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Automatically Estimating the Trustworthiness of Wikipedia Articles

Luca-Philipp Grumbach, 1. April 2025

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Einleitung

Problemstellung

- Wikipedia: Nutzung für Bildung, Arbeit und persönliche Entscheidungen
- Beiträge möglich ohne Registrierung

➔ Vertrauenswürdigkeit von Wikipedia-Artikeln ist wichtig, aber nicht garantiert

➔ manuelle Methoden zur Überprüfung der Vertrauenswürdigkeit von Artikeln

- Problem:
  - fast 7 Millionen Artikel (English Wikipedia, Stand: 01.04.2025)
  - über 1 Milliarde Revisionen (English Wikipedia, Stand: 01.04.2025)

➔ Lösungsansatz: Entwicklung automatischer Verfahren zur Unterstützung manueller Methoden

Struktur von Wikipedia

#	Wikipedia name in English	Wikipedia name in native language	Language	Script (ISO 15924 code)	WP code	Articles	Active users
1	English Wikipedia	*English Wikipedia*	English	Latn	en	6,974,700	125,074
2	French Wikipedia	*Wikipédia en français*	French	Latn	fr	2,674,493	18,702
3	German Wikipedia	*Deutschsprachige Wikipedia*	German	Latn	de	3,001,767	17,893
4	Spanish Wikipedia	*Wikipedia en español*	Spanish	Latn	es	2,021,541	14,520
5	Japanese Wikipedia	ウィキペディア日本語版 (*Wikipedia nihongo-ban*)	Japanese	Jpan	ja	1,457,145	12,840

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Namespaces			
Subject namespaces		Talk namespaces	
0	(Main/Article)	Talk	1
2	User	User talk	3
4	Wikipedia	Wikipedia talk	5
6	File	File talk	7
8	MediaWiki	MediaWiki talk	9
10	Template	Template talk	11
12	Help	Help talk	13
14	Category	Category talk	15
100	Portal	Portal talk	101
118	Draft	Draft talk	119
126	MOS	MOS talk	127
710	TimedText	TimedText talk	711
828	Module	Module talk	829
1728	Event	Event talk	1729

Templates

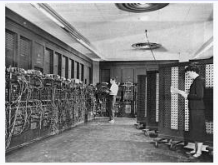
Template:History of computing

14 languages

Template Talk Tools

From Wikipedia, the free encyclopedia

History of computing



Hardware

Hardware 1960s to present

Software

Software · Software configuration management · Unix · Free software and open-source software

Computer science

Artificial intelligence · Compiler construction · Early computer science · Operating systems · Programming languages · Prominent pioneers · Software engineering

Modern concepts

General-purpose CPUs · Graphical user interface · Internet · Laptops · Personal computers · Video games · World Wide Web · Cloud · Quantum

By country

Bulgaria · Eastern Bloc · Poland · Romania · South America · Soviet Union · Yugoslavia

Timeline of computing

before 1950 · 1950–1979 · 1980–1989 · 1990–1999 · 2000–2009 · 2010–2019 · 2020–present · *more timelines ...*

Glossary of computer science

Category

v · t · e

History of computer science

18 languages

Article Talk Read Edit View history Tools

From Wikipedia, the free encyclopedia

The **history of computer science** began long before the modern discipline of computer science, usually appearing in forms like mathematics or physics. Developments in previous centuries alluded to the discipline that we now know as computer science.[1] This progression, from mechanical inventions and mathematical theories towards modern computer concepts and machines, led to the development of a major academic field, massive technological advancement across the Western world, and the basis of massive worldwide trade and culture.[2]

Prehistory [edit]

John Napier (1550–1617), the inventor of logarithms

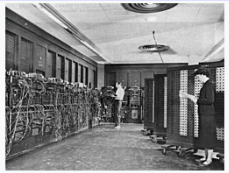
The earliest known tool for use in computation was the abacus, developed in the period between 2700 and 2300 BCE in Sumer.[3] The Sumerians' abacus consisted of a table of successive columns which delimited the successive orders of magnitude of their sexagesimal number system.[4]:11 Its original style of usage was by lines drawn in sand with pebbles. Abaci of a more modern design are still used as calculation tools today, such as the Chinese abacus.[5]

In the 5th century BC in ancient India, the grammarian Pāṇini formulated the grammar of Sanskrit in 3959 rules known as the Ashtadhyayi which was highly systematized and technical. Panini used metarules, transformations and recursions.[6]

