

Artificial intelligence history, and libraries:



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History and Legacy of Library Contributions to machine learning



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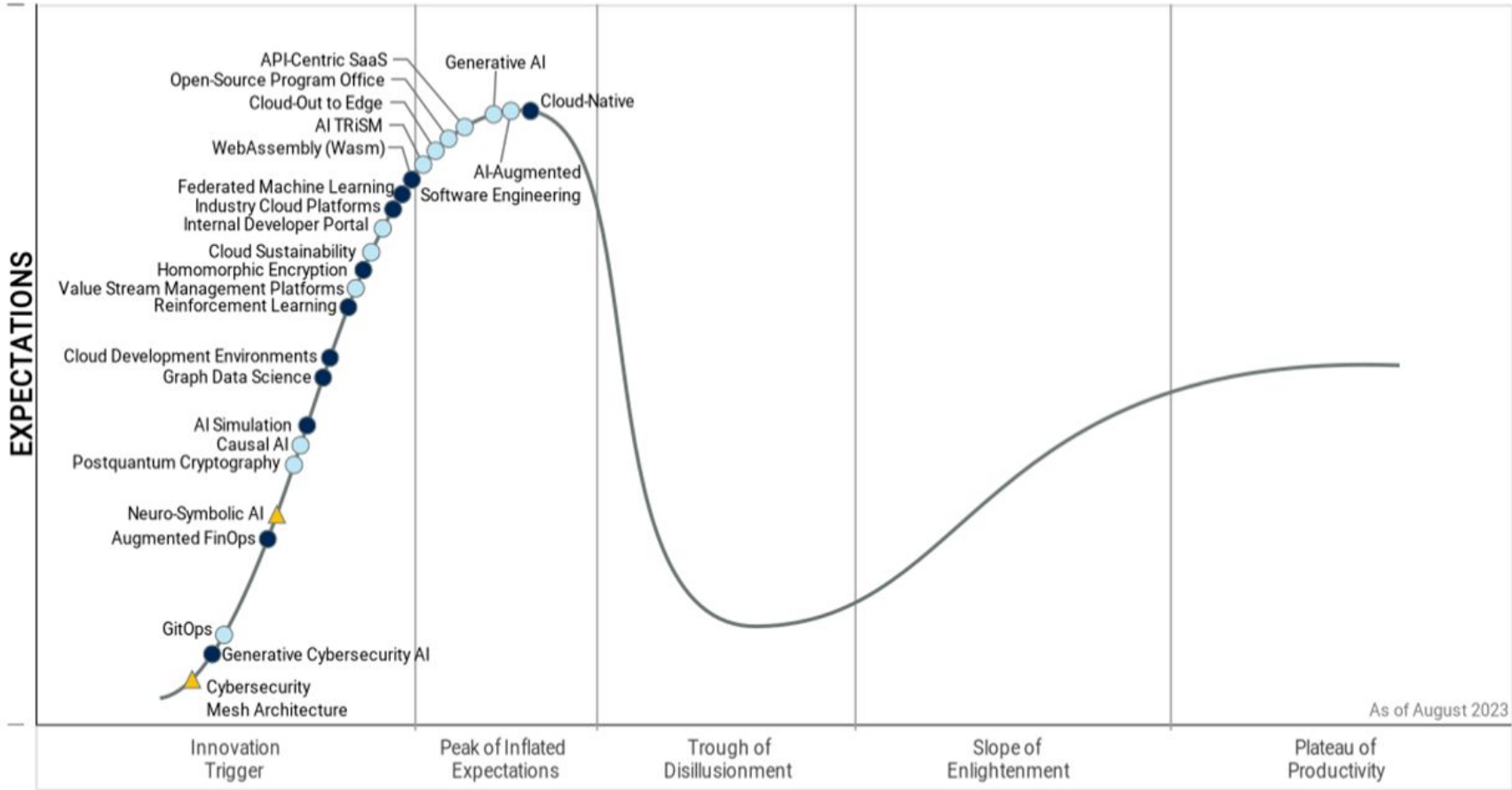
Wilhelmina Randtke, Head of Libraries Technologies and Systems, Georgia Southern University Libraries
NASIG Autumn, October 17, 2023, Virtual

The “AI” buzz

What is really new?

What is really new?

