

一流科研信息支撑图书馆 数字资源深度利用

科睿唯安 学术研究事业部

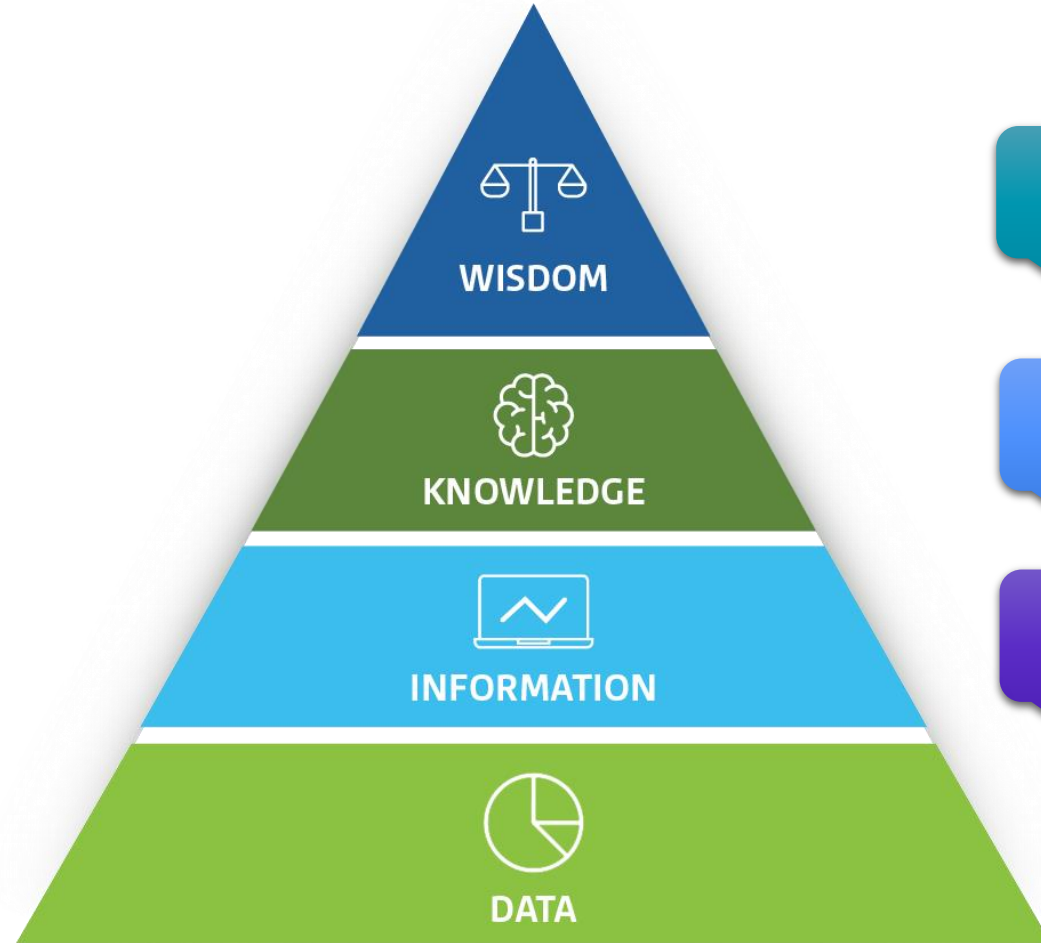
徐一然

May 12, 2022

From Data To Wisdom



罗素·艾克夫



Why

How

Who

What

When

Where

提纲

From Data To Information



相伴同行，精耕细作



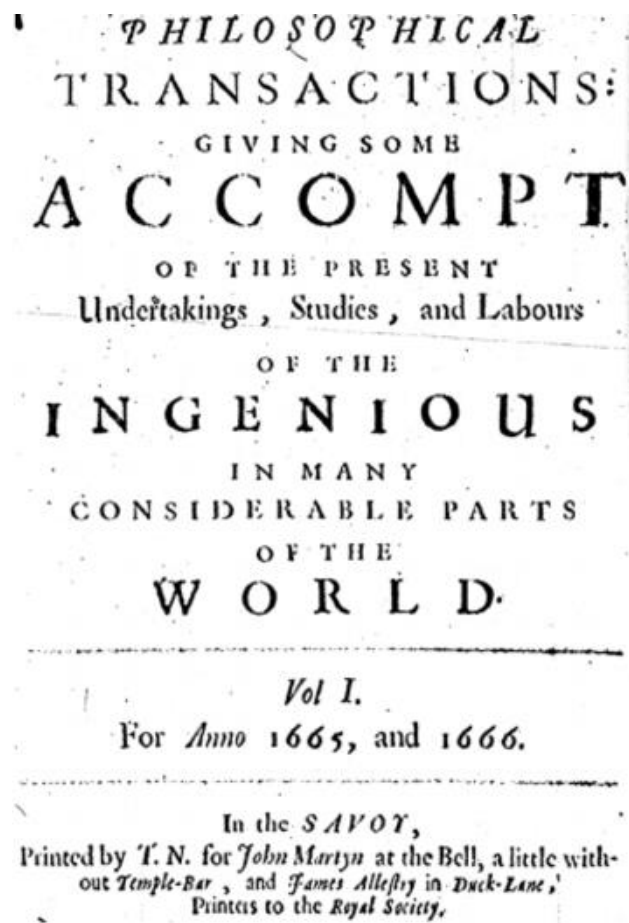
嵌入支持，推陈出新



多元整合，未来已来



科技文献——科睿唯安的基石



科技文献检索

必要性 VS 不便利性



怎样找到影响力更高的文献？
怎样找到研究热点？
怎样找到领域相关文献？
怎样找到综述类文章？

引用 科睿唯安的基石



Dr. Eugene Garfield
(1925-2017)

Founder & Chairman Emeritus
ISI, Thomson Scientific

Garfield, Eugene. "Citation Indexes for Science." Science, vol. 122, no. 3159, 1955, pp. 108–111. JSTOR,

Citation Indexes for Science

A New Dimension in Documentation
through Association of Ideas

Eugene Garfield

"The uncritical citation of disputed data by a writer, whether it be deliberate or not, is a serious matter. Of course, knowingly propagandizing unsubstantiated claims is particularly abhorrent, but just as many naive students may be swayed by unfounded assertions presented by a writer who is unaware of the criticisms. Buried in scholarly journals, critical notes are increasingly likely to be overlooked with the passage of time, while the studies to which they pertain, having been reported more widely, are discovered through the

approach to subject control of the literature of science. By virtue of its different construction, it tends to bring together material that would never be collated by the usual subject indexing. It is best described as an association-of-ideas index, and it gives the reader as much leeway as he requires. Suggestiveness through association-of-ideas is offered by conventional subject indexes but only within the limits of a particular subject heading.

If one considers the book as the macro unit of thought and the periodical article as the micro unit of thought, the

CI — CITATION INDEX

Dr. Garfield认为：将一篇文献作为检索字段从而跟踪一个Idea的发展过程及学科之间的交叉渗透的关系。

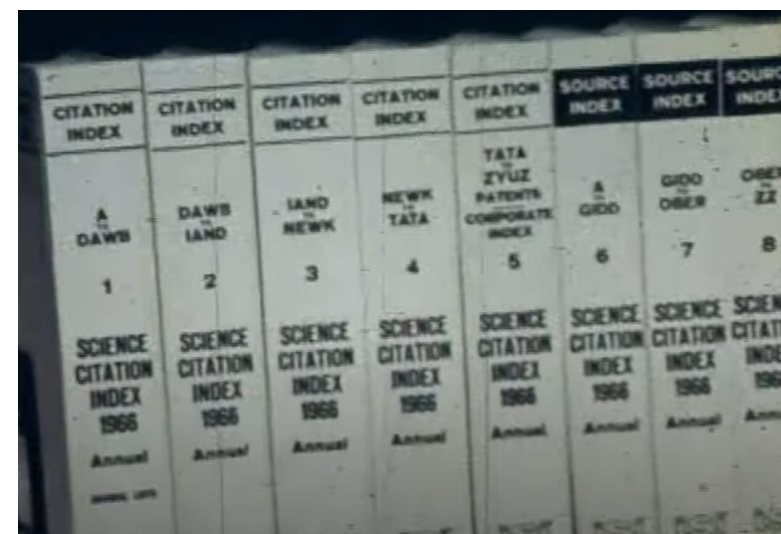
科技文献数据的发展

Citation Index的诞生

- 加菲尔德博士创立ISI
- 在Citation Index概念的基础上SCI诞生
- Citation Index改变了科学家使用文献的方式
- 科技成果转移转化



The Institute for Scientific Information™
(ISI, 1960)