The Antikythera mechanism is believed to be an early mechanical analog computer.[7] It was designed to calculate astronomical positions. It was discovered in 1901 in the Antikythera wreck off the Greek island of Antikythera, between Kythera and Crete, and has been dated to *circa* 100 BC.[7]

Mechanical analog computer devices appeared again a thousand years later in the medieval Islamic world. They were developed by Muslim astronomers, such as the mechanical geared astrolabe by Abū Rayhān al-Bīrūnī,[8] and the torquetum by Jabir ibn Aflah.[9] According to Simon Singh, Muslim mathematicians also made important advances in cryptography, such as the development of cryptanalysis and frequency analysis by Alkindus.[10][11] Programmable machines were also invented by Muslim engineers, such as the automatic flute player by the Banū Mūsā brothers.[12]

History of computing



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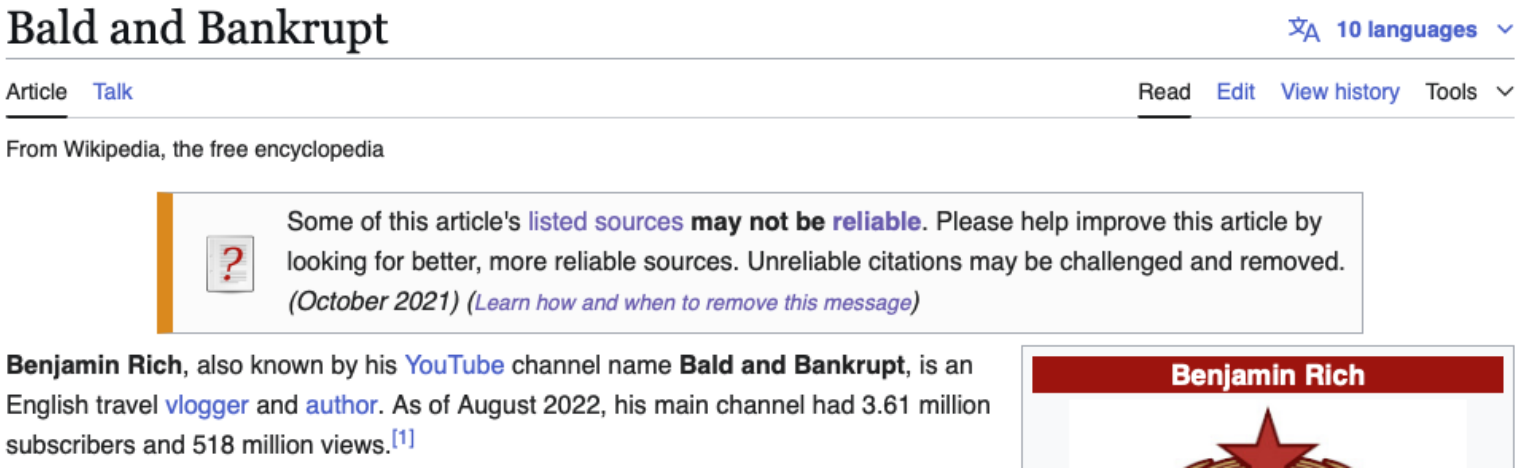
Vorgehensweise

Wie kann man Vertrauenswürdigkeit einschätzen?

Reliability Maintenance Templates

- Verwaltet von der Gruppe “WikiProject Reliability”
- Warnen vor Problemen mit der Zuverlässigkeit



Bald and Bankrupt

10 languages

Article Talk Read Edit View history Tools

From Wikipedia, the free encyclopedia

Some of this article's listed sources **may not be reliable**. Please help improve this article by looking for better, more reliable sources. Unreliable citations may be challenged and removed. *(October 2021) (Learn how and when to remove this message)*