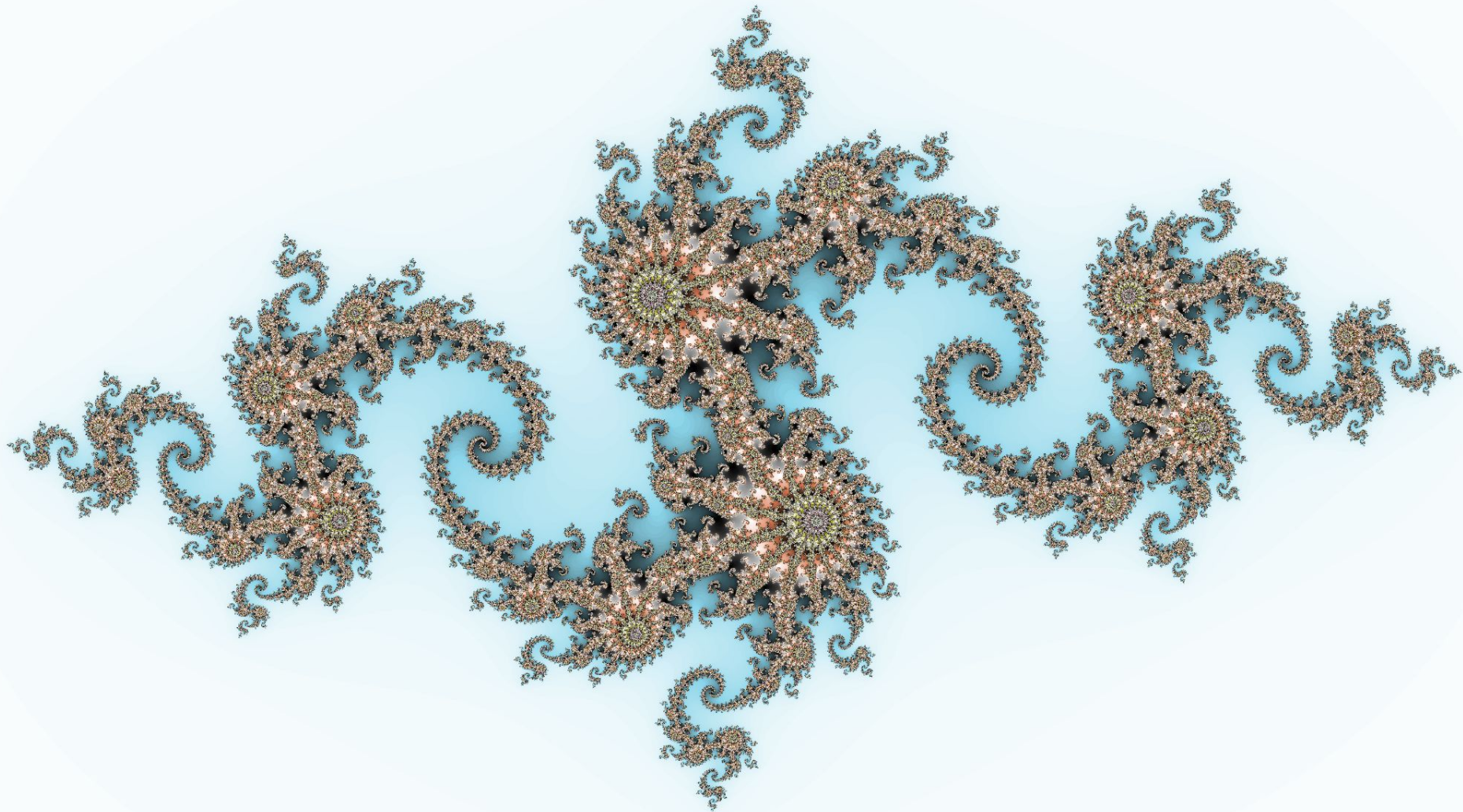
Hype?



Plateau will be reached: ○ <2 yrs. ● 2-5 yrs. ● 5-10 yrs. ▲ >10 yrs. ✗ Obsolete before plateau

What is really new?

Speed, scale



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- [Newspaper Navigator](#) (Search historic newspaper photos)

100 Years Ago Today: 10/16/1923 (27 issues)



[Daily Kennebec journal.](#)
[\[microfilm reel\]](#) (12pp.)
Augusta, Me.



[The Birmingham age-herald.](#)
[\[volume\]](#) (18pp.)
Birmingham, Ala.



[Americus times-recorder.](#)
[\[volume\]](#) (8pp.)
Americus, Ga.

What is really new?

Culture and attitudes?

First Wave



Expert knowledge or criteria and logical reasoning

The first wave of AI is represented by expert knowledge or criteria developed in law or other authoritative sources and encoded into a computer program in the form of an expert system.

Example: Online tax preparation

Second Wave



Machine/Statistical learning

Second-wave AI technology is based on machine learning, or statistical learning, and includes voice recognition, natural-language processing, and computer-vision technologies, among others.

Example: Face-recognition technology

Third Wave



Contextual adaptation

Third-wave AI technology combines the strengths of first- and second-wave AI, and is also capable of contextual sophistication, abstraction, and explanation.

Example: Autonomous ships

Who Qualifies as Your Dependent

Dependents, Qualifying Child for Child Tax Credit, and Credit for Other Dependents

Follow the steps below to find out if a person qualifies as your dependent and to find out if your dependent qualifies you to take the child tax credit or the credit for other dependents. If you have more than four dependents, check the box under *Dependents* on page 1 of Form 1040 or 1040-SR and include a statement showing the information required in columns (1) through (4).

TIP *The dependents you claim are those you list by name and SSN in the Dependents section on Form 1040 or 1040-SR.*

Before you begin. See the definition of *Social security number*, later. If you want to claim the child tax credit or the credit for other dependents, you (and your spouse if filing jointly) must have an SSN or ITIN issued on or before the due date of your 2022 return (including extensions). If an ITIN is applied for on or before the due date of a 2022 return (including extensions) and the IRS issues an ITIN as result of the application, the IRS will consider the ITIN as issued on or before the due date of the return.

Step 1 Do You Have a Qualifying Child?

A qualifying child is a child who is your...

Son, daughter, stepchild, foster child, brother, sister, stepbrother, stepsister, half brother, half sister, or a descendant of any of them (for example, your grandchild, niece, or nephew)

AND

was ...

Under age 19 at the end of 2022 and younger than you (or your spouse if filing jointly)

or

Under age 24 at the end of 2022, a student (defined later), and younger than you (or your spouse if filing jointly)

or

Any age and permanently and totally disabled (defined later)

AND

Who didn't provide over half of their own support for 2022 (see Pub. 501)

AND

Who isn't filing a joint return for 2022 or is filing a joint return for 2022 only to claim a refund of withheld income tax or estimated tax paid (see Pub. 501 for details and examples)

AND

the definition of a U.S. national or U.S. resident alien. If the child was adopted, see *Exception to citizen test*, later.)

