



Web Search: The Next Generation



Christopher
Akiki



Sebastian
Bischoff



Niklas
Deckers



Lukas
Gienapp



Wolfgang
Kircheis



Martin
Potthast



**TECHNISCHE
UNIVERSITÄT
DRESDEN**



UNIVERSITÄT
LEIPZIG

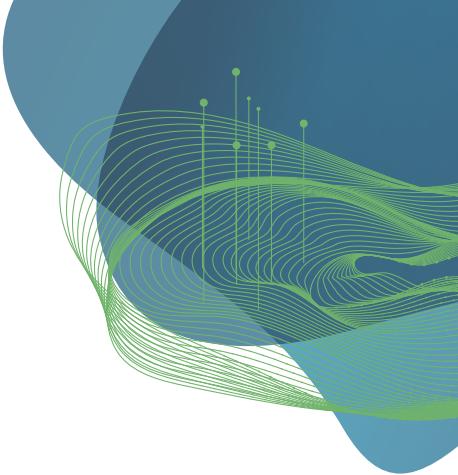
GEFÖRDERT VOM



Bundesministerium
für Bildung
und Forschung



SACHSEN
Diese Maßnahme wird gefördert durch die Bundesregierung aufgrund eines Beschlusses des Deutschen Bundestages.
Diese Maßnahme wird mitfinanziert durch Steuermittel auf der Grundlage des von den Abgeordneten des Sächsischen Landtags beschlossenen Haushaltes.



From Web Search to AI Assistants

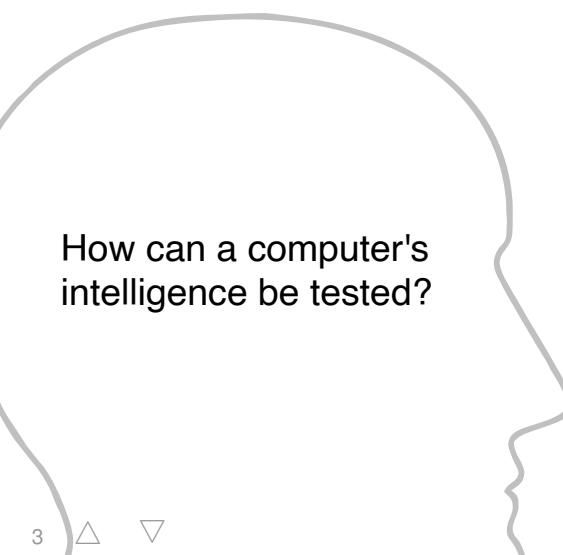
Web Search in a Nutshell

- ❑ A vague request.

Expression of a complex information need: a question

- ❑ Billions of documents.

Text, images, audio files, videos, ...



How can a computer's
intelligence be tested?



Web Search in a Nutshell

- ❑ A vague request.

Expression of a complex information need: a question, or just a few keywords.

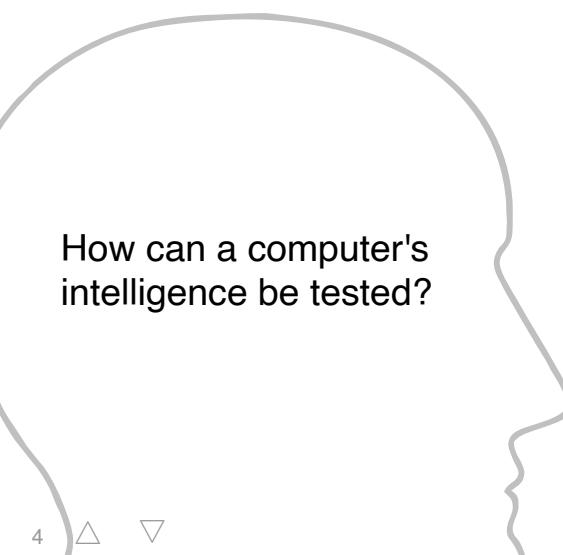
- ❑ Billions of documents.

Text, images, audio files, videos, ...

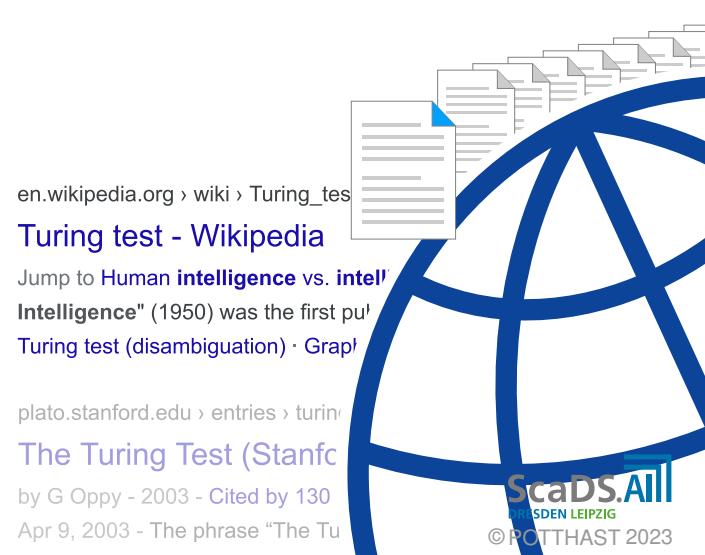
- ❑ High class imbalance.

Only a tiny fraction of all documents are relevant to the request.

- Retrieve relevant documents in milliseconds.