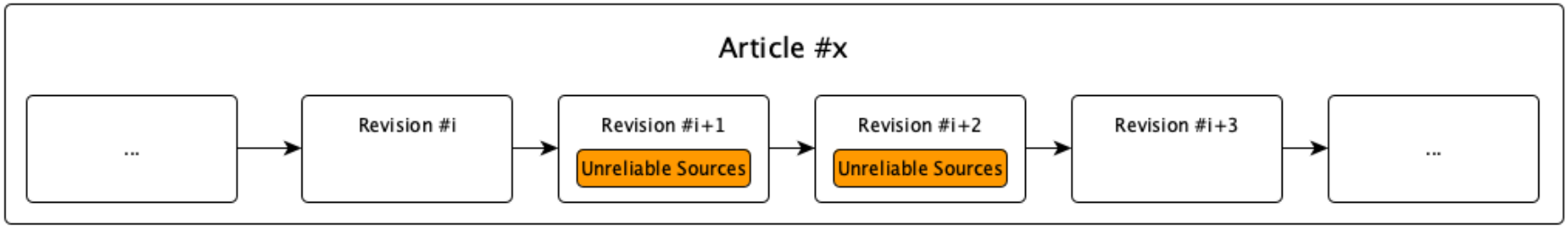
Benjamin Rich, also known by his YouTube channel name **Bald and Bankrupt**, is an English travel vlogger and author. As of August 2022, his main channel had 3.61 million subscribers and 518 million views.[1]

Benjamin Rich

Grundprinzip

Template = Reliability Maintenance Template

- Revision erhält Template
  - ➔ Problem mit der Zuverlässigkeit wurde erkannt
- Template wird aus Revision entfernt
  - ➔ Zuvor erkanntes Problem mit der Zuverlässigkeit liegt nicht (mehr) vor



Grundprinzip

Template = Reliability Maintenance Template

- Kann man mit Hilfe der Templates die Vertrauenswürdigkeit von neuen Revisionen einschätzen?

- Wikipedia Guidelines: alle Informationen belegbar
  - ➔ Vertrauenswürdigkeit eines Artikels ist abhängig von referenzierten Quellen
- Idee:
  - Vertrauenswürdigkeit externer Quellen einschätzen (mit Templates)
  - Vertrauenswürdigkeit neuer Revisionen anhand referenzierter externer Quellen einschätzen

https://en.wikipedia.org/wiki/Wikipedia:Verifiability

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Einschätzung externer Quellen

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- Auswahl eines Quellen-bezogenen Templates (zBsp. „Unreliable Sources“, „Dubious“)
- Einschätzung: Häufigkeit der Quellenreferenz beim Hinzufügen/Entfernen des Templates

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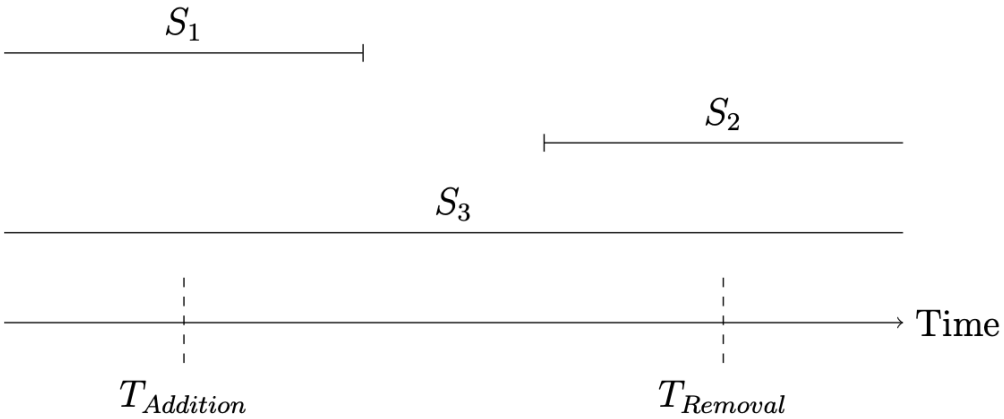

Figure 4.1: Timeline illustrating the time spans for sources S_1, S_2, S_3 relative to the events $T_{Addition}$ and $T_{Removal}$.

Einschätzung externer Quellen

Source	$P(T_{Addition})$	$P(T_{Removal})$	Occurrences
archive.org	0.1515	0.8485	931
google.com	0.2627	0.7373	571
youtube.com	0.5674	0.4326	527
imdb.com	0.6893	0.3107	338
nytimes.com	0.2862	0.7138	269
facebook.com	0.6653	0.3347	245
twitter.com	0.6000	0.4000	215
wikipedia.org	0.7011	0.2989	184
theguardian.com	0.1548	0.8452	168
wordpress.com	0.5897	0.4103	156

Table 4.1: Top 10 sources with their probabilities and occurrences for the *Unreliable sources* template