Yes. Continue

No. **STOP**

You can't claim this child as a dependent.

2. Was the child married?

Yes. See *Married person*, later.

No. Continue

3. Could you, or your spouse if filing jointly, be claimed as a dependent on someone else's 2022 tax return? (If the person who could claim you on their 2022 tax return is not required to file, and isn't filing a 2022 tax return or is filing a 2022 return only to claim a refund of withheld income tax or estimated tax paid, check "No.") See Steps 1, 2, and 4.

Yes. **STOP**

You can't claim any dependents. Complete the rest of Form 1040 or 1040-SR and any applicable schedules.

No. You can claim this child as a dependent. Complete columns (1) through (3) of the *Dependents* section on page 1 of Form 1040 or 1040-SR for this child. Then, go to Step 3.

3. Was the child under age 17 at the end of 2022?

Yes. Continue

No. You can claim the credit for other dependents for this child. Check the "Credit for other dependents" box in column (4) of the *Dependents* section on page 1 of Form 1040 or 1040-SR for this person.

4. Did this child have an SSN valid for employment issued before the due date of your 2022 return (including extensions)? (See *Social Security Number*, later.)

Yes. You can claim the child tax credit for this person. Check the "Child tax credit" box in column (4) of the *Dependents* section on page 1 of Form 1040 or 1040-SR for this person.

No. **STOP**
You can claim the credit for other dependents for this child. Check the "Credit for other dependents" box in column (4) of the *Dependents* section on page 1 of Form 1040 or 1040-SR for this person.

Step 3 Does Your Qualifying Child Qualify You for the Child Tax Credit or Credit for Other Dependents?

1. Did the child have an SSN, ITIN, or adoption taxpayer identification number (ATIN) issued on or before the due date of your return (including extensions)? (Answer "Yes" if you are applying for an ITIN or ATIN for the child on or before the due date of your return (including extensions).)

Yes. Continue

No. **STOP**

You can't claim the child tax credit or the credit for other dependents for this child.

2. Was the child a U.S. citizen, U.S. national, or U.S. resident alien? (See Pub. 519 for the definition of a U.S. national or U.S. resident alien. If the child was adopted, see *Exception to citizen test*, later.)

Yes. Continue

No. **STOP**

You can't claim the child tax credit or the credit for other dependents for this child.



Is Tom's other parent claiming Tom per your legal agreement?

Yes, Tom's other parent will claim Tom for 2018 per our legal agreement.

No, Tom's other parent will not claim Tom for 2018 per our legal agreement.

What if I don't know?



Machine Learning...

...not so new

Machine Learning toolkits, in use today

- WEKA
- MALLET
- OpenNLP

These toolkits are listed in The National Artificial Intelligence Research and Development Strategic Plan 2019 Update , Select Committee on Artificial Intelligence of the National Science and Technology Council (June 2019), available at <https://trumpwhitehouse.archives.gov/wp-content/uploads/2019/06/National-AI-Research-and-Development-Strategic-Plan-2019-Update-June-2019.pdf> .

Machine Learning toolkits: Dates of public release

- WEKA:
 - (Waikato Environment for Knowledge Analysis)
 - established circa 1997
- MALLET
 - (Machine Learning for Language Toolkit)
 - established circa 2002
- OpenNLP
 - established circa 2004

Additional Machine Learning toolkits: Dates of public release

- GATE:
 - (General Architecture for Text Engineering)
 - established circa 1995
- RapidMiner
 - (formerly called Yet Another Learning Environment)
 - released for sale 2001
- SPSS Modeler
 - (formerly called Clementine)
 - released for sale 1994

Additional Machine Learning toolkits: Dates of public release

- SAS
 - released for sale 1972
- InfiniteInsight
 - (formerly KXEN)
 - released circa 1998
- KNIME
 - released for sale 2006
- ... and many more

History of Machine Learning in Libraries

"It's worth noting that the term "artificial intelligence" can create discomfort in the computer science community. The phrase has moved in and out of fashion over the decades and is used more in marketing than by researchers. "Machine learning" is more commonly used in the technical literature. Yet the nomenclature of AI is often embraced during funding application season, when venture capitalists come bearing checkbooks, or when researchers are seeking press attention for a new scientific result. As a result, the term is both used and rejected in ways that keep its meaning in flux." - Crawford, K. Atlas of AI (2021).