Computer
Intelligence
Test

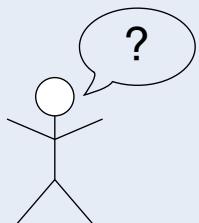


Web Search Architecture



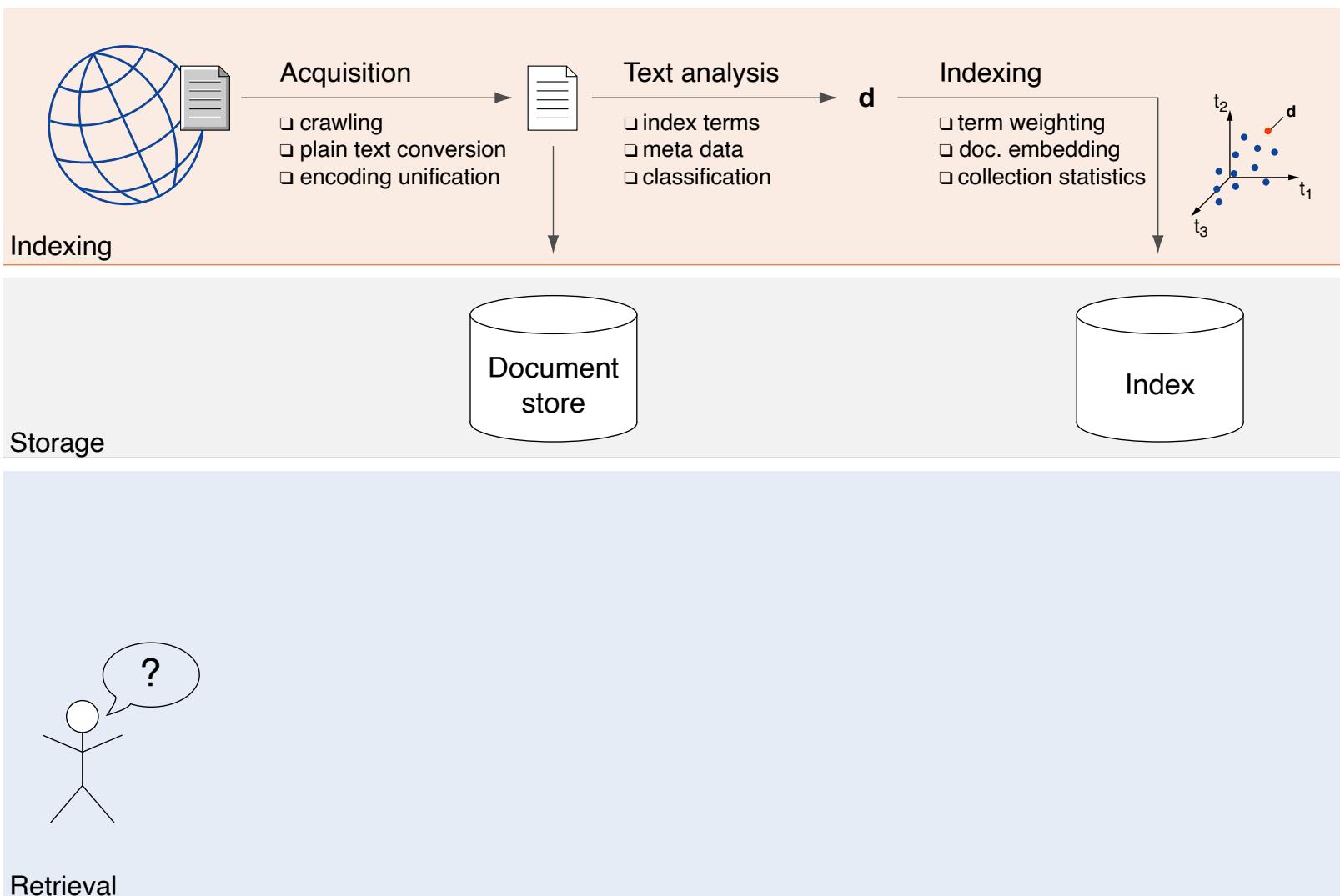
Indexing

Storage

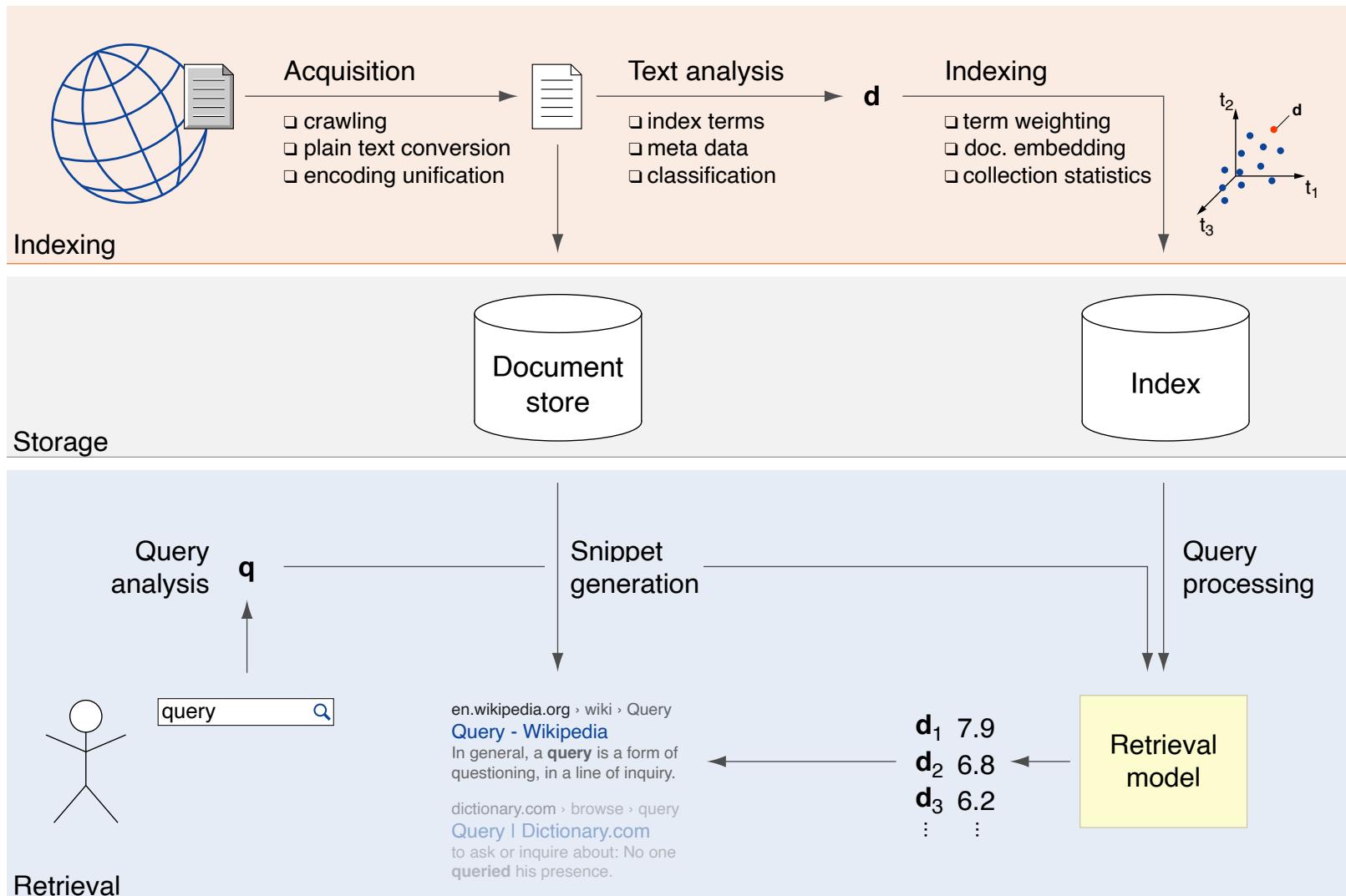


Retrieval

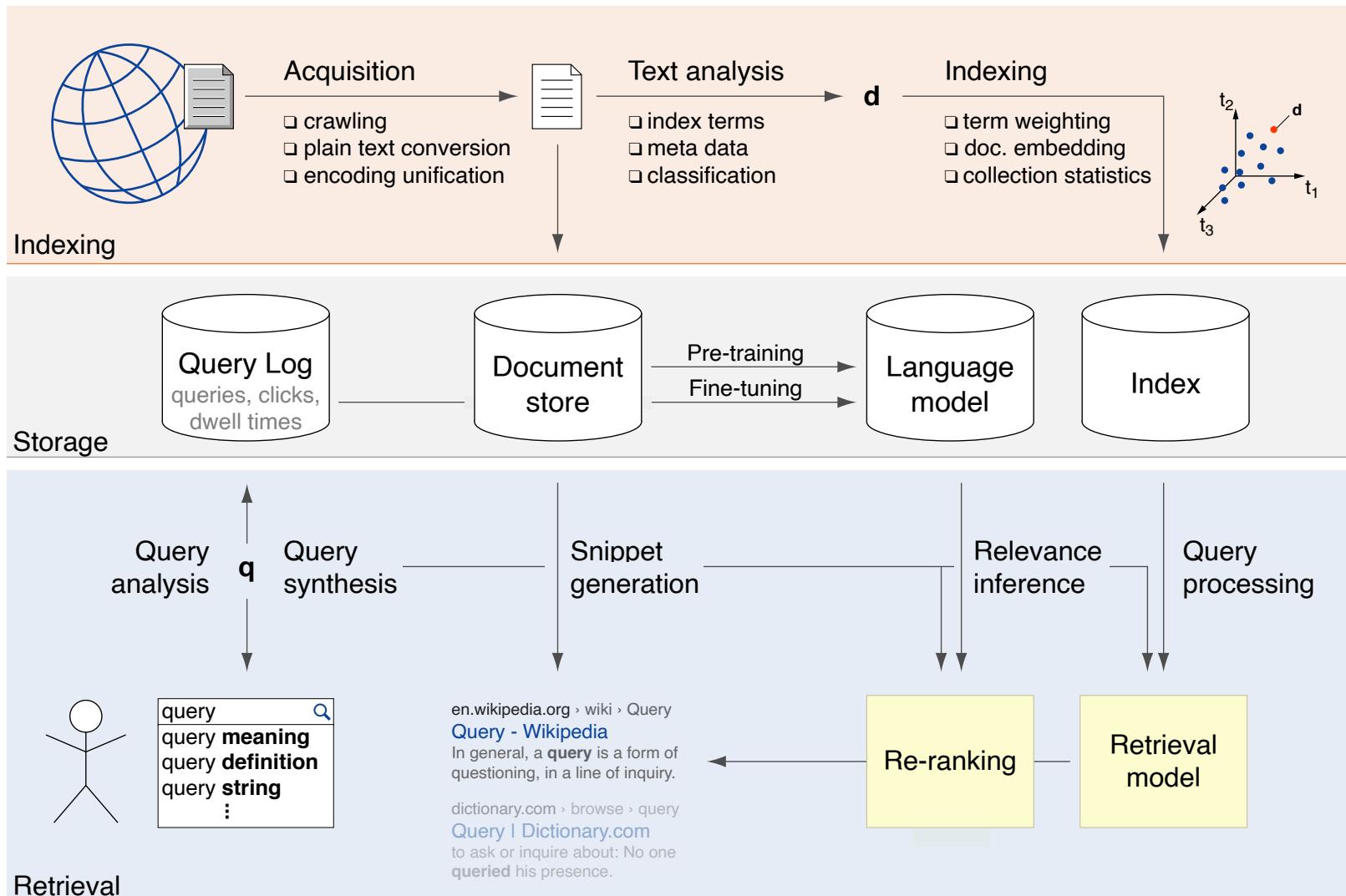
Web Search Architecture



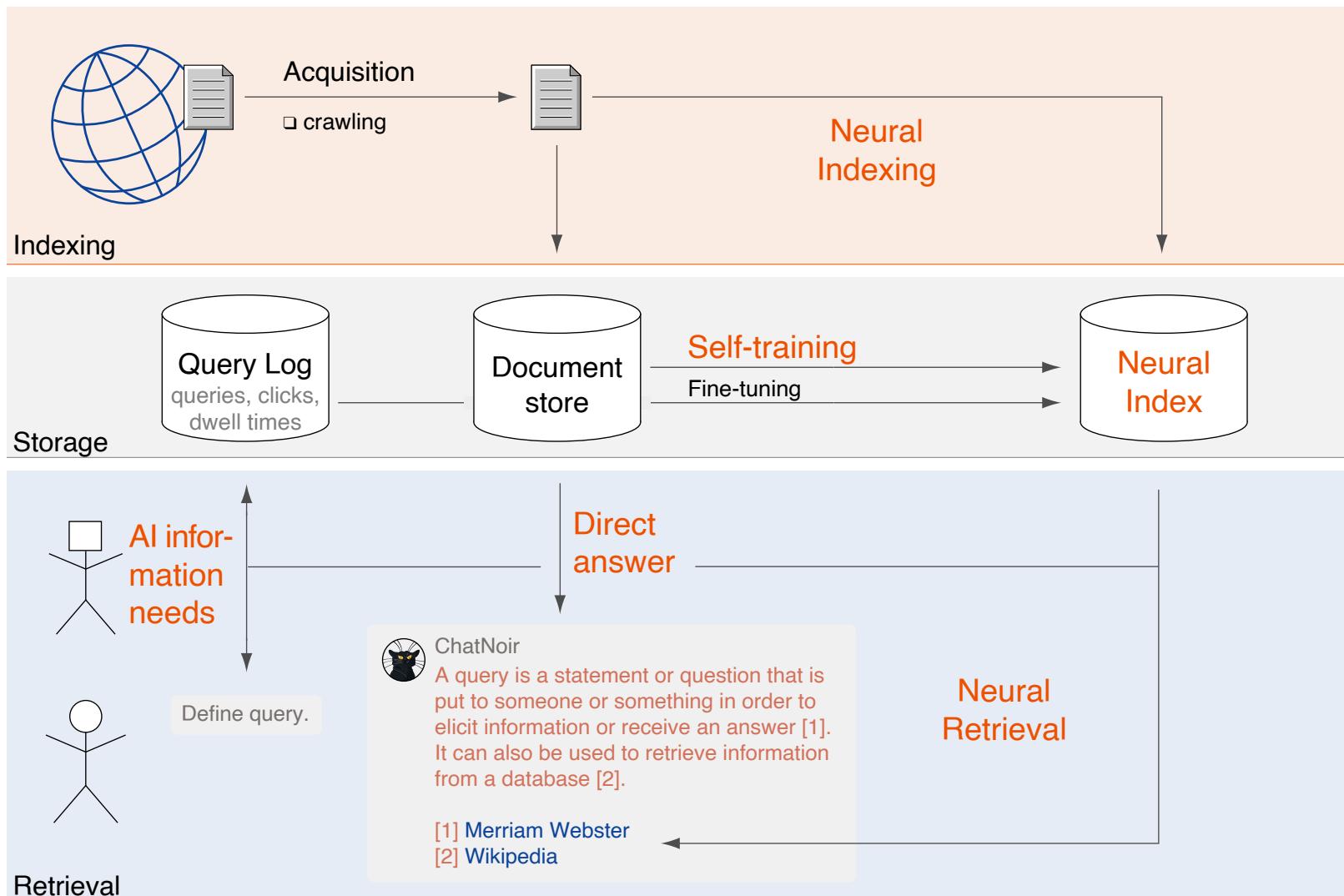
Web Search Architecture

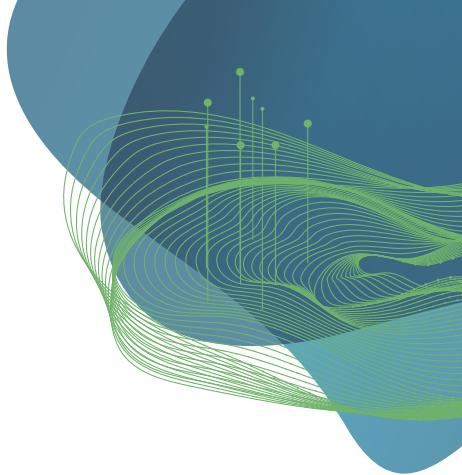


Web Search Architecture



Web Search Architecture: The Next Generation





The Infinite Index

The Infinite Index

Query 1:

Golden treehouse in lush forest with big glass window and intricate woodwork.



The Infinite Index

Query 1:

Golden treehouse in lush forest with big glass window and intricate woodwork.



Query 2:

Big treehouse in rain forest with two floors, green roof, and spiral staircase.



The Infinite Index

Query 1:

Golden treehouse in lush forest with big glass window and intricate woodwork.



Query 2:

Big treehouse in rain forest with two floors, green roof, and spiral staircase.



The Infinite Index

Query 1:

Golden treehouse in lush forest with big glass window and intricate woodwork.



Query 2:

Big treehouse in rain forest with two floors, green roof, and spiral staircase.



The Infinite Index

Query 1:

Golden treehouse in lush forest with big glass window and intricate woodwork.



Query 2:

Big treehouse in rain forest with two floors, green roof, and spiral staircase.



The Infinite Index

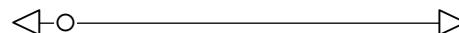
Query 1:

Golden treehouse in lush forest with big glass window and intricate woodwork.



Query 2:

Big treehouse in rain forest with two floors, green roof, and spiral staircase.



The Infinite Index

Query 1:

Golden treehouse in lush forest with big glass window and intricate woodwork.



Query 2:

Big treehouse in rain forest with two floors, green roof, and spiral staircase.



The Infinite Index

Query 1:

Golden treehouse in lush forest with big glass window and intricate woodwork.



Query 2:

Big treehouse in rain forest with two floors, green roof, and spiral staircase.



The Infinite Index

Query 1:

Golden treehouse in lush forest with big glass window and intricate woodwork.



Query 2:

Big treehouse in rain forest with two floors, green roof, and spiral staircase.



The Infinite Index

Query 1:

Golden treehouse in lush forest with big glass window and intricate woodwork.



Query 2:

Big treehouse in rain forest with two floors, green roof, and spiral staircase.



The Infinite Index

Query 1:

Golden treehouse in lush forest with big glass window and intricate woodwork.



Query 2:

Big treehouse in rain forest with two floors, green roof, and spiral staircase.



The Infinite Index

Query 1:

Golden treehouse in lush forest with big glass window and intricate woodwork.



Query 2:

Big treehouse in rain forest with two floors, green roof, and spiral staircase.



The Infinite Index

Query 1:

Golden treehouse in lush forest with big glass window and intricate woodwork.



Query 2:

Big treehouse in rain forest with two floors, green roof, and spiral staircase.



The Infinite Index

Query 1:

Golden treehouse in lush forest with big glass window and intricate woodwork.



Query 2:

Big treehouse in rain forest with two floors, green roof, and spiral staircase.



The Infinite Index

Query 1:

Golden treehouse in lush forest with big glass window and intricate woodwork.



Query 2:

Big treehouse in rain forest with two floors, green roof, and spiral staircase.



The Infinite Index

Query 1:

Golden treehouse in lush forest with big glass window and intricate woodwork.



Query 2:

Big treehouse in rain forest with two floors, green roof, and spiral staircase.



The Infinite Index

Query 1:

Golden treehouse in lush forest with big glass window and intricate woodwork.