1973

Social Sciences Citation Index



1964

Science Citation Index



1978

Arts and Humanities Citation Index

Web of Science 核心合集



Unique Data
独特

清晰的引文索引数据

Quality
质量

独立于出版集团的编辑团队
严格的遴选标准
动态调整机制

Diversity
广度

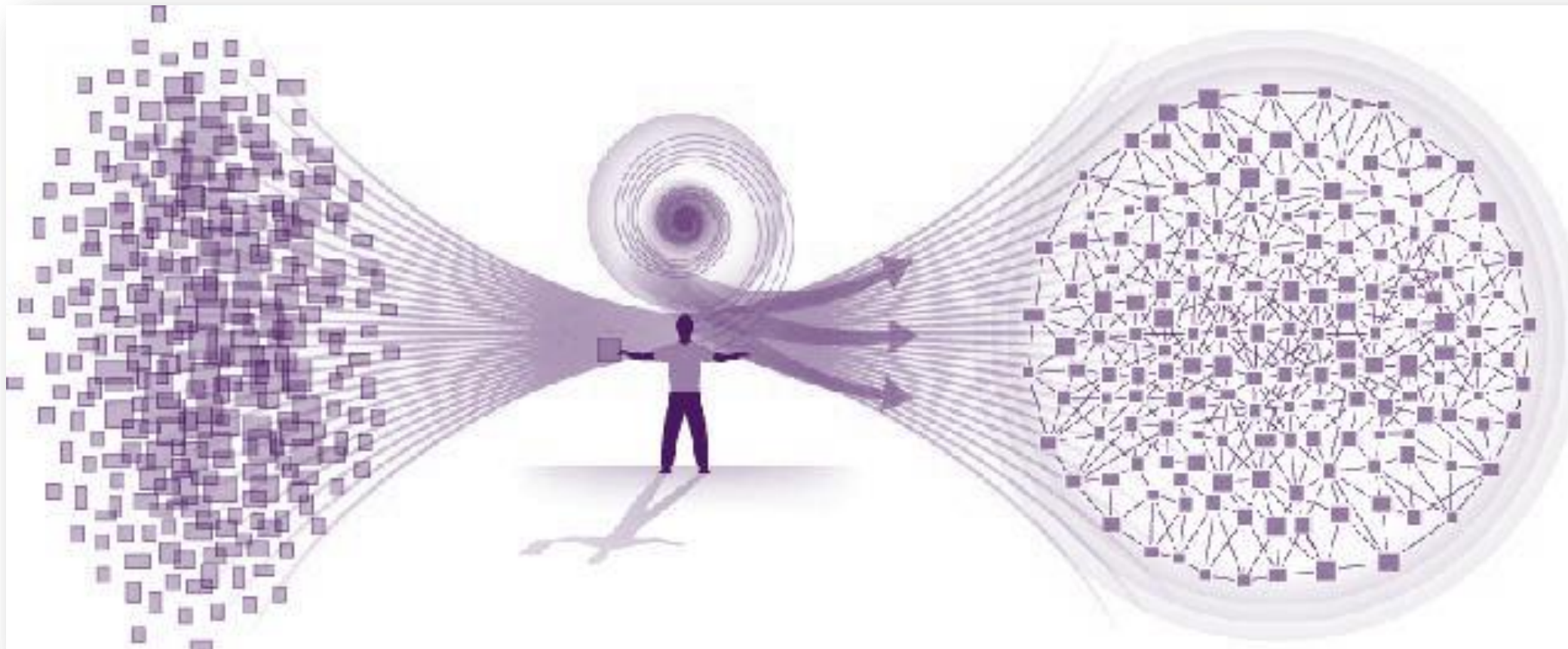
期刊SCIE/SSCI/AHCI/ESCI
会议CPCI
图书BkCI 多维度收录

Depth
深度

1900百年回溯
AHCI回溯至1975年



Web of Science™ 核心合集——引文索引



从简单检索到遴选高质量数据
准确、全面地体现科研成果间的内生联系，提供高精度的科研大数据全景图。

提纲

From Information To Knowledge



相伴同行，深耕服务



嵌入支持，推陈出新



多元整合，未来已来



科技文献数据的发展

指标的出现



大量且完整的数据承担更多职责

文献体量的增加加剧了对科研评价的需求

指标被赋予适用范围的界定

科技文献数据的发展

影响因子的提出

Citation Analysis as a Tool in Journal Evaluation

Journals can be ranked by frequency and impact of citations for science policy studies.

Eugene Garfield

As a communications system, the network of journals that play a paramount role in the exchange of scientific and technical information is little understood. Periodically since 1927, when Gross and Gross published their study

(1) of references in 1 year's issues of the *Journal of the American Chemical Society*, pieces of the network have been illuminated by the work of Bradford (2), Allen (3), Gross and Woodford (4), Hooker (5), Henkle

(6), Fussler (7), Brown (8), and others (9). Nevertheless, there is still no map of the journal network as a whole. To date, studies of the network and of the interrelation of its components have been limited in the number of journals, the areas of scientific study, and the periods of time their authors were able to consider. Such shortcomings have not been due to any lack of purpose, insight, or energy on the part of investigators, but to the practical difficulty of compiling and manipulating manually the enormous amount of necessary data.

A solution to this problem of data is available in the data base used to produce the *Science Citation Index (SCI) (10)*. The coverage of the SCI is international and multidisciplinary; it has grown from 600 journals in 1964 to 2400 journals in 1972, and now includes the world's most important sci-

The author is president of the Institute for Scientific Information, Philadelphia, Pennsylvania 19106.

Garfield, Eugene. "Citation Analysis as a Tool in Journal Evaluation." Science, vol. 178, no. 4060, 1972, pp. 471-479.

COMMENT OBITUARY

Eugene Garfield

(1925-2017)

Inventor of the Science Citation Index.

"I think you're making history, Gene!" So said Nobel laureate and molecular biologist Joshua Lederberg to his friend Eugene Garfield in 1962. They were building the Science Citation Index (SCI), now the Clarivate Analytics Web of Science, with long-sought grants from US funding agencies. Today, we cannot imagine research without indexes that reveal how articles are cited. Garfield enabled an entire field: scientometrics, the quantitative study of science and technology.

Garfield died on 28 February. We met in 1992, when I was writing a history of the index. That was a few months before he sold the Institute for Scientific Information (ISI), the company he had founded (initially named Documentation) in 1956 in Philadelphia, Pennsylvania, to Thomson Reuters. He stepped on as chairman emeritus, a bomb of energy, still coming up with ideas for applying citation indexes.

Garfield also launched *The Scientist* — a monthly magazine for life scientists — together with indexes in the social sciences and humanities, and services that alert researchers to new relevant publications. The ISI's flagship product was *Current Contents*, which compiles the tables of contents for recent scientific journals. He built a host of services to summarize, filter, index and classify articles. His tools allowed scientists to learn how publications were used in later research and to find related ones — an ability now so crucial that it is hard to imagine that it had to be invented. Garfield was also a prolific letter-writer; he developed his best ideas in communication with scientists, scholars, public speakers and technical experts. This correspondence and his more than 1,000 published essays are gold mines for historians.

Garfield was born on 16 September 1925 into a family of second-generation Jewish immigrants living in New York City's East Bronx. He and his sisters were raised by their mother and her family, a mix of left-wing labour activists and entrepreneurs. Garfield, in 1949, he graduated from Columbia University in New York as a chemistry major



In 1951, he landed a job at the Welch Medical Library at Johns Hopkins University in Baltimore, Maryland, where almost all information services of the National Library of Medicine were born. He explored new ways to deal with the exploding medical literature, which was surpassing the capacity of human indexing, and developed machine methods for searching and cataloguing using punch cards.

In 1953, the library organized what it billed as the First Symposium on Machine Methods in Scientific Documentation. This introduced Garfield to Shepard's Citations, a system for legal citations invented in 1873 that tracked how US court cases cited earlier ones. It was a radical departure from subject indexing, which then dominated thinking in science.

Garfield contacted William Adams, a former vice-president at Shepard's who had expertise in citation indexing, to see whether computers could be applied to the problem. So began a mutual education — Garfield learnt about citation indexing and taught Adams about the scientific literature. While working, Garfield did a master's degree in library and information science at Columbia University in 1954, and obtained a PhD in structural linguistics at the University of Pennsylvania in Philadelphia

at conferences, making prototype indexes and sending proposals after proposals to the US Patent Office, the National Science Foundation and the National Institutes of Health. Funding finally became available after 1957, when the launch of the Soviet Union's Sputnik satellite unleashed panic in the United States about the information crisis in science. Funders wanted ways to evaluate their effectiveness. Lederberg and Garfield joined forces to build an automated citation index across science.

Nevertheless, for many years, the SCI made a loss, supported by profits from *Current Contents* and other ISI services. Neither scientists nor librarians saw much use for these expensive books (a ten-year set could cost US\$25,000) with their long lists of code in small print. The exception was the community of historians and sociologists of science. For example, Derek de Solla Price, a science historian at Yale University in New Haven, Connecticut, and sociologist Robert Merton at Columbia University immediately saw the SCI as an instrument for analysing the dynamics and structure of science, and each developed theories about citations in research.

Since the early 1970s, the SCI's influence has extended. Quantitative analyses of output and citations have been used to evaluate funding programmes, research groups, individuals and nations. This use increased markedly after the *Journal Impact Factor* was marketed in 1973 (the impact factor had been computed for selected journals in the SCI from the early 1960s). Garfield came to see the impact factor as a mixed blessing, "like nuclear energy". Although he felt that citation indexing and the impact factor could be remedies for the limitations of peer review, he was uncomfortable with their misuse as performance indicators.

Garfield was fascinated by art. The former ISI building, designed by architects Denise Scott Brown and Robert Venturi, housed an impressive collection, including striking murals by Hatched artists from Mexico.

Garfield's enthusiasm was not the bookkeeper's but the visionary's. He saw in his creations a better science for society and the ideal of a unified body of knowledge