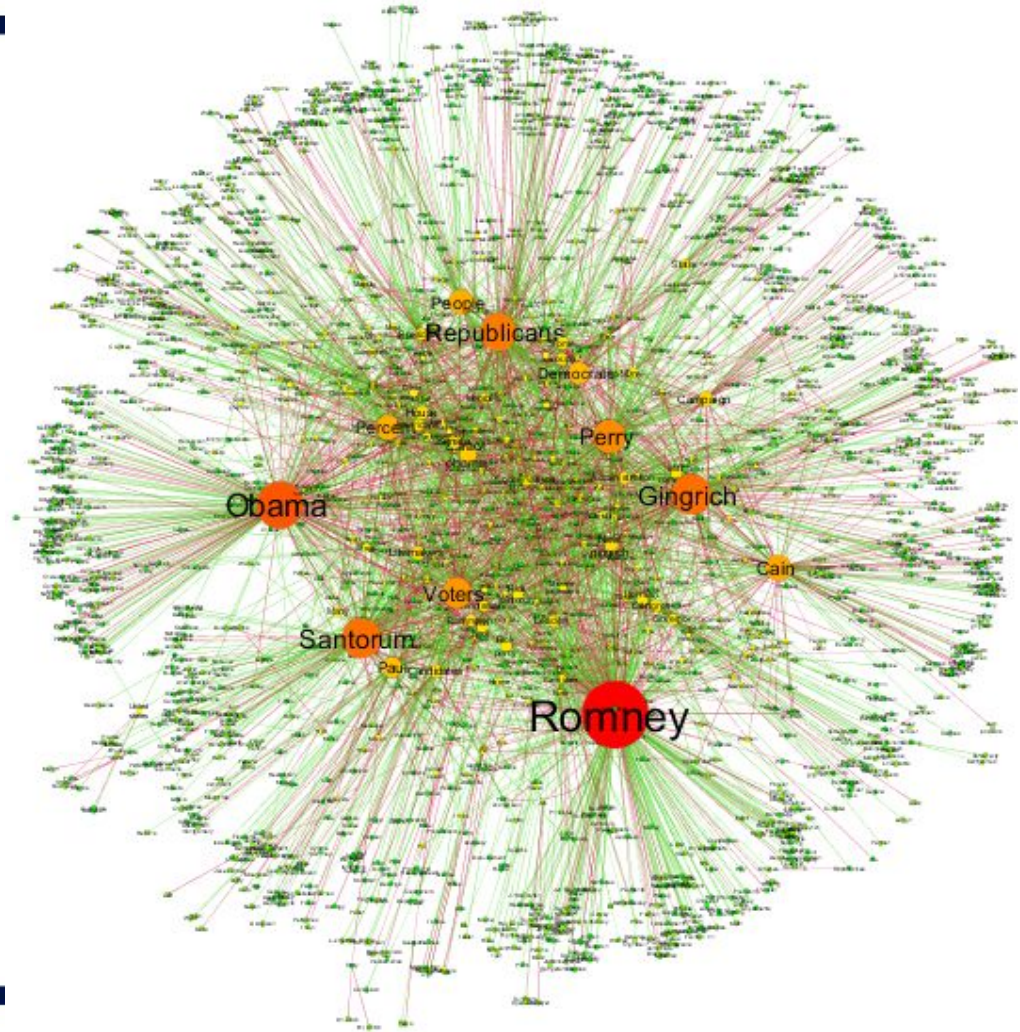


Buzzwords of past hype

Big Data (2013 hype)

Data Mining / Text Mining
(2003 hype)

Predictive Coding



Toolkits (they are all old!)

- WEKA (Waikato Environment for Knowledge Analysis)
- MALLET (Machine Learning for Language Toolkit)
- OpenNLP
- GATE (General Architecture for Text Engineering)
- SAS
- RapidMiner (formerly called Yet Another Learning Environment)
- SPSS Modeler (formerly called Clementine)
- InfiniteInsight (formerly KXEN)
- KNIME



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Since 2023

Since 2022

Since 2019

Custom range...

Sort by relevance

Sort by date

Any type

Review articles

include patents

include citations

Create alert

Grid-enabling natural language engineering by stealth

[B Hughes](#), [S Bird](#) - arXiv preprint cs/0304028, 2003 - arxiv.org

... Our model leverages existing lin0 guistic resource description and discovery mechanisms based on extended **Dublin Core** metadata. In addition, application design is flexible, allowing ...

☆ Save Cite Cited by 19 Related articles All 5 versions

[PDF] arxiv.org

[PDF] Tools and trends in corpora use for teaching and learning

[R Godwin-Jones](#) - 2001 - scholarspace.manoa.hawaii.edu

... The **Dublin Core** project began in 1995 to develop ... OLAC uses the core 15 elements of the **Dublin Core** and extends ... are GATE ("**General Architecture for Text Engineering**") which sets ...

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[PDF] hawaii.edu

KIM—a semantic platform for information extraction and retrieval

[B Popov](#), [A Kiryakov](#), [D Ognyanoff](#)... - Natural language ..., 2004 - cambridge.org

The KIM platform provides a novel Knowledge and Information Management framework and services for automatic semantic annotation, indexing, and retrieval of documents. It provides ...

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[PDF] proquest.com

Ontology-driven semantic digital library

[SA Noah](#), [NAR Alias](#), [NA Osman](#), [Z Abdullah](#)... - ... Technology: 6th Asia ..., 2010 - Springer

... An adaptation of the **Dublin core** metadata can be used to represent the semantic resources ... by employing the GATE (**General Architecture for Text Engineering**) engine toolkit [8]. The ...

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[PDF] academia.edu

Content enrichment with expressive document modelling to leverage the understanding of unstructured data

[G Sabaraj](#), [K Tejada](#), [E Gonzalez](#)... MATEC Web of ..., 2019 - matec-conferences.org

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Any time

Since 2023

Since 2022

Since 2019

Custom range...

Sort by relevance

Sort by date

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 include patents include citations Create alert

[PDF] OUC's participation in the 2012 INEX Book and Linked-Data Tracks

M Preminger, R Nordlie, D Massey... - ... cG2012 remains with ..., 2012 - [ilitia.cua.uam.mx](#)

... The choice this time fell on the **opennlp** package of the Apache project. The package was ... paper we try to build upon this, and look at **subject headings** extracted from the **MARC** data. ...