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Einschätzung von Revisionen

Einschätzung von Revisionen

- Basierend auf Vertrauenswürdigkeit aller referenzierten externen Quellen
- gewichteter Durchschnitt
- Gewicht abhängig von der Häufigkeit der Quelle
  - höheres Vorkommen einer Quelle -> Einschätzung anhand mehr Datenpunkten -> größeres Vertrauen in die Genauigkeit der Einschätzung

Revision ID	$P(T_{Addition})$	$P(T_{Removal})$
955423887	0.5000	0.5000
986192126	0.2353	0.7647
1063325745	0.7011	0.2989

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Ergebnisse

Durchführung

- Parsen des kompletten enwiki-Datensatzes (Sep. 2022)
- Extraktion von Revisionspaaren
- Aufteilung ”Training”- und “Test”-Datensatz (80/20 split)
- Quellen werden mit Hilfe des Trainings-Datensatzes eingeschätzt
- Revisionen des Test-Datensatzes werden eingeschätzt und mit Labels verglichen
  - Labels = (1.0, 0.0) oder (0.0, 1.0) für “Template hinzugefügt” / “Template entfernt”

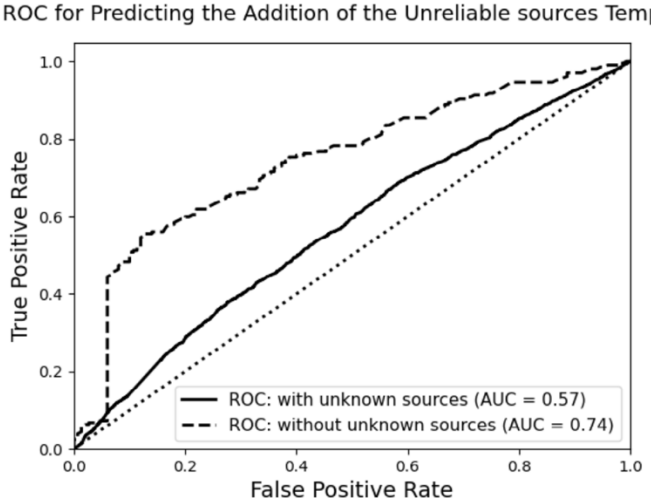


Figure 5.2: ROC curves for the prediction of an *Unreliable sources* template addition