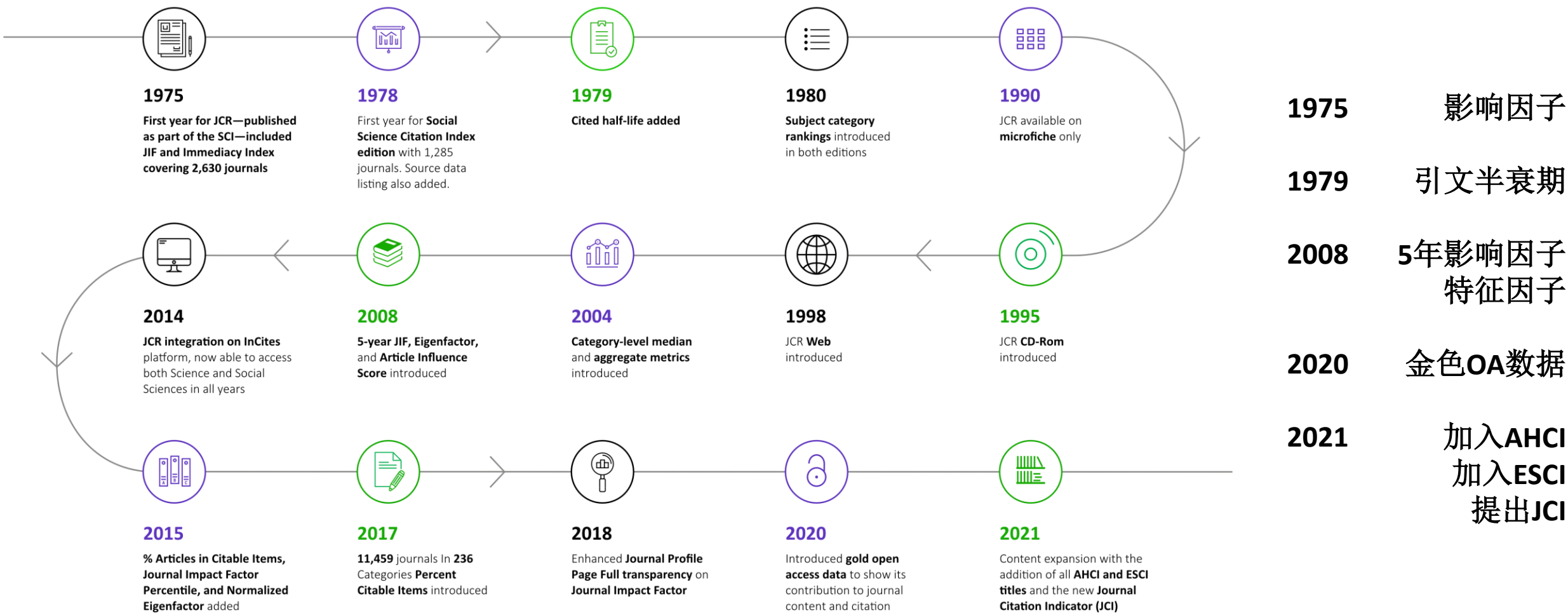
1975年影响因子提出

影响因子的初衷是为了图书馆馆员的馆藏建设提供参考

配合SCI帮助研究人员选择期刊

影响因子开始被滥用

JCR 发展变化时间表



指标的演进

科研分析的新视角

发表论文的绝对数量

问题：
发表1000篇的机构就一定优于发表900篇的吗？

考虑到学科和出版年代差异后的比较

问题：
当绝对数量差异较大时如何比较？

发表论文的被引次数

问题：
被引用100次的文章就一定优于被引90次的吗？

一系列相对指标的组合

- 文献指标使用的演进
- 分类评价的驱动
- 相对指标的优势
- 标准化利于跨领域比较

指标的演进

Percentile的使用

Percentile Rank and Author Superiority Indexes for Evaluating Individual Journal Articles and the Author's Overall Citation Performance

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<http://eugeneagarfield.org>

Presented at
Fifth International Conference on Webometrics, Informetrics & Scientometrics (WIS)
Tenth COLLNET Meeting, September 13-16, 2009 – Dalian, China

Abstract

In this paper we propose two new indexes to quantify the citation status of papers and authors. The Percentile Rank Index (PRI) indicates the citation rank of the author's individual papers among the papers published in the same year and source (journal or multi-authored monograph or book). PRI is independent of the paper's age, specialty, or source journal size. The Author's Superiority Index (ASI) is determined by the number of the author's papers with a PRI at or above a specified value (99, 95, or 75). ASI allows comparisons across specialties and different time periods. The data necessary to calculate both the PRI and ASI can be obtained from Thomson-Reuters database Web of Science (www.isiknowledge.com) or other comparable databases.

Principles for comparing sets of documents in citation analysis: From independent samples to comparing sub-samples in terms of percentile ranks

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Abstract

Using citation analysis, sets of documents can be compared as independent samples; for example, in terms of average citation counts using potentially different reference sets. From this perspective, the size of samples matters only for the statistical significance testing of differences and the error estimation. Using the percentile rank approach, differences among citation distributions can be studied in a single scheme. The comparison among the sets reveals that different sizes of the samples affect the weighting of the probabilities and therefore the rankings. We distinguish among (1) the normalization of papers against external reference sets, (2) the normalization in terms of frequencies relative to the margin-totals of independent versus dependent samples, and (3) the potentially normative definition of percentile rank classes for the evaluation (e.g., top-1% most highly cited, median, etc.).

2001年ESI诞生

- 对学科、年代进行分类
- 采用了更科学的百分位
- 高被引论文

ISI Web of Knowledge™
Essential Science Indicators™

INSTITUTION RANKINGS IN (ALL FIELDS)

Display items with at least: Citations(s)

Sorted by: Citations

View	Institution	Papers	Citations	Citations Per Paper
1	UNIV CALIF SYSTEM	340,931	7,861,673	23.06
2	HARVARD UNIV	177,191	5,179,643	29.23
3	CNRS	278,853	4,285,868	15.37
4	US DEPT HEALTH HUMAN SERVICES	113,897	3,278,333	28.79
5	UNIV LONDON	164,558	2,210,846	19.51
6	CHINESE ACAD SCI	259,739	1,123,815	12.03
7	UNIV TEXAS SYS	138,390	2,918,720	21.06
8	NATL INST HEALTH UNIV USA	83,964	2,641,940	31.49
9	US DEPT ENERGY	117,235	2,305,706	21.38
10	MAX PLANCK SOCIETY	94,721	2,275,353	24.02
11	PENNSYLVANIA COMMONWEALTH SYS HIGH EDUC	112,823	2,160,623	19.15
12	VA BOSTON HEALTHCARE SYS	69,971	2,013,316	33.06

1%



Highly Cited Researchers

- 与同行比较，在同行中所处的位置
- 相对位置可以进行跨学科的比较

指标的演进

新皇冠指标的出台

Lundberg, J. (2007). *Lifting the crown—citation z-score. Journal of informetrics*, 1(2), 145-154.

$$MNCS = \frac{1}{n} \sum_{i=1}^n \frac{c_i}{e_i}$$

论文标题	作者	来源	卷	期	页	出版年	被引频次	期刊预期被引频次	类别预期被引频次	期刊规范化的引文影响力	学科规范化的引文影响力	学科领域百分比	期刊影响因子
Human capital creation, accumulation and management in Lithuania: The case of national and foreign capital enterprises	Grundy, Dainora; Varnas, Darius	TRANSFORMATIONS IN BUSINESS & ECONOMICS	5	3	81-105	2006	15	4.5	13.81	3.33	1.09	22.66	0.26

15/13.81 = 1.09

对于任何一篇2006年在Economics学科出版的article:
 若CNCI > 1, 说明其引文影响力已经超过全球平均水平
 若CNCI < 1, 说明引文影响力不及全球平均水平

- 新皇冠指标（伦德伯格）

- 对学科、文献类型、年代做了标准化

- 先平均再求和

- 可以跨学科和领域进行比较

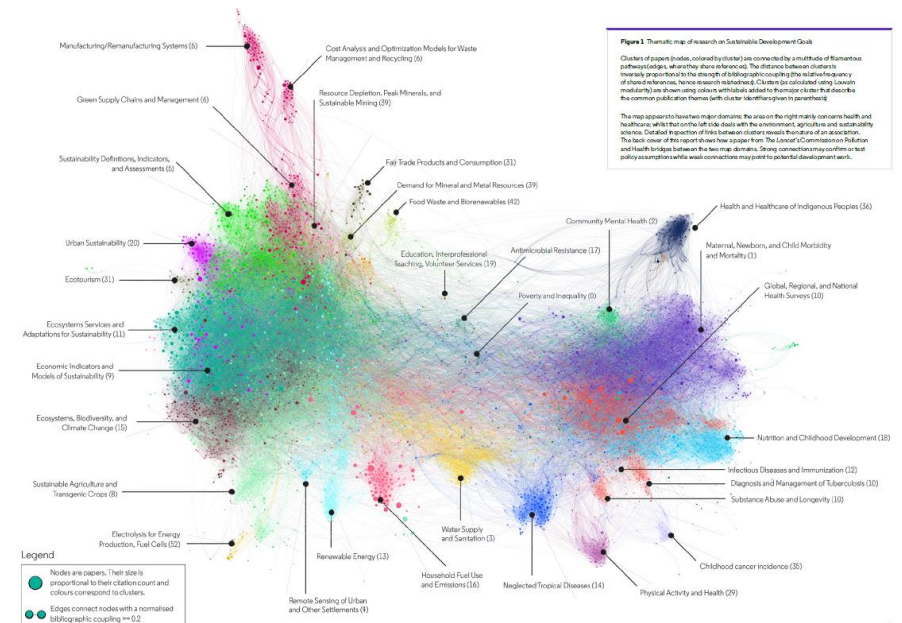
从简单指标到全面画像



An indicator



Numbers of indicators



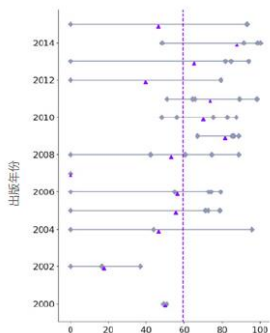
Whole picture/
Profile



ISI研究报告《全面画像，而非简单指标》

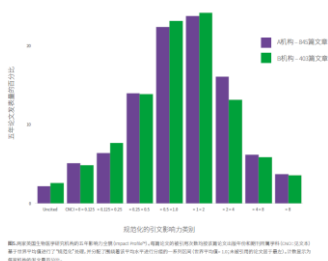
科研人员

- ✓ 射束图
- H指数

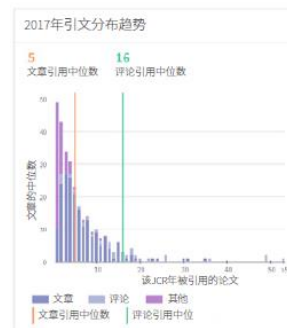
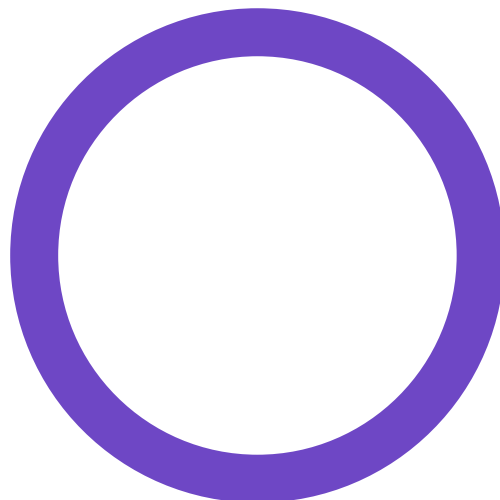