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[PDF] [uam.mx](#)

[HTML] CDAPubMed: a browser extension to retrieve EHR-based biomedical literature

[D Perez-Rey](#)... - [BMC medical ...](#), 2012 - [bmcmedinformdecismak ...](#)

... selected for CDAPubMed was the Medical **Subject Headings** (MeSH) thesaurus [28], ... , **OpenNLP** [32], extracting sentences and words (or tokens) from the free text content. **OpenNLP** is ...

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[HTML] [biomedcentral.com](#)

[HTML] A framework for exploring associations between biomedical terms in PubMed

[H Yang](#), [L Zhao](#), [Y Zhang](#), [H Ju](#), [D Wang](#), [Y Hu](#)... - [Oncotarget](#), 2017 - [ncbi.nlm.nih.gov](#)

... The text of PubMed were segmented into sentences by Apache **OpenNLP** first, and then terms of sentences were recognized by MGREP. After that two terms occurring in a common ...

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[HTML] [nih.gov](#)

Understanding Natural Language Metadata

[A Autayeu](#), [F Giunchiglia](#), [P Andrews](#) - 2010 - [eprints.biblio.unitn.it](#)

... It is a thesaurus of **subject headings** maintained by the US ... as the basic building blocks of the LC formulas. Any controlled ... We have chosen the NER algorithm from **OpenNLP** and we ...

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[PDF] [unitn.it](#)

Example uses

Optical Character Recognition

Husene er for det meste af træ. I bydelen omkring Sannesund er gaderne trange og krogede; bebyggelsen består af smaa træhuse omkring den store S. melkefabrik (kondenseret melk) m. fl. fabriker. Her ligger ogsaa toldboden, dampskibsbryggen. I den nye bydel langs Glommens (Sarpfossens) vestbred de store bygninger for Borregaards fabriker. S. er en af Norges ældste byer. Den hed oprindelig Borg og anlagdes af Olav den hel-

med elektricitet fra Hafslunds elektricitetsverk ved Sarpfossen. Foruden folkeskole og kommunal høiere almen-skole er der en teknisk aftenskole. To blade («Glommen» og «Sarpen»). Byen vælger én stortingsrepræsentant. Ved Smaalensbanen staar S. i forbindelse med Kra. (Se pl. Sarpsborg.) [Litt.: B. Christophersen, «S.s historie fra 1016» (1901); «Norges næringsliv. S. og omegn. Med indledning af N. S. Olsen» (1908).]

lassen — ② leave out, omit —
① omettre, oublier.
udeladelse — ① Aus-, Weg-
lassung f — ② omission — ③
omission f, oubli m.
udelukke — ① ausschliessen
— ② exclude, debar — ③ exclure,
retrancher; être incompatible avec.
udelukkelse — ① Ausschlies-
sen n, -schliessung f — ② exclu-

sion; expulsion — ③ exclusion f,
retranchement m.
udelukkende — ① ausschlies-
lich — ② exclusive; entirely,
wholly — ③ exclusif; entièrement,
tout.
uden — ① ohne, ausser; (ingen
u.) niemand als — ② without;
(ingen u.) none (nobody) but —
③ sans; (ingen u.) personne sinon;

(u. at) ogs. à moins que ne, à
moins de.
udenad — ① auswendig — ② by
heart — ③ par cœur; (efter hukom-
melsen) de mémoire.
udenbys — ① ausser der Stadt;
auswärts; auswärtig — ② out of
town; not resident in town — ③
(qui demeure) hors de la ville.
udenfor — ① ausser(halb);


draussen — ② outside, without;
out of — ③ hors (au, en dehors) de;
devant (la porte osv.); (au) dehors.
udenforstaaende — ② un-
betelligt — ③ outside(r), impartial
spectator — ④ étranger à, hors de
l'affaire; (de u.) ceux du dehors.
udenfra — ① von aussen —
② from without, from outside —
③ de dehors.

Shoffner, R. M. (1971). Some Implications of Automatic Recognition of Bibliographic Elements. *Journal of the American Society for Information Science*, 22(4), 275–282. <https://doi.org/10.1002/asi.4630220406>