Query 2:

Big treehouse in rain forest with two floors, green roof, and spiral staircase.



The Infinite Index

Query 1:

Golden treehouse in lush forest with big glass window and intricate woodwork.



Query 2:

Big treehouse in rain forest with two floors, green roof, and spiral staircase.



The Infinite Index

Query 1:

Golden treehouse in lush forest with big glass window and intricate woodwork.



Query 2:

Big treehouse in rain forest with two floors, green roof, and spiral staircase.



The Infinite Index

Query 1:

Golden treehouse in lush forest with big glass window and intricate woodwork.



Query 2:

Big treehouse in rain forest with two floors, green roof, and spiral staircase.



The Infinite Index

Query 1:

Golden treehouse in lush forest with big glass window and intricate woodwork.



Query 2:

Big treehouse in rain forest with two floors, green roof, and spiral staircase.



The Infinite Index

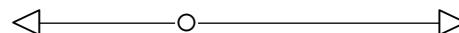
Query 1:

Golden treehouse in lush forest with big glass window and intricate woodwork.



Query 2:

Big treehouse in rain forest with two floors, green roof, and spiral staircase.



The Infinite Index

Query 1:

Golden treehouse in lush forest with big glass window and intricate woodwork.



Query 2:

Big treehouse in rain forest with two floors, green roof, and spiral staircase.



The Infinite Index

Query 1:

Golden treehouse in lush forest with big glass window and intricate woodwork.



Query 2:

Big treehouse in rain forest with two floors, green roof, and spiral staircase.



The Infinite Index

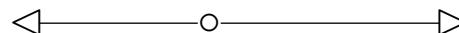
Query 1:

Golden treehouse in lush forest with big glass window and intricate woodwork.



Query 2:

Big treehouse in rain forest with two floors, green roof, and spiral staircase.



The Infinite Index

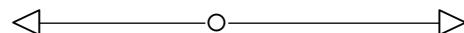
Query 1:

Golden treehouse in lush forest with big glass window and intricate woodwork.



Query 2:

Big treehouse in rain forest with two floors, green roof, and spiral staircase.



The Infinite Index

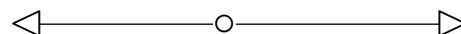
Query 1:

Golden treehouse in lush forest with big glass window and intricate woodwork.



Query 2:

Big treehouse in rain forest with two floors, green roof, and spiral staircase.



The Infinite Index

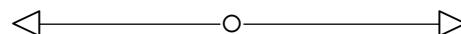
Query 1:

Golden treehouse in lush forest with big glass window and intricate woodwork.



Query 2:

Big treehouse in rain forest with two floors, green roof, and spiral staircase.



The Infinite Index

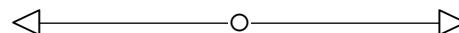
Query 1:

Golden treehouse in lush forest with big glass window and intricate woodwork.



Query 2:

Big treehouse in rain forest with two floors, green roof, and spiral staircase.



The Infinite Index

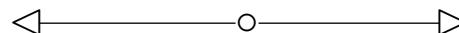
Query 1:

Golden treehouse in lush forest with big glass window and intricate woodwork.



Query 2:

Big treehouse in rain forest with two floors, green roof, and spiral staircase.



The Infinite Index

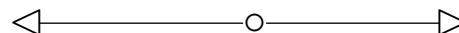
Query 1:

Golden treehouse in lush forest with big glass window and intricate woodwork.



Query 2:

Big treehouse in rain forest with two floors, green roof, and spiral staircase.



The Infinite Index

Query 1:

Golden treehouse in lush forest with big glass window and intricate woodwork.



Query 2:

Big treehouse in rain forest with two floors, green roof, and spiral staircase.



The Infinite Index

Query 1:

Golden treehouse in lush forest with big glass window and intricate woodwork.



Query 2:

Big treehouse in rain forest with two floors, green roof, and spiral staircase.



The Infinite Index

Query 1:

Golden treehouse in lush forest with big glass window and intricate woodwork.



Query 2:

Big treehouse in rain forest with two floors, green roof, and spiral staircase.



The Infinite Index

Query 1:

Golden treehouse in lush forest with big glass window and intricate woodwork.



Query 2:

Big treehouse in rain forest with two floors, green roof, and spiral staircase.



The Infinite Index

Query 1:

Golden treehouse in lush forest with big glass window and intricate woodwork.



Query 2:

Big treehouse in rain forest with two floors, green roof, and spiral staircase.



The Infinite Index

Query 1:

Golden treehouse in lush forest with big glass window and intricate woodwork.



Query 2:

Big treehouse in rain forest with two floors, green roof, and spiral staircase.



The Infinite Index

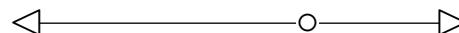
Query 1:

Golden treehouse in lush forest with big glass window and intricate woodwork.



Query 2:

Big treehouse in rain forest with two floors, green roof, and spiral staircase.



The Infinite Index

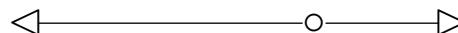
Query 1:

Golden treehouse in lush forest with big glass window and intricate woodwork.



Query 2:

Big treehouse in rain forest with two floors, green roof, and spiral staircase.



The Infinite Index

Query 1:

Golden treehouse in lush forest with big glass window and intricate woodwork.



Query 2:

Big treehouse in rain forest with two floors, green roof, and spiral staircase.



The Infinite Index

Query 1:

Golden treehouse in lush forest with big glass window and intricate woodwork.



Query 2:

Big treehouse in rain forest with two floors, green roof, and spiral staircase.



The Infinite Index

Query 1:

Golden treehouse in lush forest with big glass window and intricate woodwork.



The Infinite Index

Query 1:

Golden treehouse in lush forest with big glass window and intricate woodwork.



Query 2:

Big treehouse in rain forest with two floors, green roof, and spiral staircase.



The Infinite Index

Query 1:

Golden treehouse in lush forest with big glass window and intricate woodwork.



Query 2:

Big treehouse in rain forest with two floors, green roof, and spiral staircase.



The Infinite Index

Query 1:

Golden treehouse in lush forest with big glass window and intricate woodwork.



Query 2:

Big treehouse in rain forest with two floors, green roof, and spiral staircase.



The Infinite Index

Query 1:

Golden treehouse in lush forest with big glass window and intricate woodwork.



Query 2:

Big treehouse in rain forest with two floors, green roof, and spiral staircase.



The Infinite Index

Query 1:

Golden treehouse in lush forest with big glass window and intricate woodwork.



Query 2:

Big treehouse in rain forest with two floors, green roof, and spiral staircase.



The Infinite Index

Query 1:

Golden treehouse in lush forest with big glass window and intricate woodwork.



Query 2:

Big treehouse in rain forest with two floors, green roof, and spiral staircase.



The Infinite Index

Query 1:

Golden treehouse in lush forest with big glass window and intricate woodwork.



Query 2:

Big treehouse in rain forest with two floors, green roof, and spiral staircase.



The Infinite Index

Query 1:

Golden treehouse in lush forest with big glass window and intricate woodwork.



Query 2:

Big treehouse in rain forest with two floors, green roof, and spiral staircase.



The Infinite Index

Query 1:

Golden treehouse in lush forest with big glass window and intricate woodwork.



Query 2:

Big treehouse in rain forest with two floors, green roof, and spiral staircase.



The Infinite Index

Query 1:

Golden treehouse in lush forest with big glass window and intricate woodwork.



Query 2:

Big treehouse in rain forest with two floors, green roof, and spiral staircase.



The Infinite Index

Query 1:

Golden treehouse in lush forest with big glass window and intricate woodwork.



Query 2:

Big treehouse in rain forest with two floors, green roof, and spiral staircase.



The Infinite Index

Query 1:

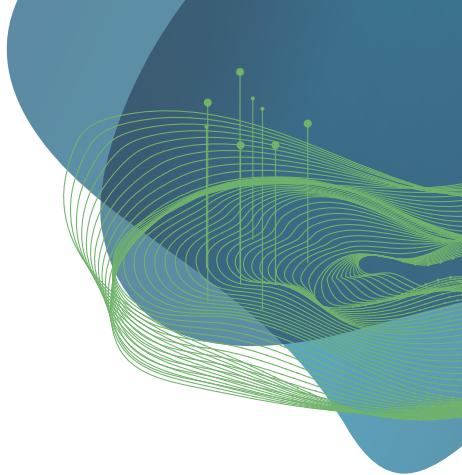
Golden treehouse in lush forest with big glass window and intricate woodwork.