- ✓ 影响力全貌 Impact Profile

- 篇均引文影响力

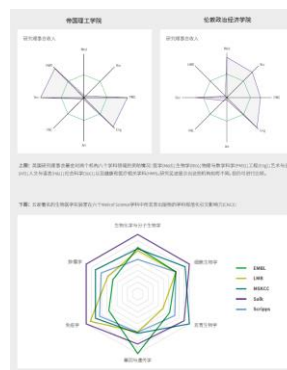


机构



期刊

- ✓ 期刊引证报告 (JCR)
- 影响因子 (JIF)



- ✓ 多因素研究足迹

- 排名

大学

科技文献数据的发展

从数据到情报信息



怎样完成机构之间的对标？

发现本机构/同行机构之间的优势/潜力所在？



怎样通过文献计量指标，分析并识别高影响力的研究成果？



怎样发现科研绩效突出的研究人员，潜在的科研新星，为队伍建设提供依据？



怎样评估现有与潜在的合作对象，找到最佳合作伙伴？



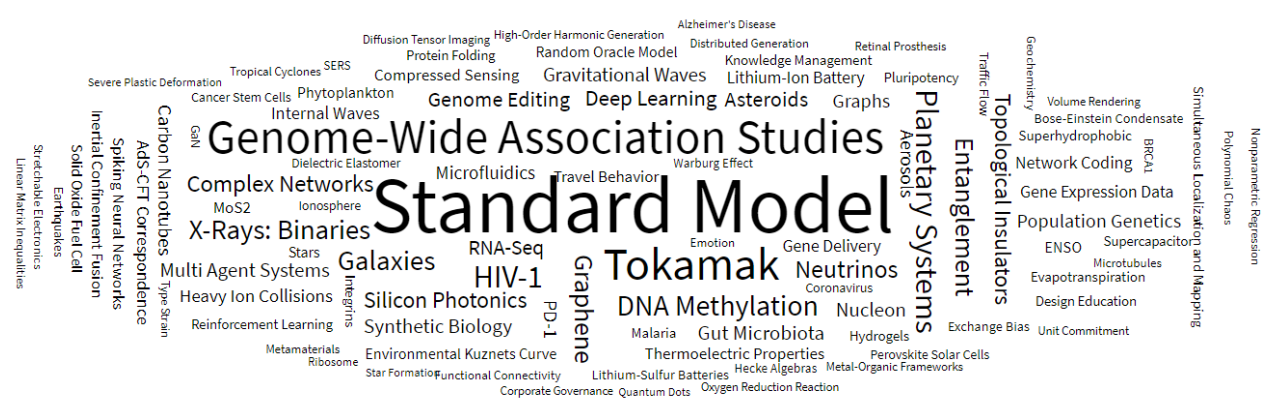
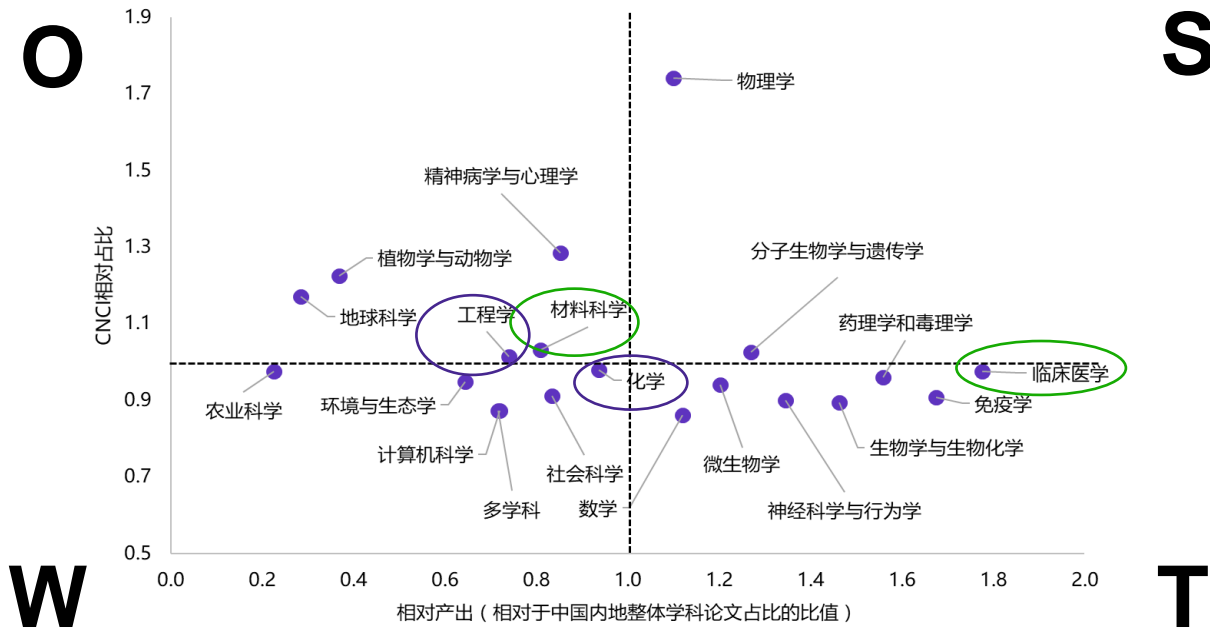
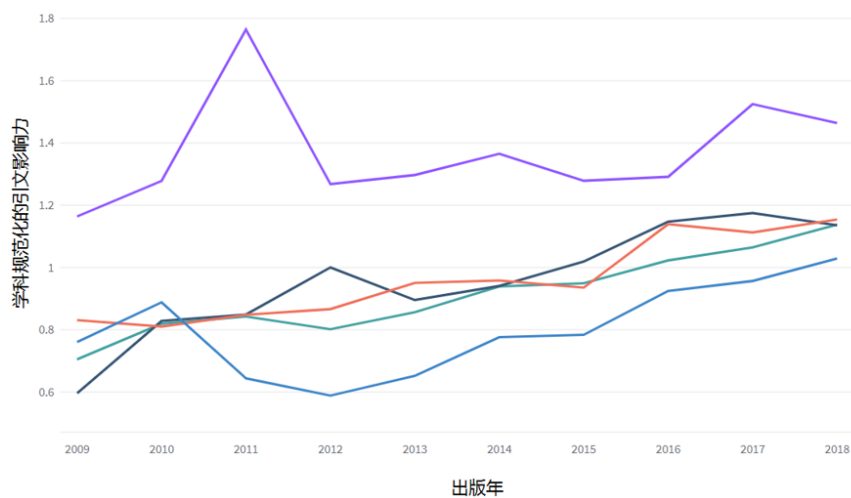
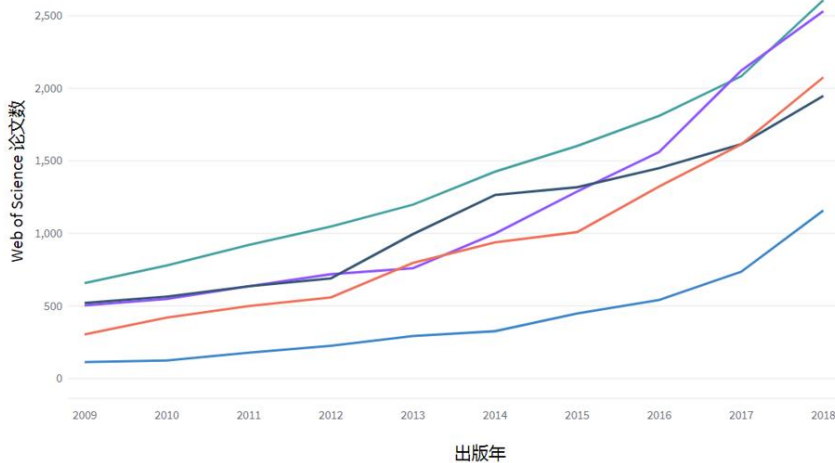
怎样衡量在开放研究（Open Research）中的表现，更好地融入全球学术交流？