Extracting metadata fields from digitized records

C:/Users/18503/Downloads/Altamaha%20Raft%20Festivals%20collection.pdf

Draw | Read aloud | Ask Bing AI | 2 of 4

 **GEORGIA SOUTHERN UNIVERSITY**
UNIVERSITY LIBRARIES
Henderson Library and Lane Library

ALTAMAHA RAFT FESTIVALS COLLECTION
FINDING AID

OVERVIEW OF COLLECTION

Title: Altamaha Raft Festivals Collection

Date: 1982

Extent: 1 box

Creator/Collector: Delma Eugene Presley and Norris Kemp Mabry, collectors

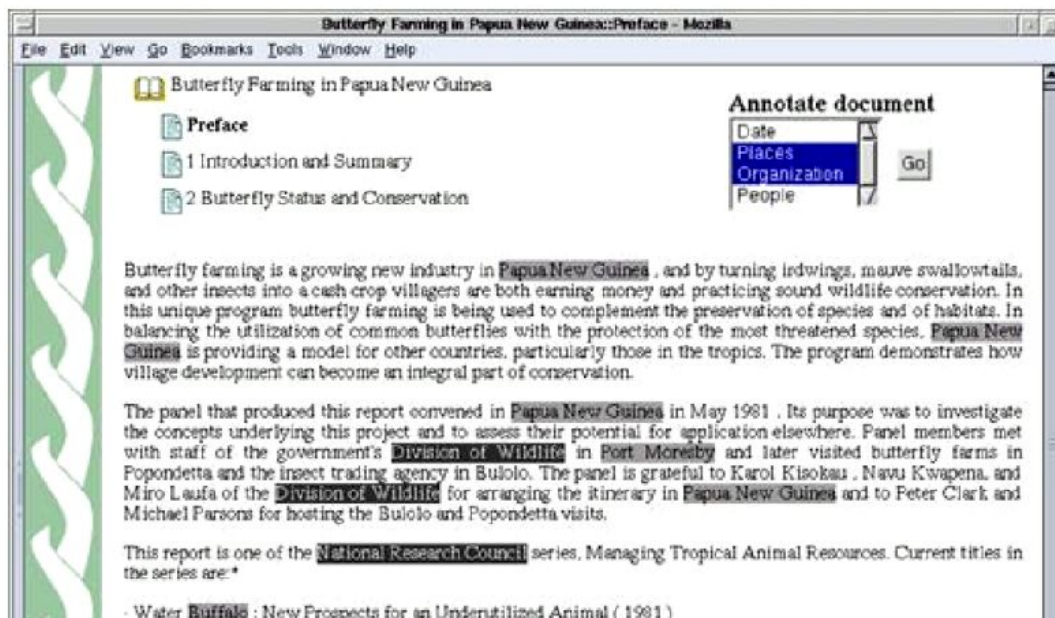
Language: English

Repository: Zach S. Henderson Library Special Collections, Georgia Southern University, Statesboro, GA. specolle@georgiasouthern.edu, 912-358-4331. library.georgiasouthern.edu.

Processing Note: Finding Aid revised in 2019.

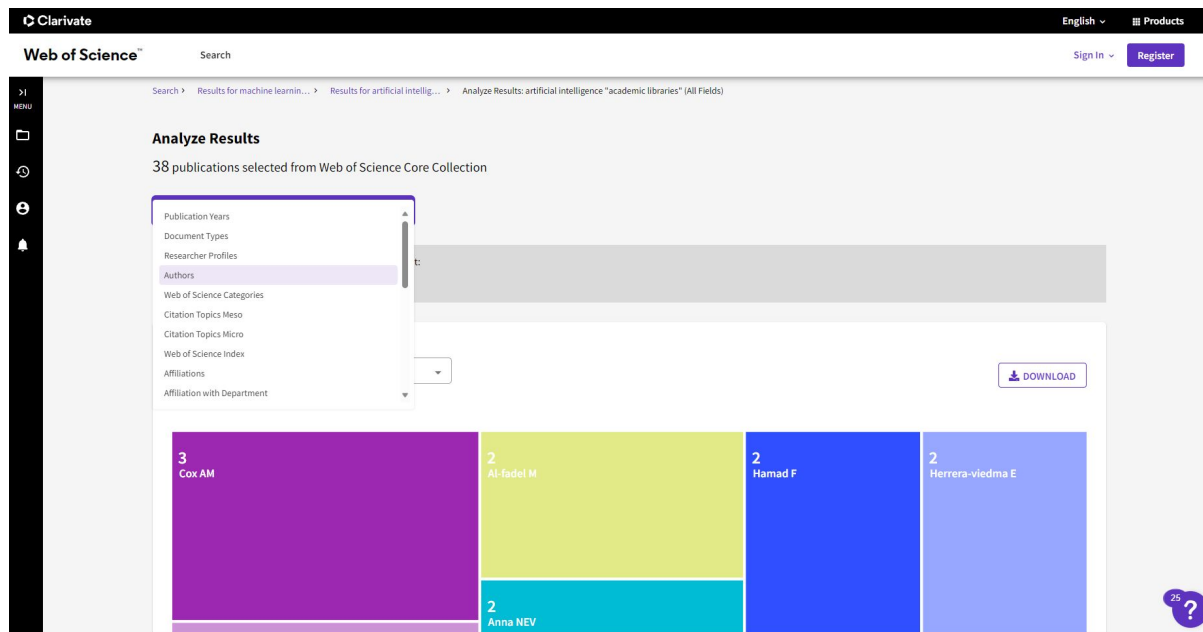
Shoffner, R. M. (1971). Some Implications of Automatic Recognition of Bibliographic Elements. *Journal of the American Society for Information Science*, 22(4), 275–282. <https://doi.org/10.1002/asi.4630220406>

Tag names of people, places, and organizations



Witten, I. H., Don, K. J., Dewsnip, M., & Tablan, V. (2004). Text mining in a digital library. *International Journal on Digital Libraries*, 4(1), 56–59.
<https://doi.org/10.1007/s00799-003-0066-4>

Entity ranking



Anne-Marie Vercoustre, Jovan Pehcevski, James A. Thom. Using Wikipedia Categories and Links in Entity Ranking. Proceedings of the sixth International Workshop of the Initiative for the Evaluation of XML Retrieval (INEX 2007), Dec 2007, Schloss Dagstuhl, Germany. pp. 321-335, ff10.1007/978-3-540-85902-4_28ff. ffinria-00192489.