Query 2:

Big treehouse in rain forest with two floors, green roof, and spiral staircase.





Direct Answers with ChatNoir



ChatNoir

Bonjour! I'm ChatNoir, your friendly cat
assistant. How can I help you today?

How can a computer's intelligence be tested?



ChatNoir

To test computer intelligence, you can give it problems to solve and evaluate how it performs. You can also give it tasks that require it to think outside the box, such as creating its own algorithms or coming up with innovative solutions to problems. Additionally, you can give it tests that measure its knowledge and understanding of a given subject.

This is outlined in [1], which also covers other definitions and tests of machine intelligence proposed, such as [2] which provides an overview of these definitions and tests. Finally, [3] is a standard test for machine intelligence.

www.wired.com/.../pass-turing-ai-test/

[1] **How to Pass the Turing Artificial Intelligence Test | WIRED**

ClueWeb22 · Crawled Aug 2022 ·

How to Pass the Turing Artificial Intelligence Test | WIRED WIRED Staff Science Jun 19, 2012 2:00 PM How to Pass the Turing Artificial Intelligence Test Are you human or a machine? Prove it, by passing the Turing Test – a test of the ability of a machine to exhibit intelligent behavior.

www.shivonzilis.com/

[2] **Machine Intelligence - Shivon Zilis**

ClueWeb22 · Crawled Aug 2022 ·

Teams need to figure out how to test newfound capabilities, and applications need to change so they offer more than a system of record; they also need to coach employees and learn from the data they enter.

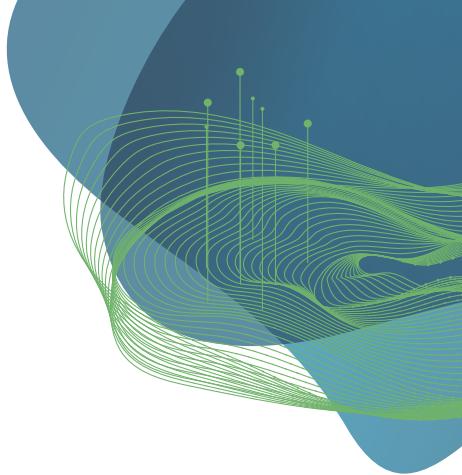
www.geeksforgeeks.org/turing-test-artificial-intelligence/

[3] **Turing Test in Artificial Intelligence - GeeksforGeeks**

ClueWeb22 · Crawled Aug 2022 ·

If a machine engages in a conversation with a human how to process the data it has been demonstrated by a machine, He has proposed the following skills of the test as follows: The turning judges the conversational skills of humans.

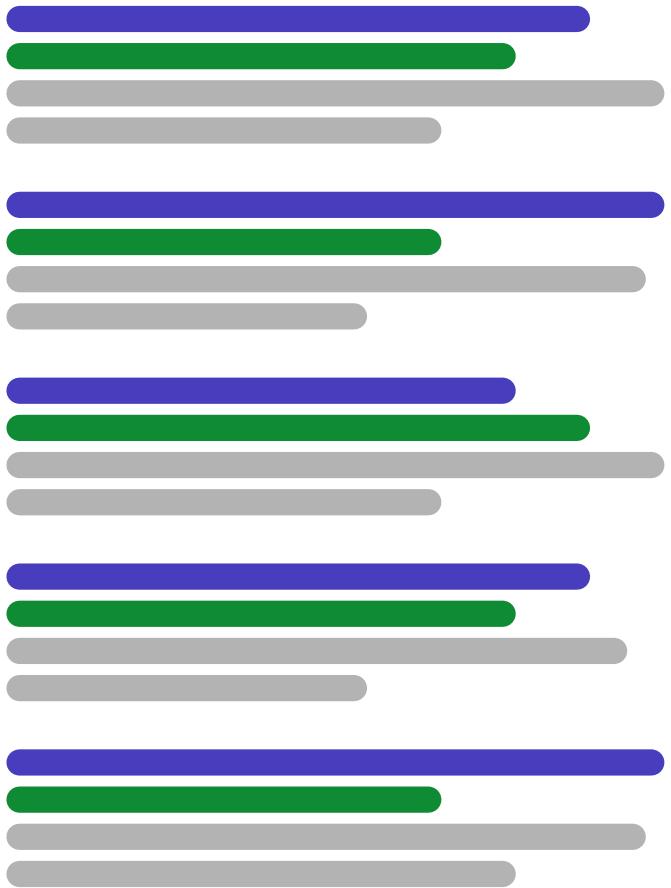
Show more...