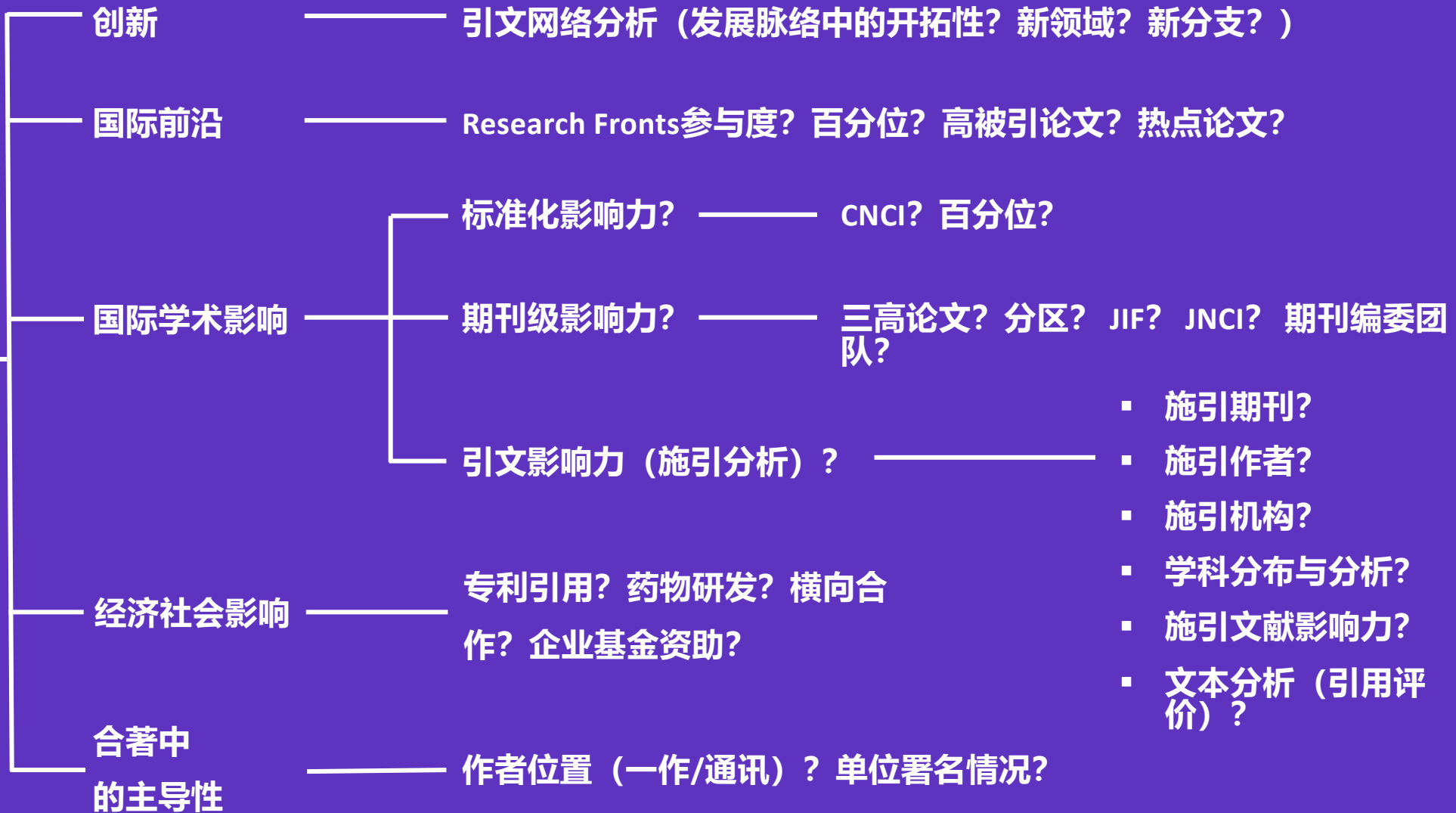
怎样通过数据确定本机构研究最相关的期刊，充分利用好图书馆预算？

本机构/对标/合作分析

利用数据进行挖掘
探究机构/学科间的深层次关联



代表性成果
指标参考



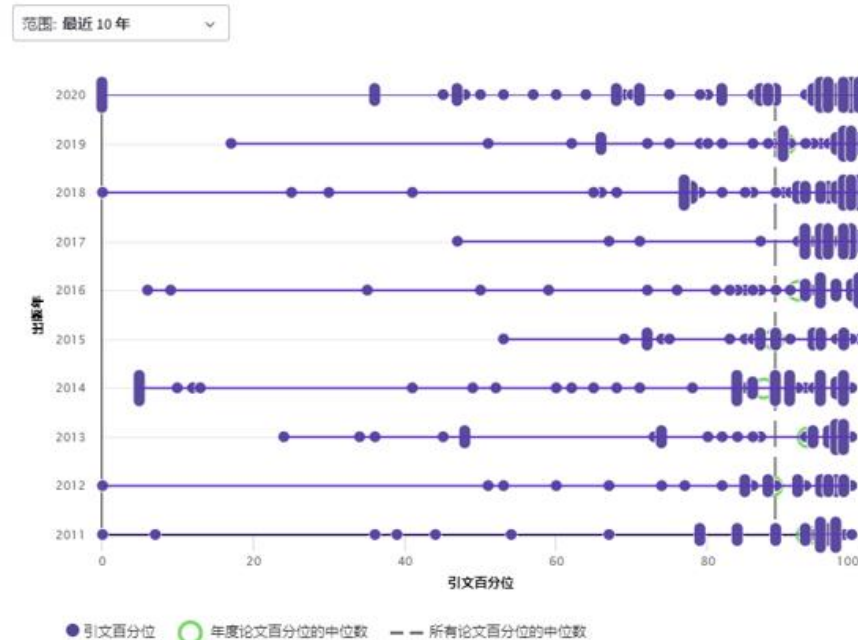
识别与发现科研人员

- 通过数据分析归类
- 构建领军人才
- 学术新星学术画像
- 学者个人档案

科研人才学术表现特征参考示例

	A	B	C	D	E	F	G
	Name	Center	Join Year	Time Period	Web of Science Documents	Category Normalized Citation Impact	Highly Cited Papers
1							
2	Baik, Mu-Hyun	Center for Catalytic	2015	All years	125	1.28	0
3	Baik, Mu-Hyun	Center for Catalytic	2015	Before joining IBS	88	1.23	0
4	Baik, Mu-Hyun	Center for Catalytic	2015	After joining IBS	37	1.39	0
5	Baik, Mu-Hyun	Center for Catalytic	2015	1993	1	0	0
6	Baik, Mu-Hyun	Center for Catalytic	2015	2000	1	0.3	0
7	Baik, Mu-Hyun	Center for Catalytic	2015	2001	4	1.09	0
8	Baik, Mu-Hyun	Center for Catalytic	2015	2002	6	2.13	0
9	Baik, Mu-Hyun	Center for Catalytic	2015	2003	6	2.15	0
10	Baik, Mu-Hyun	Center for Catalytic	2015	2004	9	1.06	0
11	Baik, Mu-Hyun	Center for Catalytic	2015	2005	7	1.19	0
12	Baik, Mu-Hyun	Center for Catalytic	2015	2006	8	1.81	0
13	Baik, Mu-Hyun	Center for Catalytic	2015	2007	3	0.99	0
14	Baik, Mu-Hyun	Center for Catalytic	2015	2008	11	1.03	0
15	Baik, Mu-Hyun	Center for Catalytic	2015	2009	5	1	0
16	Baik, Mu-Hyun	Center for Catalytic	2015	2010	4	1.22	0
17	Baik, Mu-Hyun	Center for Catalytic	2015	2011	8	0.89	0
18	Baik, Mu-Hyun	Center for Catalytic	2015	2012	4	1.47	0
19	Baik, Mu-Hyun	Center for Catalytic	2015	2013	6	0.58	0
20	Baik, Mu-Hyun	Center for Catalytic	2015	2014	5	1	0
21	Baik, Mu-Hyun	Center for Catalytic	2015	2015	10	1.32	0

作者影响力射束图



引文计数来自 Web of Science 核心合集; 引文百分位数据来自 InCites。
作者影响力射束图数据以研究人员职业生涯期间(回溯到最早 1980 年)的论文和综述文献为基础。

研究人员射束图：
三维角度全面了解
研究人员

- 年代
- 相对位置
- 影响力

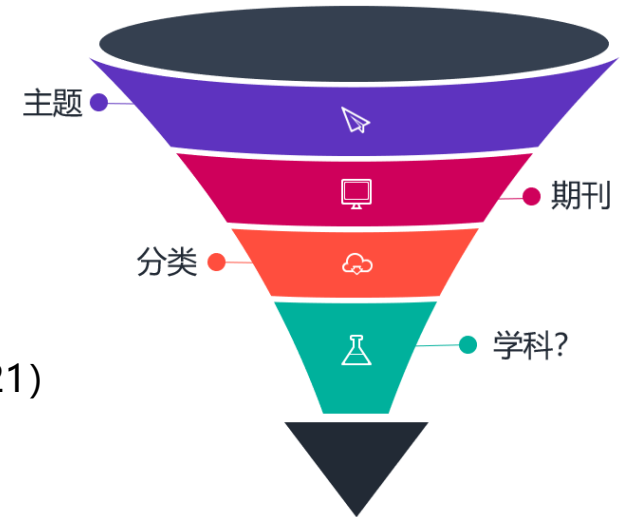
学科的演进

源自学科，超越学科

- 专家判断
- 体系稳定
- 与真的研究方向是否可以完全对应？

- Web of Science学科分类 (250+个)
- ESI学科分类 (22个)
- **中国：教育部一级学科**
(China SCADC Subject 97 Narrow)
- **全新的文章级别分类体系：Citation Topics**
- 意大利：ANVUR
- 澳大利亚：Australia FOR Level 1/2
- 巴西：FAPESP、CAPES
- 英国：UK REA (2008)、UK REF (2014/2021)
- 日本：KAKEN
- GIPP全球机构概况研究领域
- 经合组织：OECD
- **联合国可持续发展目标分类**
- **上海软科世界一流学科排名分类**

- 最佳的分类系统与应用的场景和目标息息相关
- 每一个相对指标应该都与分类相关联



Citation Topics分析

表 1 新冠领域中外文论文发文量 TOP10 研究机构

论文数	国际论文 TOP10 机构	排名	中文论文 TOP10 机构	论文数
1,619	HARVARD UNIVERSITY	1	北京大学	454
1,492	UNIVERSITY OF LONDON	2	华中科技大学	434
1,351	UNIVERSITY OF CALIFORNIA SYSTEM	3	武汉大学	326
1,076	HUAZHONG UNIVERSITY OF SCIENCE TECHNOLOGY	4	复旦大学	247
1,008	HARVARD MEDICAL SCHOOL	5	中国科学院	239
788	INSTITUT NATIONAL DE LA SANTE ET DE LA RECHERCHE MEDICALE INSERM	6	浙江大学	224
732	UNIVERSITY OF TORONTO	7	中国社会科学院	202
719	UNIVERSITY OF TEXAS SYSTEM	8	四川大学	197
673	UNIVERSITY COLLEGE LONDON	9	上海交通大学	195
654	WUHAN UNIVERSITY	10	清华大学	192

表 4 新冠领域外文论文宏观、微观主题分布 (Incites)