Classify by readability (hard vs easy to read)

The screenshot shows the Microsoft Word interface. The ribbon includes File, Home, Insert, Draw, Design, Layout, References, Mailings, Review, View, Help, and Acrobat. The Home ribbon is active, showing options for Clipboard, Font, Paragraph, Styles, Editing, and Adobe Acrobat. The document text is: "Machine learning seems to be newly everywhere. It's no newly useful. Imagine an automated cataloging program takes a week to run. Increased processing speed is a sub history of libraries and artificial intelligence. First, teasing libraries. High quality results and concrete applications c explored and published for decades. Over time, faster pr library and metadata work contributes to machine learn". A "Readability Statistics" dialog box is open, displaying the following data:

Readability Statistics	
Counts	
Words	101
Characters	577
Paragraphs	1
Sentences	9
Averages	
Sentences per Paragraph	9.0
Words per Sentence	11.2
Characters per Word	5.5
Readability	
Flesch Reading Ease	39.6
Flesch-Kincaid Grade Level	10.5
Passive Sentences	11.1%

An "Editor" panel is also visible on the right, showing various settings:

Setting	Value
Formality	2
Inclusiveness	<input checked="" type="checkbox"/>
Punctuation Conventions	1
Resume	<input checked="" type="checkbox"/>
Sensitive Geopolitical References	<input checked="" type="checkbox"/>
Vocabulary	<input checked="" type="checkbox"/>

Leroy, G., Miller, T., Rosembat, G., & Browne, A. (2008). A balanced approach to health information evaluation: A vocabulary-based naïve Bayes classifier and readability formulas. *Journal of the American Society for Information Science & Technology*, 59(9), 1409–1419. <https://doi.org/10.1002/asi.20837>

Locate and tag all citations in a piece of text

Thaler v. Vidal

United States Court of Appeals, Federal Circuit | August 5, 2022 | 43 F.4th 1207 (Approx. 9 pages)

Document

Filings (14)

Negative Treatment (0)

History (3)

Citing References (96) ▾

Table of Authorities

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human entities. That non-humans may iminge patents does not tell us anything about whether non-humans may also be inventors of patents. The question before us inevitably leads back to the Patent Act's definition of "inventor," which uses the word "individual" – and does not use "whoever."⁵ Furthermore, as we noted already, the Dictionary Act establishes that Congress uses "whoever" as a much broader term than "individual." See 1 U.S.C. § 1.

Second, Thaler contends that AI software programs must qualify as inventors because otherwise patentability would depend on "the manner in which the invention was made," in contravention of 35 U.S.C. § 103. Section 103 is not about inventorship. Instead, it provides, in relevant part, that inventions may still be nonobvious even if they are discovered during "routine" testing or experimentation. See *Honeywell Int'l Inc. v. Mexichem Amanco Holding S.A. de C.V.*, 865 F.3d 1348, 1356 (Fed. Cir. 2017); see also *Graham v. John Deere Co.*, 383 U.S. 1, 15, 86 S.Ct. 684, 15 L.Ed.2d 545 (1966) (explaining that second sentence of § 103 was intended to clarify that "flash of creative genius" is unnecessary for patentability). This statutory provision relates to *how* an invention is made and does not trump a provision that specifically addresses *who* may be an inventor.

Third, Thaler emphasizes that the term "inventor" must be interpreted with attention to the "context in which that language is used[] and the broader context of the statute as a whole." *Yates v. United States*, 574 U.S. 528, 537, 135 S.Ct. 1074, 191 L.Ed.2d 64 (2015) (internal quotation marks omitted). We have undertaken precisely this task. For the reasons explained above, the Patent Act, when considered in its entirety, confirms that "inventors" must be human beings.

B

Our holding today that an "inventor" must be a human being is supported by our own precedent. See *Univ. of Utah v. Max-Planck-*

Arguello, J., Callan, J., & Shulman, S. (2008). Recognizing Citations in Public Comments. *Journal of Information Technology & Politics*, 5(1), 49–71. <https://doi.org/10.1080/19331680802153683>

Recognizing author's emotions at time of writing



Facebook said it conducted the study to gauge users' response to content

Facebook is facing criticism after it emerged it had conducted a psychology experiment on nearly 700,000 users without their knowledge.

The test saw Facebook "manipulate" news feeds to control which emotional expressions the users were exposed to.

The research was done in collaboration with two US universities to gauge if "exposure to emotions led people to change their own posting behaviours".

Facebook said there was "no unnecessary collection of people's data".

"None of the data used was associated with a specific person's Facebook account," the social networking giant added.

Cornell University and the University of California at San Francisco were involved in the study.

Boiy, E., & Moens, M.-F. (2009). A machine learning approach to sentiment analysis in multilingual Web texts. *Information Retrieval Journal*, 12(5), 526–558. <https://doi.org/10.1007/s10791-008-9070-z>

Investopedia

INVESTING

SIMULATOR

BANKING

PERSONAL FINANCE

NEI

Trump's 2016 presidential campaign.

- Although Cambridge Analytica closed its doors in 2018, several of the company's key personnel have since founded or moved to similar companies.

Understanding Cambridge Analytica

Founded in 2013, Cambridge Analytica was the offshoot of a British company called SCL Group (formerly Strategic Communication Laboratories) and was set up as a U.S. [subsidiary company](#) of SCL. During its early days, it targeted Facebook and other [social media platforms](#) to run advertisements based on user profiles, including ads for political campaigns.^[3]

In 2018, the company became the subject of widespread criticism following reports that it purchased data from a British academic concerning the personal psychological profile of roughly 270,000 Facebook users.^{[4] [5]} Due to the terms and conditions of the [Facebook platform](#) at that time, the company was able to indirectly access data from the Facebook friends of those users.^[6] In this

Recognizing emotions based on cell phone use



Burns, M. N., Begale, M., Duffecy, J., Gergle, D., Karr, C. J., Giangrande, E., & Mohr, D. C. (2011). Harnessing Context Sensing to Develop a Mobile Intervention for Depression. *Journal of Medical Internet Research*, 13(3), 11. <https://doi.org/10.2196/jmir.1838>

And many more...