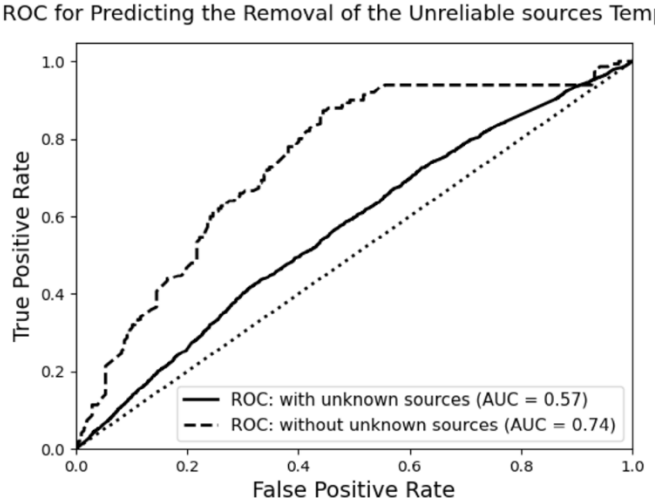


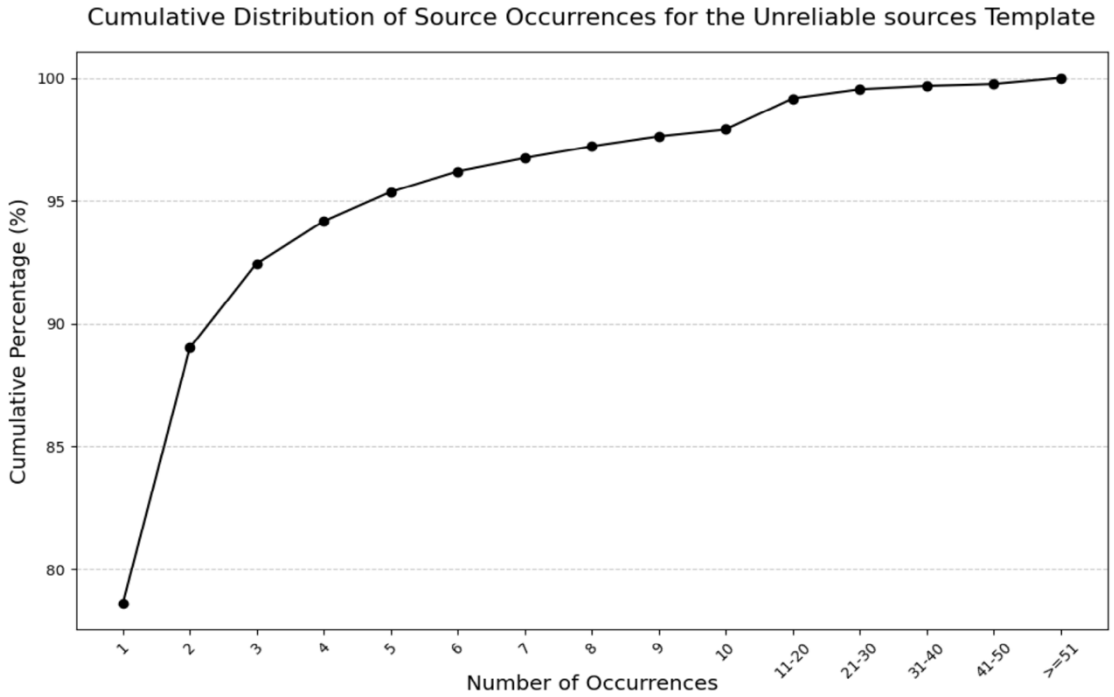
Figure 5.3: ROC curves for the prediction of an *Unreliable sources* template removal

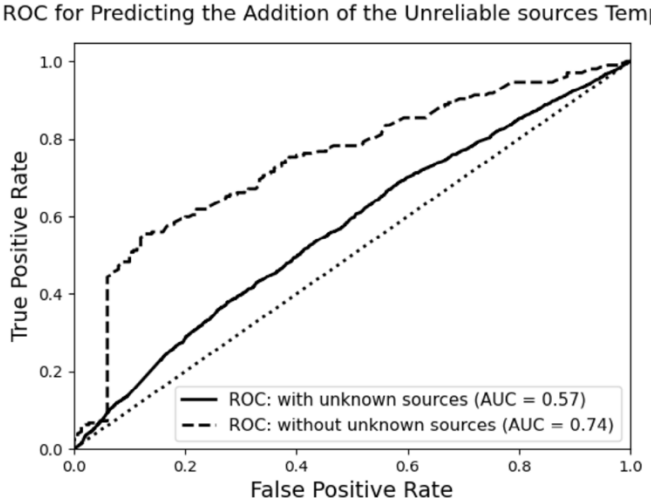
Fehleranalyse

- Template Identifikation & vereinfachtes Modell
  - Welche Teile des Artikels werden kritisiert?
  - Welche Quellen sind betroffen?
- Defizite der Daten
  - 88% der Revisionen im “Unreliable Sources” Test-Datensatz referenzieren eine Quelle ohne vorherige Einschätzung
  - Von den 88% haben im Durchschnitt 49% der referenzierten Quellen keine Einschätzung
  - (Dubious: 92% - 44%)

Fehleranalyse

- Einschätzungen externer Quellen basieren meist auf wenigen Datenpunkten (Revisionspaaren)





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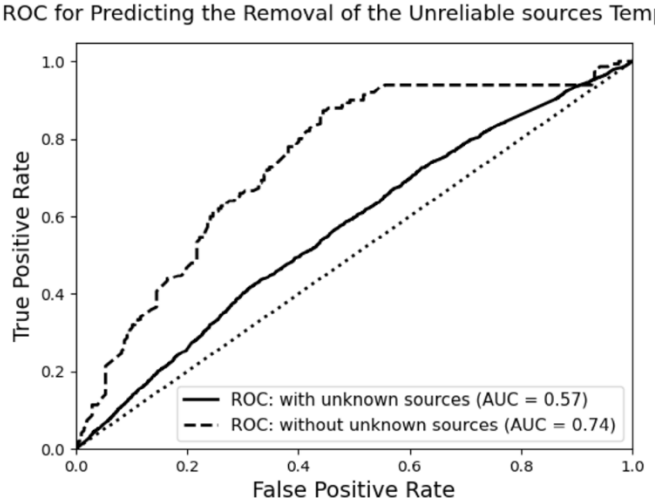

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Vielen Dank für Ihre Aufmerksamkeit!

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