大类 (发文量)	宏观主题 (发文量)	TOP10 微观主题 (发文量)
生物医学 (8951)	Clinical & Life Sciences (8951)	① Coronavirus(冠状病毒, 4794)
		② Telemedicine(远程医疗, 176)
人文社科 (1118)	Social Sciences (1056)	③ Influenza(流行性感冒, 114)
		④ Disaster Medicine(灾难医学, 108)
理科 (565)	Arts & Humanities (62)	⑤ Ebola Virus(埃博拉病毒, 89)
		⑥ Syndromic Surveillance(症状监测, 72)
工科 (294)	Agriculture, Environment & Ecology (173)	⑦ Neutrophil Extracellular Traps(中性粒细胞胞外诱捕网, 67)
		⑧ Bioaerosols(生物气溶胶, 53)
理科 (565)	Earth Sciences (154)	⑨ Pleurodesis(胸膜固定术, 51)
		⑩ Respiratory Syncytial Virus(呼吸道合胞病毒, 49)
理科 (565)	Mathematics (113)	① PTSD(创伤后应激障碍, 43)
		② Public Administration(公共管理, 40)
理科 (565)	Chemistry (111)	③ Tourism(旅游业, 33)
		④ Public Relations(公共关系, 26)
理科 (565)	Physics (14)	⑤ Stock Returns(股票收益, 23)
		⑥ Thermal Comfort(热舒适, 22)
理科 (565)	Electrical Engineering, Electronics & Computer Science (277)	⑦ Environmental Kuznets Curve(环境库兹涅茨曲线, 19)
		⑧ Science Communication(科学传播, 19)
理科 (565)	Engineering & Materials Science (17)	⑨ Subjective Well-Being(主观幸福感, 19)
		⑩ Problem-Based Learning(问题导向学习法, 18)
理科 (565)	Agriculture, Environment & Ecology (173)	① Air Pollution(空气污染, 52)
		② Aerosols(气溶胶, 42)
理科 (565)	Mathematics (113)	③ Global Stability(全球稳定性, 41)
		④ Olfaction(嗅觉, 37)
理科 (565)	Physics (14)	⑤ Heat Waves(高温热浪, 24)
		⑥ Causal Inference(因果推断, 18)
理科 (565)	Chemistry (111)	⑦ Protein Folding(蛋白质折叠, 12)
		⑧ Household Air Pollution(家居空气污染, 10)
理科 (565)	Physics (14)	⑨ Competing Risks(竞争风险, 10)
		⑩ Fractional Calculus(分数微积分, 9)
工科 (294)	Electrical Engineering, Electronics & Computer Science (277)	① Blockchain(区块链, 19)
		② Complex Networks(复杂网络, 18)
工科 (294)	Engineering & Materials Science (17)	③ Crowdsourcing(众包, 18)
		④ Deep Learning(深度学习, 17)
工科 (294)	Engineering & Materials Science (17)	⑤ Coreference Resolution(指代消解, 15)
		⑥ Human-Robot Interaction(人机交互, 10)
工科 (294)	Engineering & Materials Science (17)	⑦ Group Testing(分组检测, 10)
		⑧ Airlines(航空公司, 9)
工科 (294)	Engineering & Materials Science (17)	⑨ Safety Climate(安全氛围, 9)
		⑩ Supply Chain(供应链, 9)



现有的分类模式

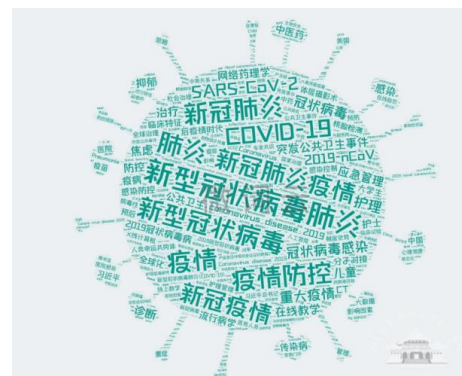
- 期刊级别分类体系



Citation Topics

- 文章级别分类体系
- 更高解析度 (10个宏观主题、326个中观主题、2444个微观主题)

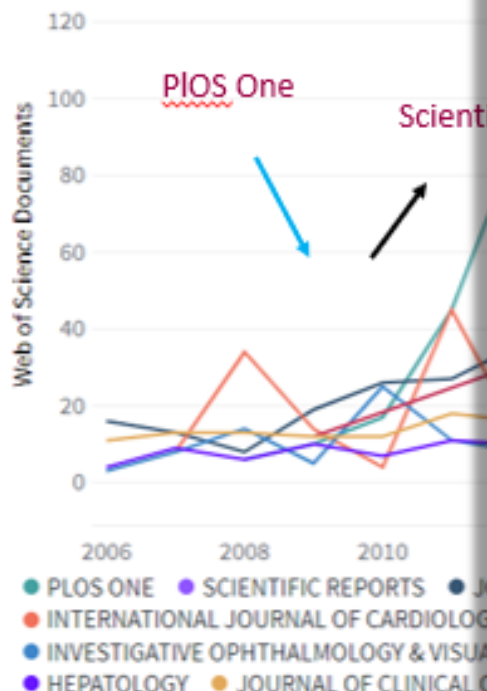
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实现研究主题宏观/中观/微观的聚类



案例来源: 【学术前沿动态】新冠专题跟踪报道, 武汉大学图书馆

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我校论文经常发表的期刊

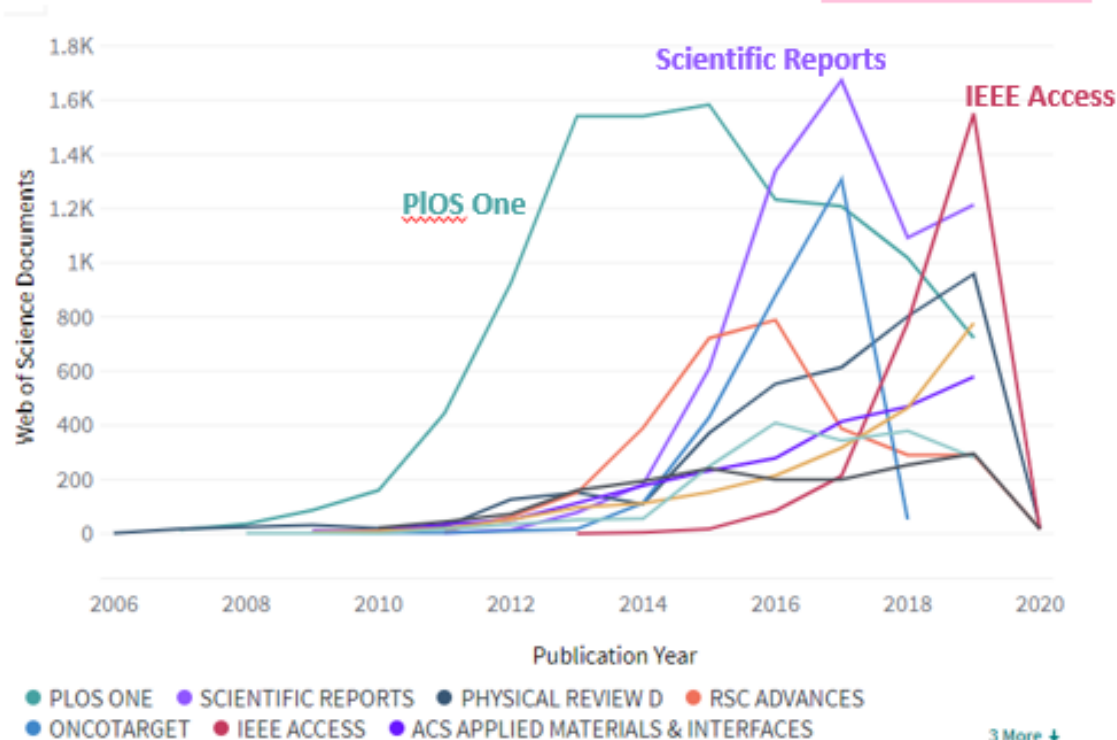


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馆藏资源建设

资源广度

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2	SCIENTIFIC REPORTS	PROCEEDINGS OF THE NATIONAL ACADEMY OF SCIENCES OF THE UNITED STATES OF AMERICA	SCIENTIFIC REPORTS
3	JOURNAL OF GASTROENTEROLOGY AND HEPATOLOGY	JOURNAL OF THE AMERICAN CHEMICAL SOCIETY	PHYSICAL REVIEW D
4	INTERNATIONAL JOURNAL OF CARDIOLOGY	PHYSICAL REVIEW LETTERS	RSC ADVANCES
5	INVESTIGATIVE OPHTHALMOLOGY & VISUAL SCIENCE	NATURE	ONCOTARGET
6	HONG KONG MEDICAL JOURNAL	ANGEWANDTE CHEMIE-INTERNATIONAL EDITION	IEEE ACCESS
7	HEPATOLOGY	SCIENCE	ACS APPLIED MATERIALS & INTERFACES
8	JOURNAL OF CLINICAL ONCOLOGY	ADVANCED MATERIALS	INTERNATIONAL JOURNAL OF MOLECULAR SCIENCES
9	CANCER RESEARCH	JOURNAL OF BIOLOGICAL CHEMISTRY	JOURNAL OF HIGH ENERGY PHYSICS
10	ANNALS OF ONCOLOGY	SCIENTIFIC REPORTS	NANOSCALE

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多元整合，未来已来



全球研究生态的变化趋势



研究体验

- 竞争日益激烈和快速变化的研究环境需要新工具来**减轻信息过载**并提高研究效率
- 机构和资助者的新任务增加了研究人员的**管理任务**，导致**多个配置文件和重复系统**，从而占用了研究时间



开放科学

- 开放科学正在从根本上**改变工作流程**，更加强调透明度和成果的共享
- **资助者正在加速向开放科学的过渡**，这给作者、出版商和评估人员带来了挑战



研究影响

- 科研界面临越来越大的压力，需要**评估和证明公共研究投资在现实世界中的收益**
- 日益激烈的竞争和复杂性正在推动对支持**战略融资和投资决策的高级分析需求**



研究社群

- 对效率和生产力不断增长的需求正在推动加强**国际合作、政企合作和社区互动**
- 决策者需要在整个研究生命周期中跟踪产出，从而推动改进**跨生态系统工作流程和网络的需求**



研究体验

Representation Learning: A Review and New Perspectives

作者: Bengio, Y (Bengio, Yoshua)¹; Courville, A (Courville, Aaron)¹; Vincent, P (Vincent, Pascal)¹
来自 Web of Science ResearcherID 和 ORCID (由 Clarivate 提供)

IEEE TRANSACTIONS ON PATTERN ANALYSIS AND MACHINE INTELLIGENCE

卷: 35 期: 8 页: 1798-1828

DOI: 10.1109/TPAMI.2013.50

出版日期: AUG 2013

文档类型: Review

摘要

The success of machine learning algorithms generally depends on data representation, and we hypothesize that this is because different representations can entangle and hide more or less the different explanatory factors of variation behind the data. Although specific domain knowledge can be used to help design representations, learning with generic priors can also be used, and the quest for ϕ is motivating the design of more powerful representation-learning algorithms implementing such priors. This paper reviews recent work in the area of unsupervised feature learning and deep learning, covering advances in probabilistic models, autoencoders, manifold learning, and deep networks. This motivates longer term unanswered questions about the appropriate objectives for learning good representations, for computing representations (i.e., inference), and the geometrical connections between representation learning, density estimation, and manifold learning.