**GEORGIA
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Contributions of Libraries to Machine Learning

Lots of Words



Ontologies

CLASSIFICATION ADOPTÉE.

		CLASSES.	Pag.
PLANTES PHANÉROGAMES pourvues de Cotylédons	<i>Dicotylédonées</i>	Dialypétales hypogynes.....	2
		— périgynes.....	81
		Gamopétales hypogynes.....	175
		— périgynes.....	241
		Apétales non amentacées....	299
	— amentacées.....	331	
		Gymnospermes ou Conifères..	353
	<i>Monocotylédonées</i>	Pétaloïdes supérovariées.....	367
		— inférovariées.....	382
		Glumacées exalbuminées.....	397
— albuminées.....		404	

Provenance

WordNet Search - 3.1

[- WordNet home page](#) - [Glossary](#) - [Help](#)

Word to search for:

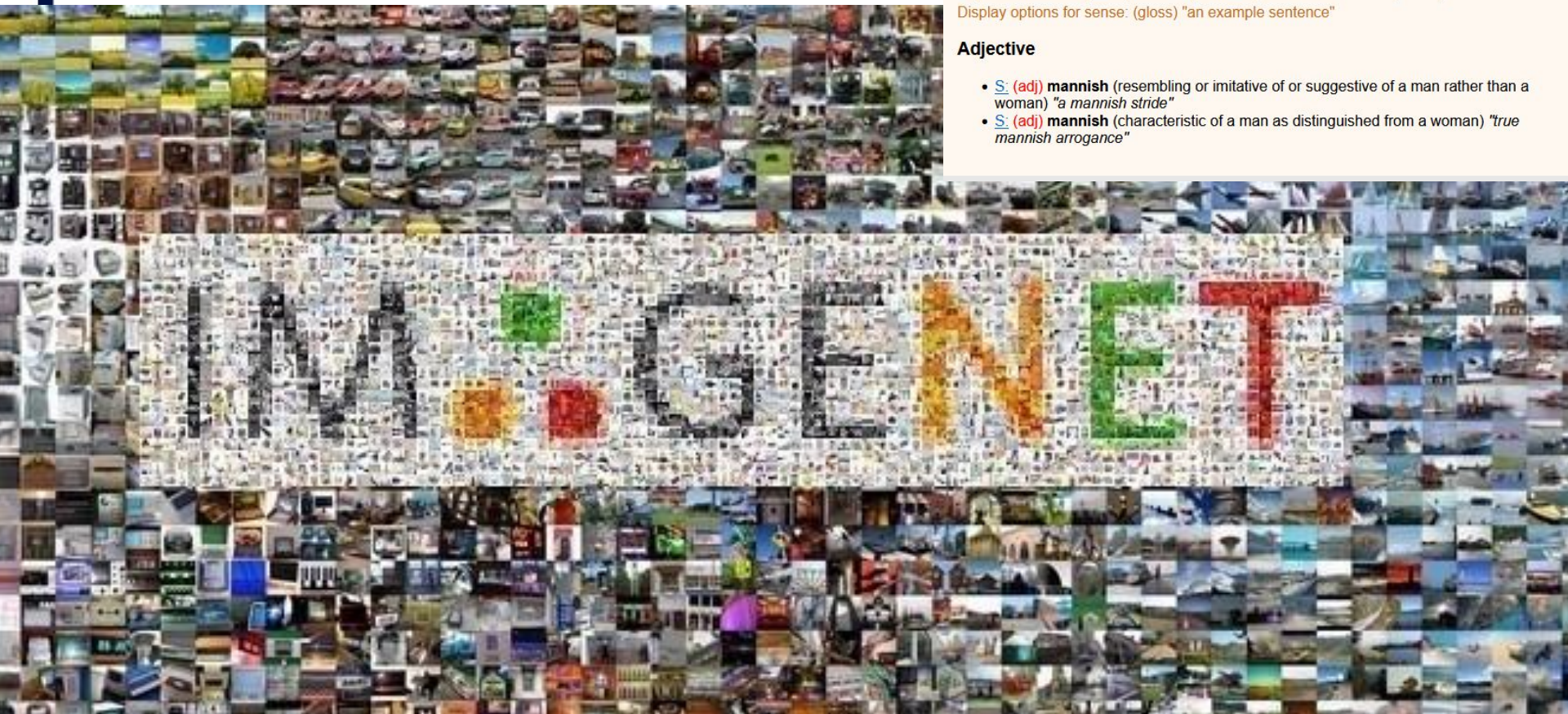
Display Options:

Key: "S:" = Show Synset (semantic) relations, "W:" = Show Word (lexical) relations

Display options for sense: (gloss) "an example sentence"

Adjective

- **S: (adj) mannish** (resembling or imitative of or suggestive of a man rather than a woman) *"a mannish stride"*
- **S: (adj) mannish** (characteristic of a man as distinguished from a woman) *"true mannish arrogance"*



Artificial intelligence history, and libraries:



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History and Legacy of Library Contributions to machine learning



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Wilhelmina Randtke, Head of Libraries Technologies and Systems, Georgia Southern University Libraries
NASIG Autumn, October 17, 2023, Virtual