Native Advertising in Search

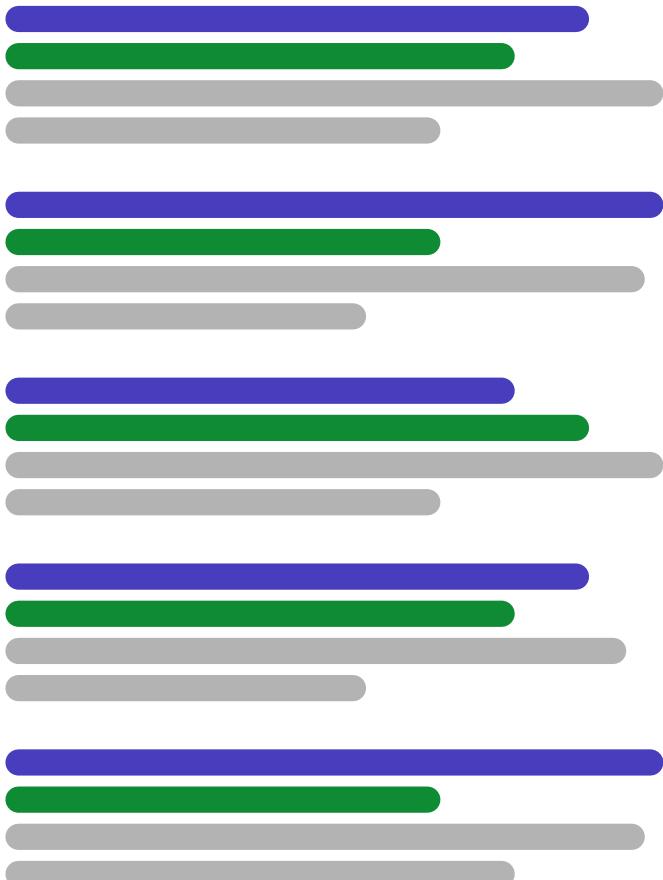
Native Advertising in Search

Query

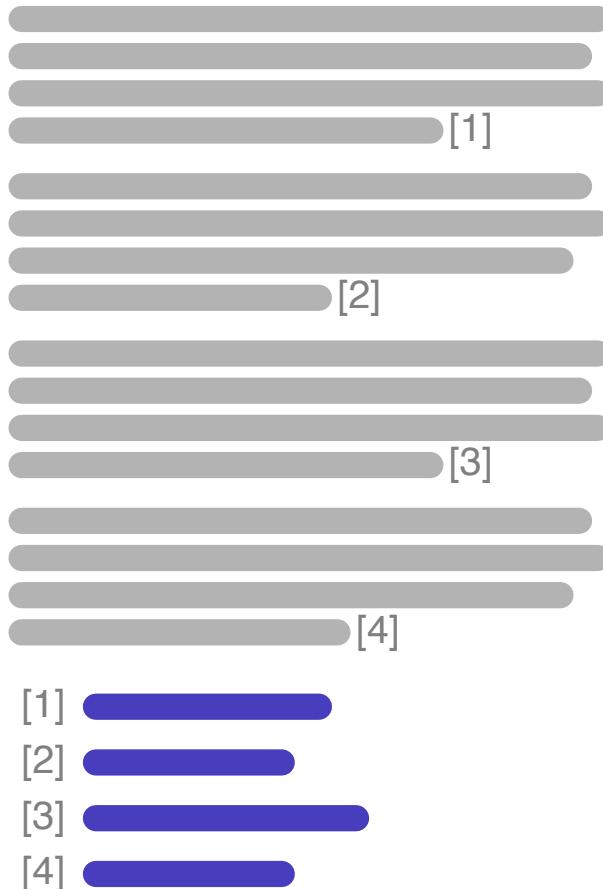


Native Advertising in Search

Query

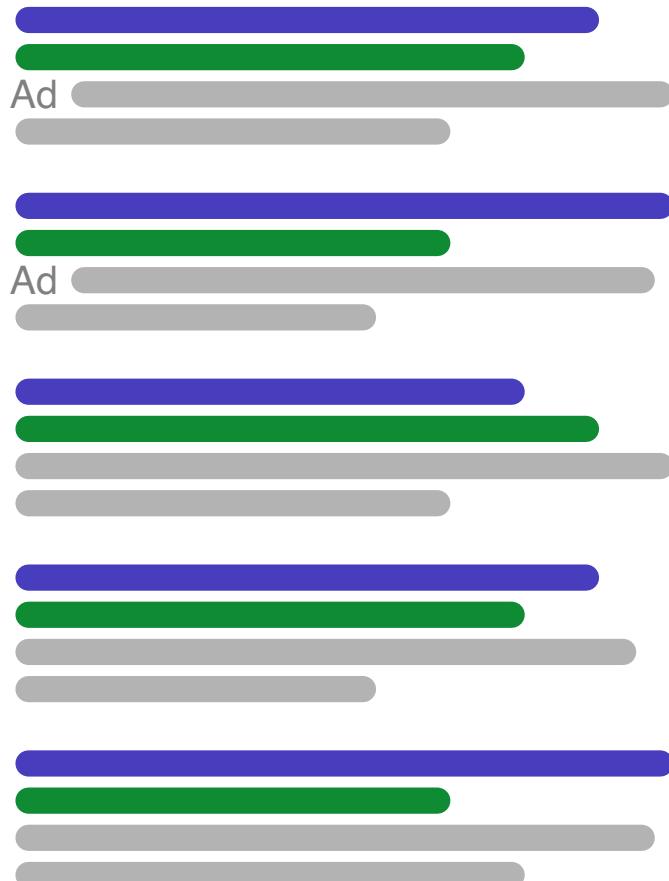


Question

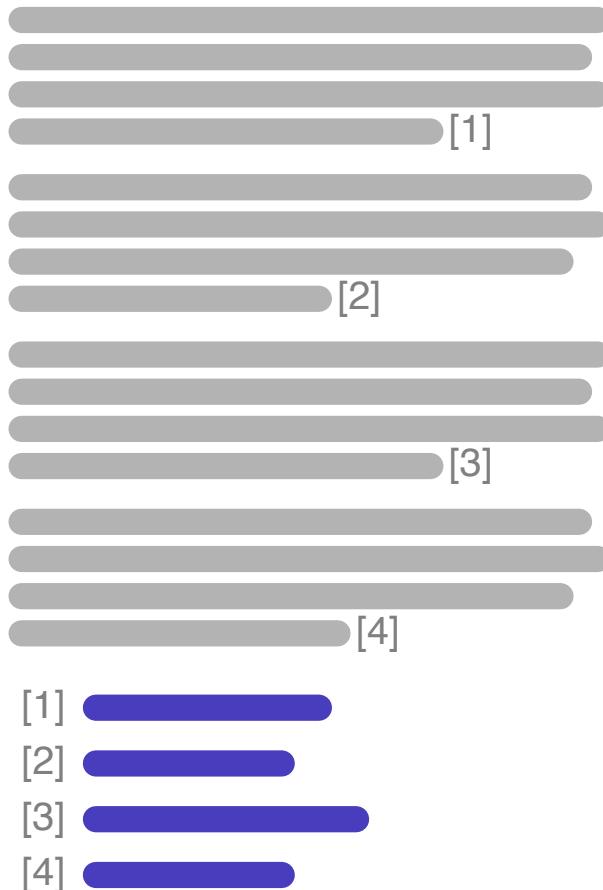


Native Advertising in Search

Query

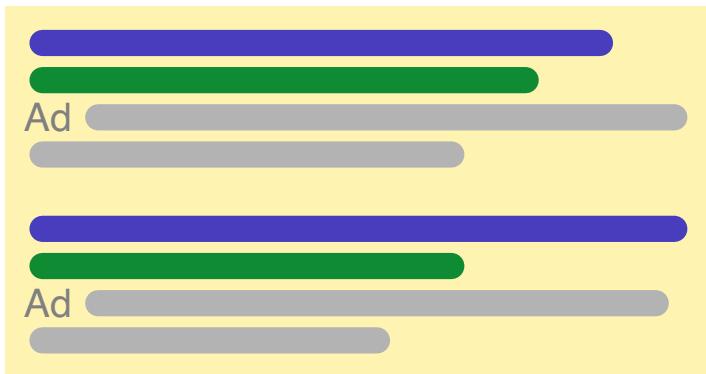


Question

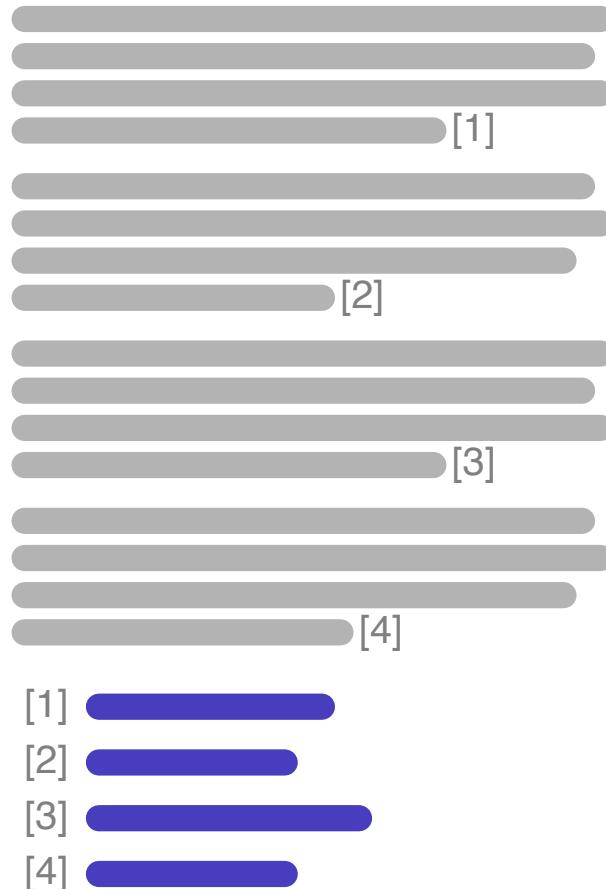


Native Advertising in Search

Query

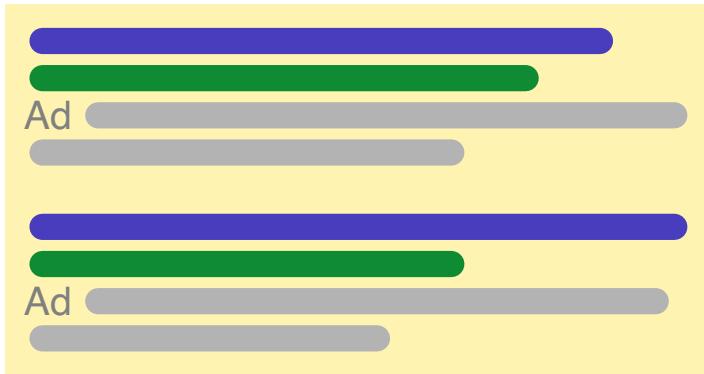


Question

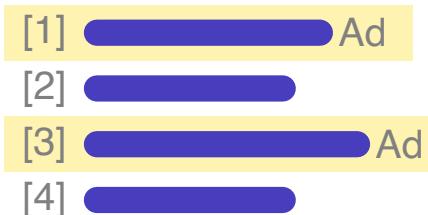
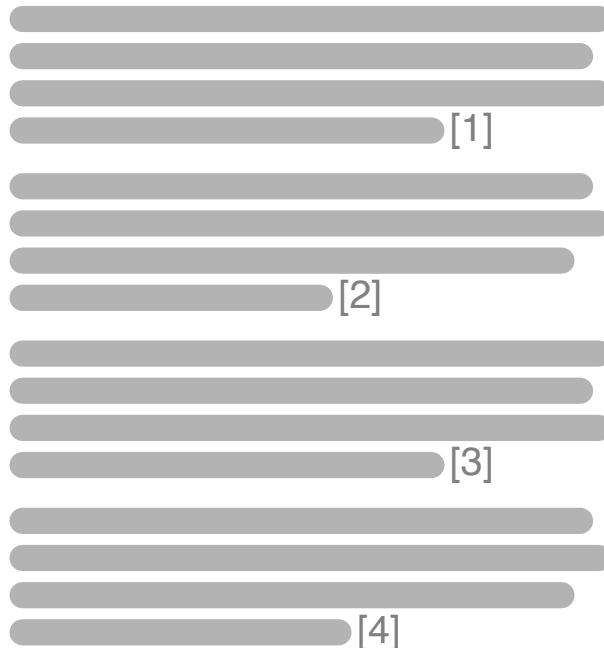