关键词

作者关键词: Deep learning; representation learning; feature learning; unsupervised learning; Boltzmann machine; autoencoder; neural nets

Keywords Plus: ORGANIZING NEURAL-NETWORK; SLOW FEATURE ANALYSIS; DIMENSIONALITY REDUCTION; OBJECT RECOGNITION; DEEP; EMERGENCE; ALGORITHM; MODELS; SHIFT; CODE

作者信息

通讯作者地址: Bengio, Yoshua (通讯作者)

Univ Montreal, Dept Comp Sci & Operat Res, P0B 6128, Succ Ctr Ville, Montreal, PQ H3C 3J7, Canada

地址

Univ Montreal, Dept Comp Sci & Operat Res, Montreal, PQ H3C 3J7, Canada

类别/分类

研究方向: Computer Science; Engineering

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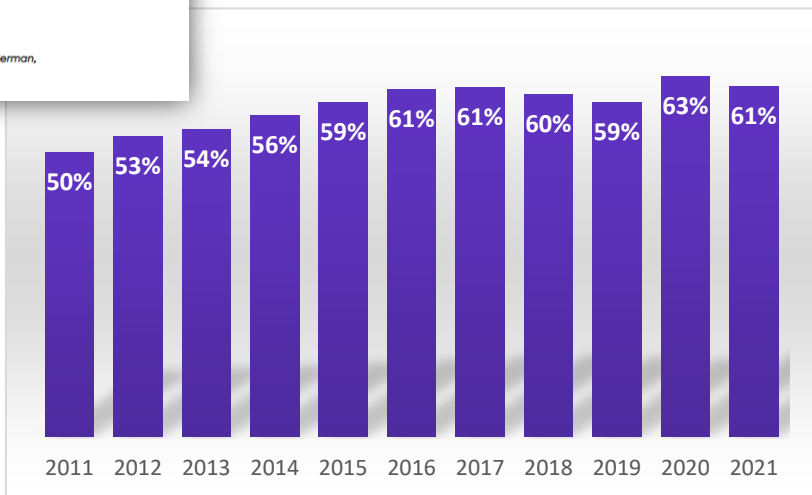


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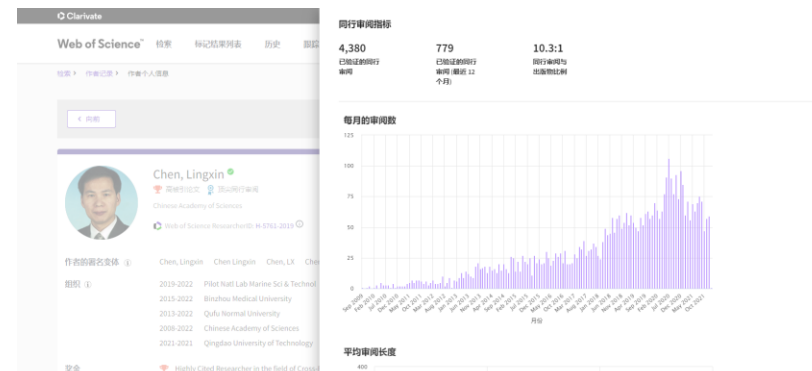
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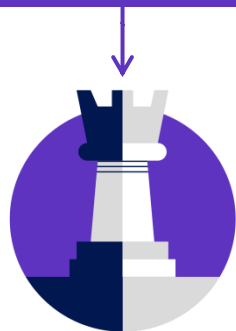


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丰富的字段类型
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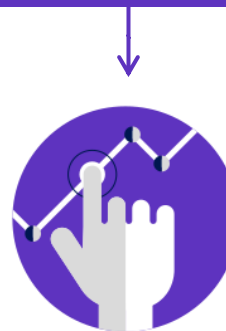
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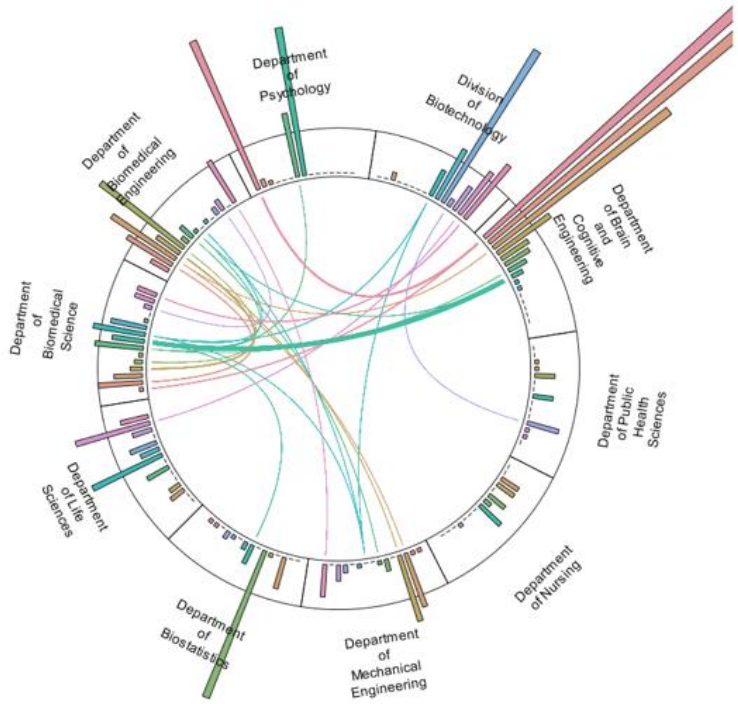
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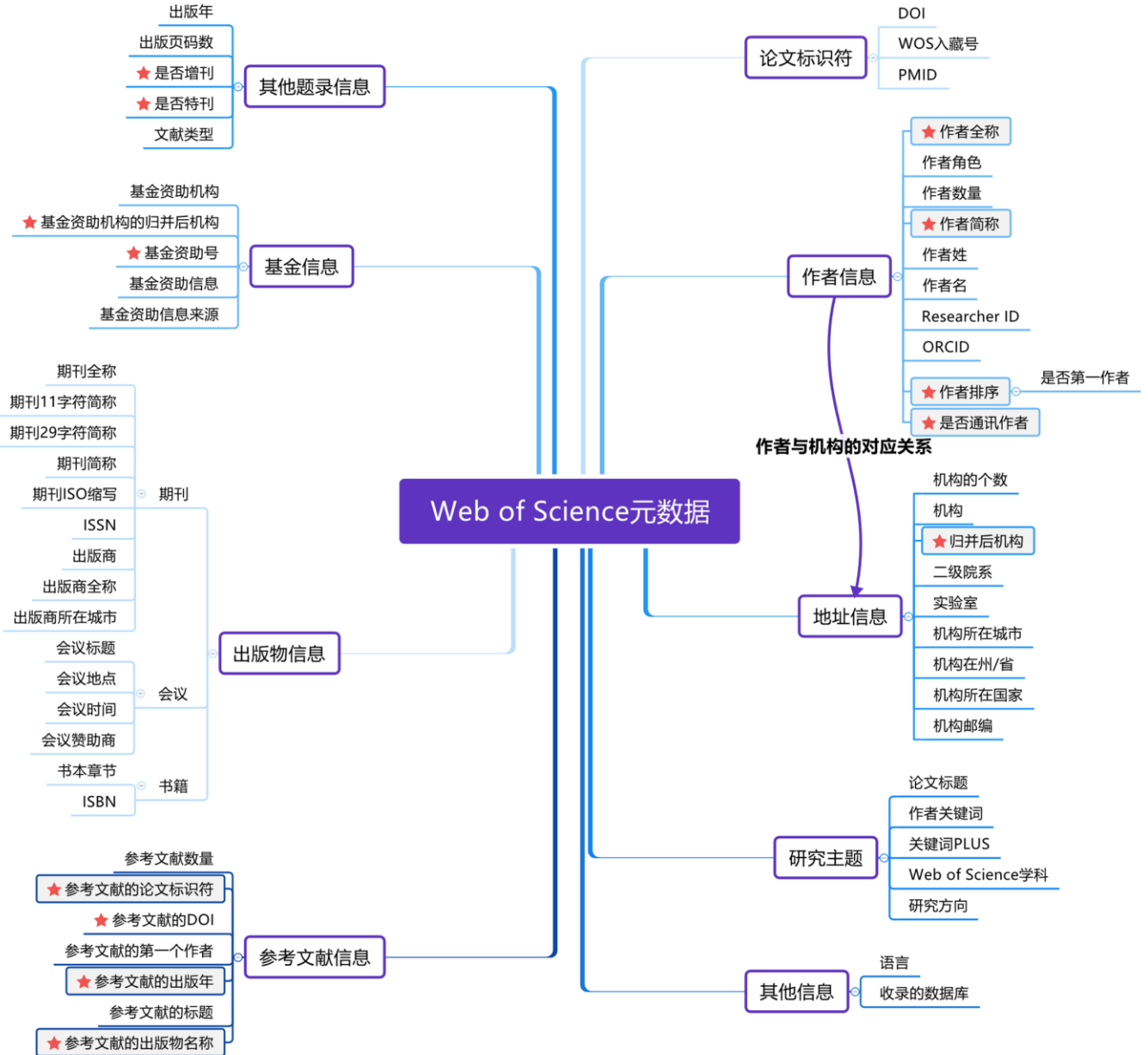
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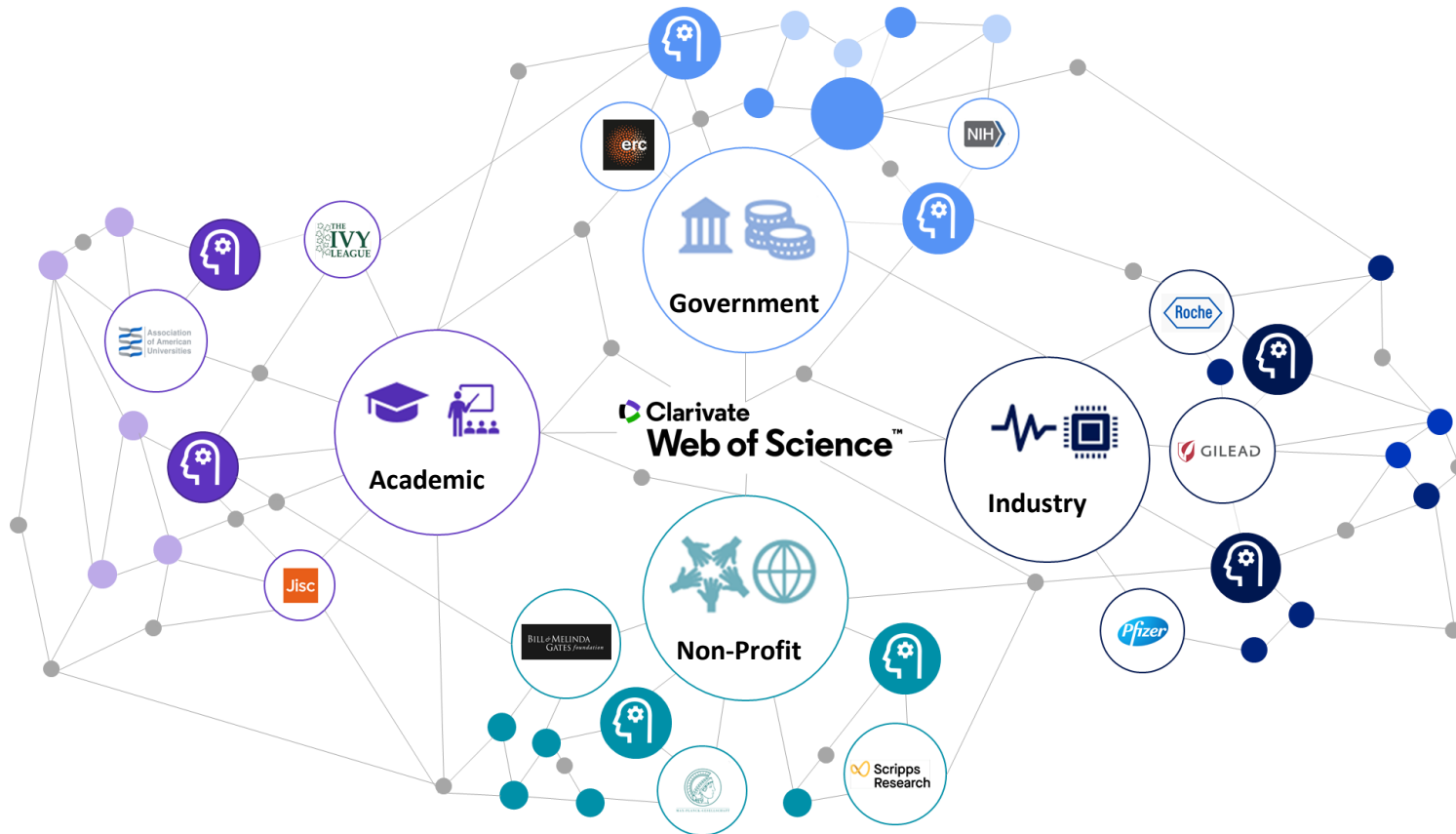
元数据的应用趋势



