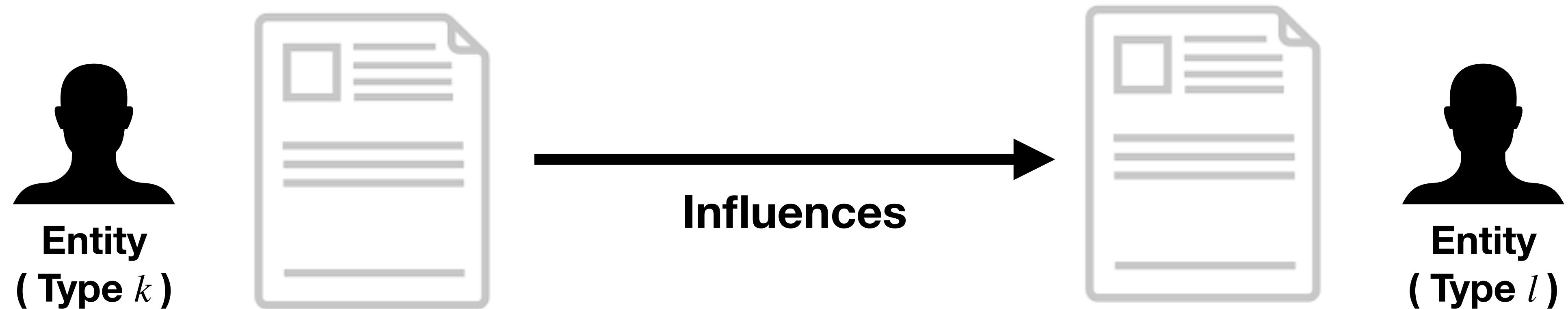


(d) Filled petals

Computing Influence Score

- We regard a unit of influence as a citation made by a single paper.

$$S^{(k,l)} = A^{(k)} C A^{(l)T}$$



(E : the set of entities, P : the set of papers)

The association matrix $A^{(k)} \in \{0,1\}^{|E| \times |P|}$ indicates the relations between entities (k) and papers.

The citation matrix $C \in \{0,1\}^{|P| \times |P|}$ indicates the citation relation between papers.