Native Advertising in Search

Query

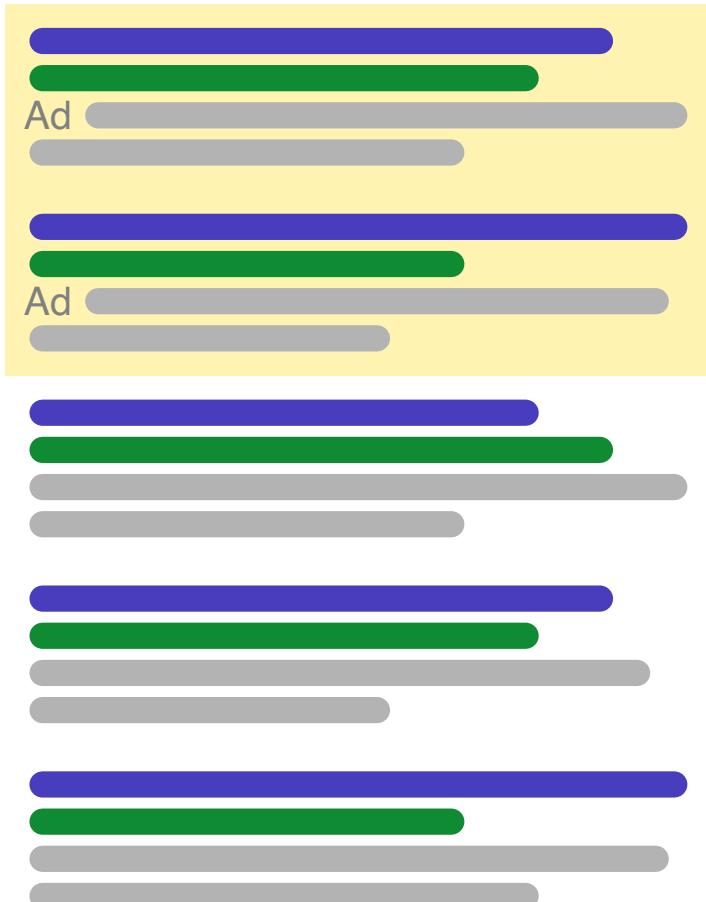


Question

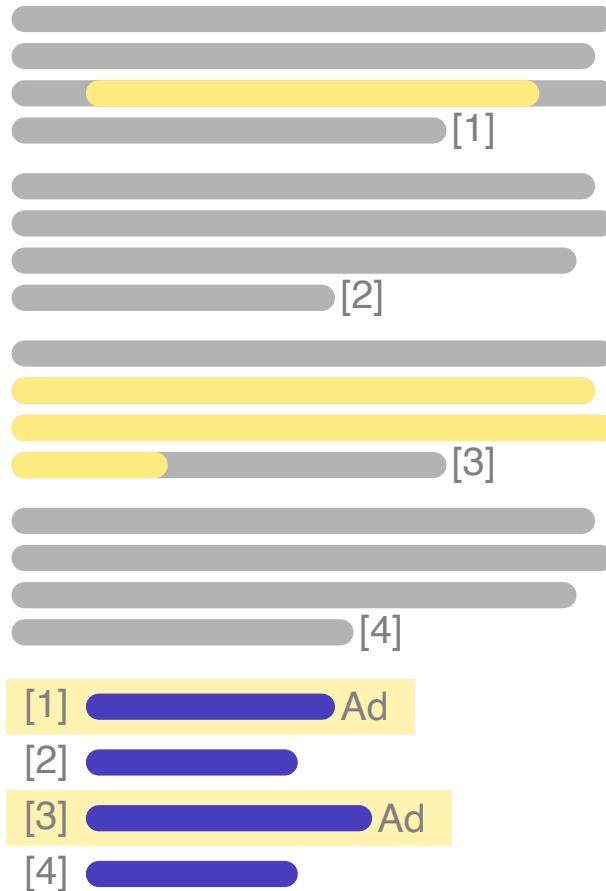


Native Advertising in Search

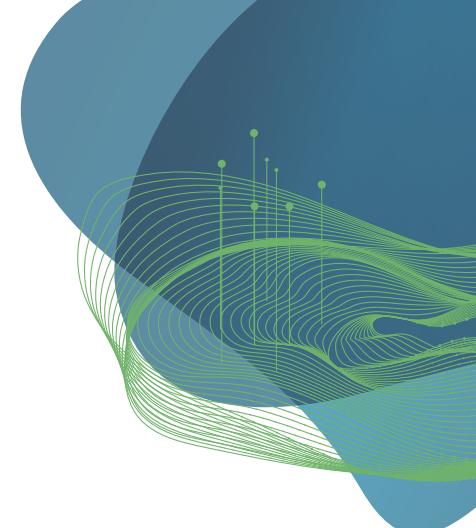
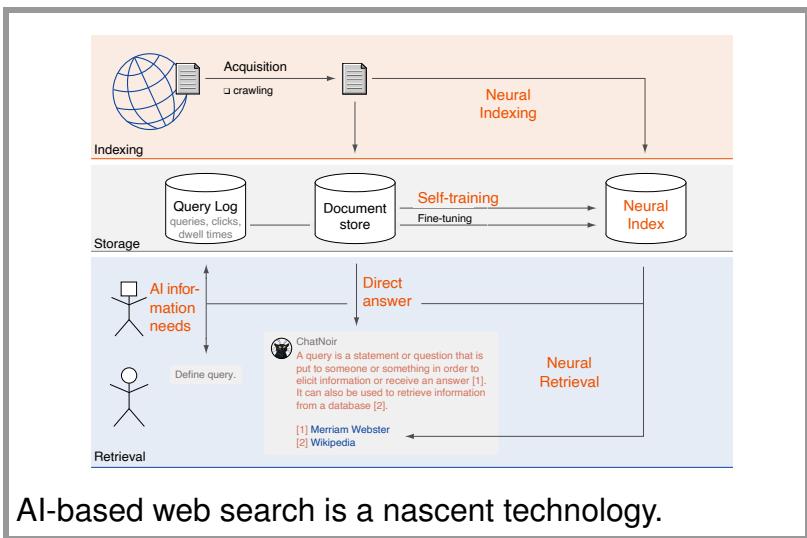
Query