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- Bacteriology
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- Neuroscience
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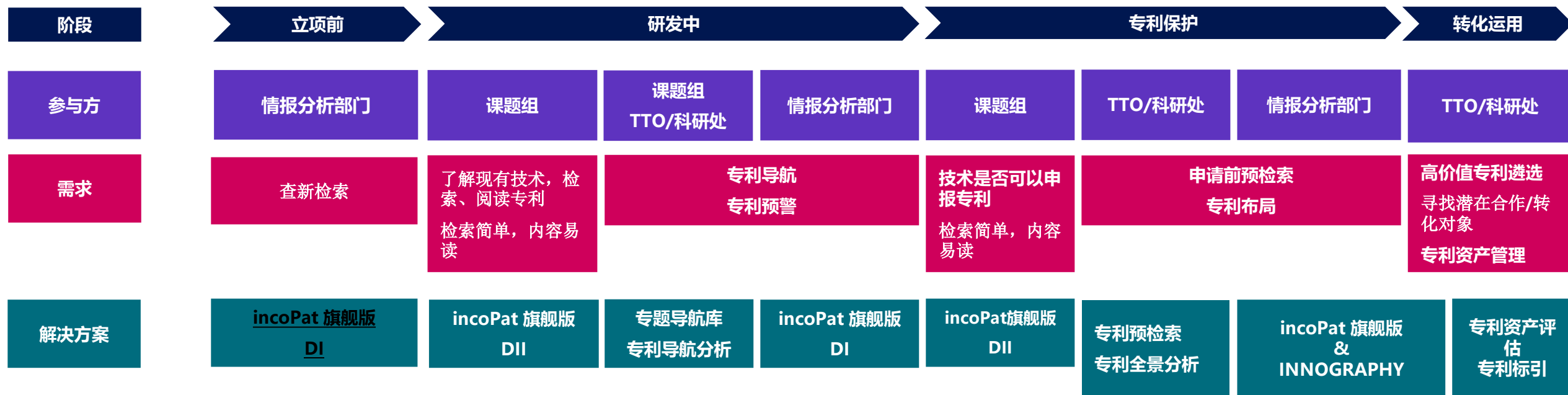


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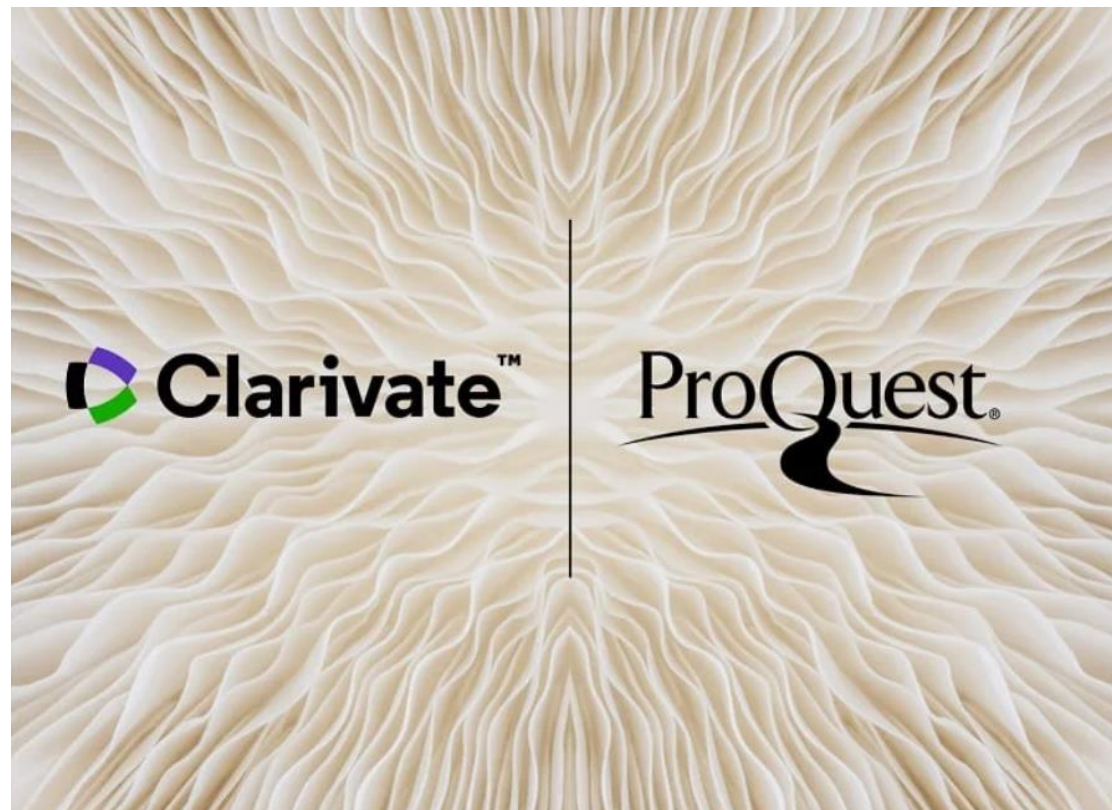
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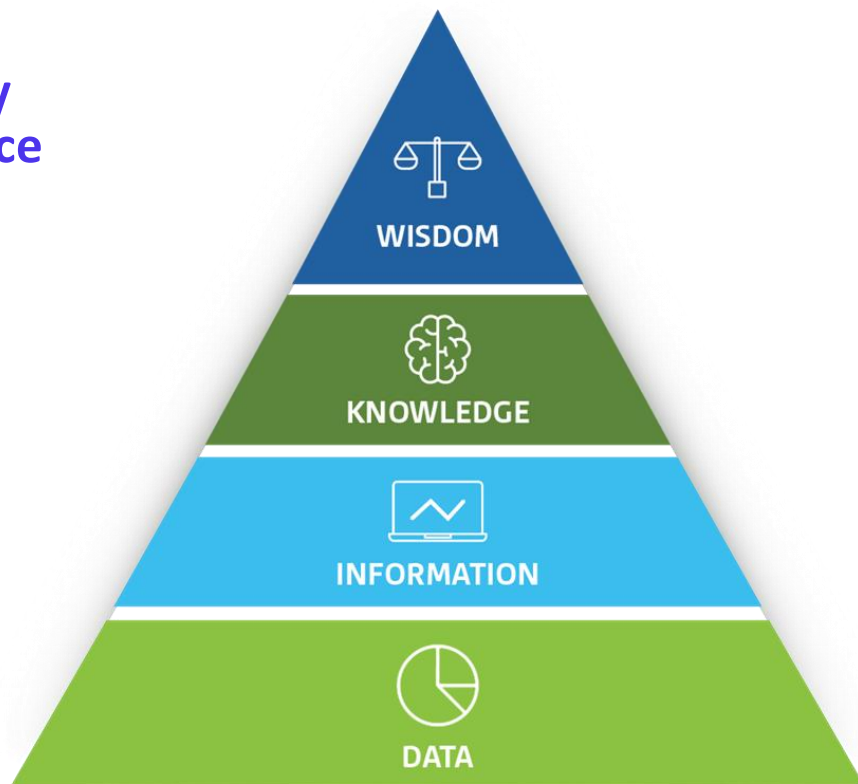
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