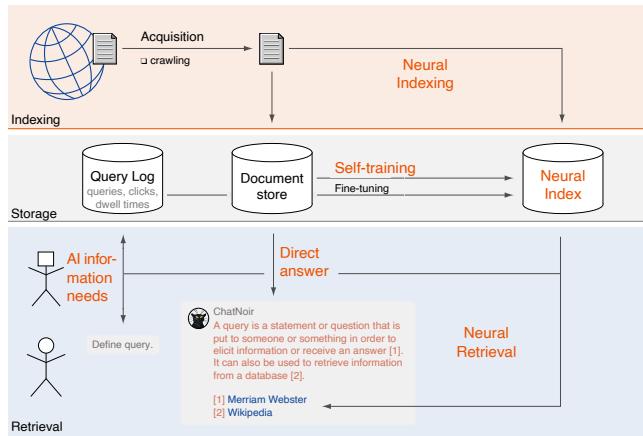
Question



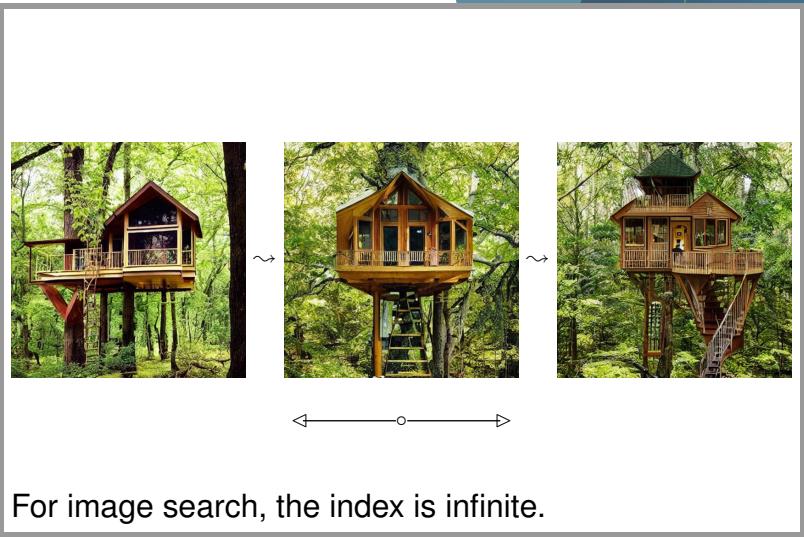
Summary



Summary

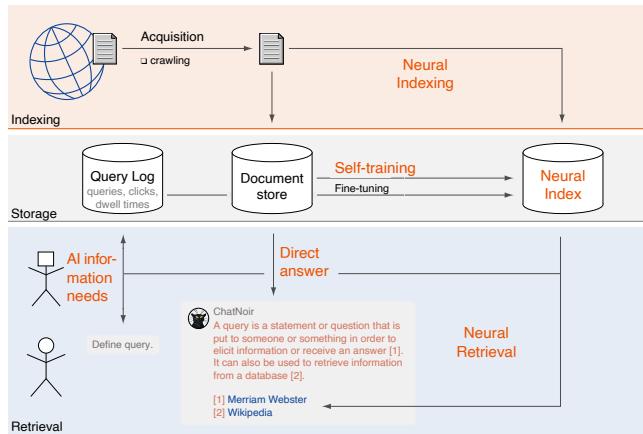


AI-based web search is a nascent technology.

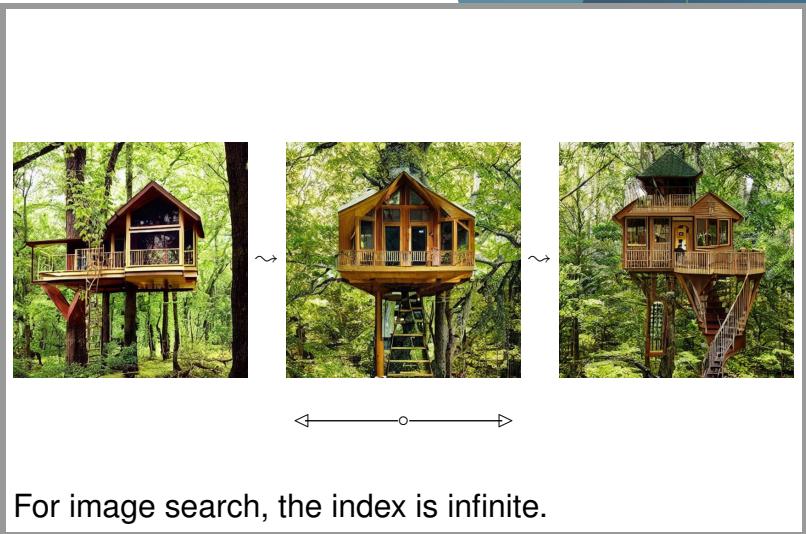


For image search, the index is infinite.

Summary



AI-based web search is a nascent technology.



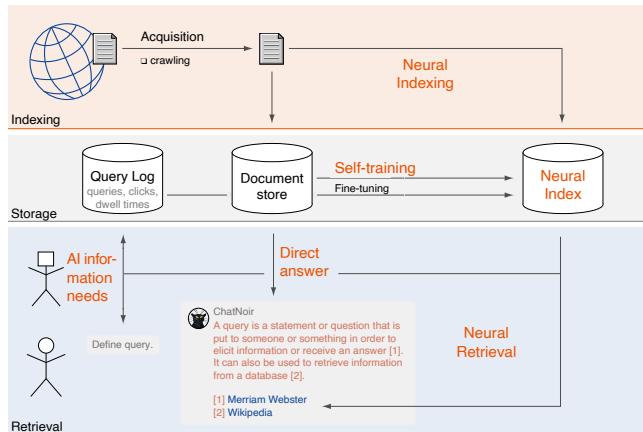
For image search, the index is infinite.

The interface shows a conversation with a cat named ChatNoir and a user asking about Turing tests. Below the conversation, a sidebar lists three search results related to the Turing test:

- [1] [How to Pass the Turing Artificial Intelligence Test | WIRED](http://www.wired.com/.../pass-turing-test/)
ChatWeb22 - Crawled Aug 2022
- [2] [Machine Intelligence - Shlomo Zilis](http://www.elhovorilis.com/.../intelligence/)
ChatWeb22 - Crawled Aug 2022
- [3] [Turing Test in Artificial Intelligence - GeeksforGeeks](http://www.geeksgEEKS.org/turing-test-artificial-intelligence/)
ChatWeb22 - Crawled Aug 2022

ChatNoir: First open conversational search engine.

Summary



AI-based web search is a nascent technology.



For image search, the index is infinite.

ChatNoir
Bonjour! I'm ChatNoir, your friendly cat assistant. How can I help you today?

How can a computer's intelligence be tested?

ChatNoir
To test computer intelligence, you can give it problems to solve and evaluate how it performs. You can also give it tasks that require it to think outside the box, such as creating its own algorithms or coming up with innovative solutions to problems. Additionally, you can give it tests that measure its knowledge and understanding of a given subject.

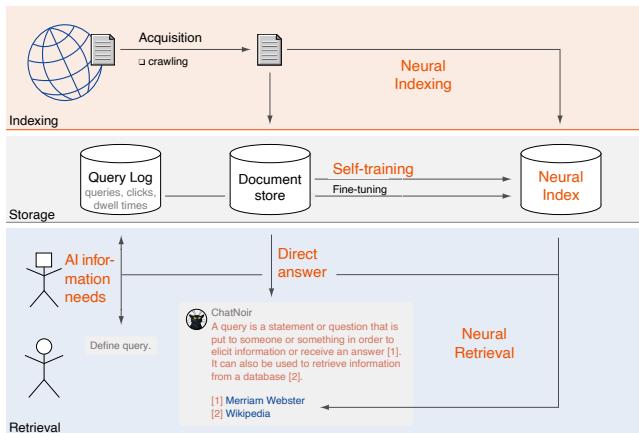
This is outlined in [1], which also covers other definitions and tests of machine intelligence proposed, such as [2] which provides an overview of these definitions and tests. Finally, [3] is a standard test for machine intelligence.

[1] www.wired.com/.../java-turing-ai-test/
[2] www.chatnoir.de/.../turing-test-in-artificial-intelligence-test/
[3] www.geeksforgeeks.org/turing-test-in-ai/

ChatNoir: First open conversational search engine.



Future AI must advertise responsibly.



AI-based web search is a nascent technology.



For image search, the index is infinite.

ChatNoir
Bonjour! I'm ChatNoir, your friendly cat
assistant. How can I help you today?

How can a computer's intelligence be tested?

ChatNoir
To test computer intelligence, you can
give it problems to solve and evaluate
how it performs. You can also give it
tasks that require it to think outside the
box, such as creating its own algorithms
or coming up with innovative solutions to
problems. Additionally, you can give it
tests that measure its knowledge and
understanding of a given subject.

This is outlined in [1], which also covers
other definitions and tests of machine
intelligence proposed, such as [2] which
provides an overview of these definitions
and tests. Finally, [3] is a standard test for
machine intelligence.

- [1] www.wired.com/.../java-turing-ai-test/
How to Pass the Turing Artificial Intelligence Test | WIRED
ChatWeb22 - Crawled Aug 2022
 - [2] www.wired.com/.../turing-test-in-ai-intelligence/
How to Pass the Turing Artificial Intelligence Test | WIRED Staff Science Jun 19, 2012
Turing Artificial Intelligence Test: Are you human or a machine? Prove it, by passing the Turing Test, the ability of a machine to exhibit intelligent behavior.
 - [3] www.geeksforgeeks.org/turing-test-ai-intelligence/
Turing Test in Artificial Intelligence - GeeksforGeeks
ChatWeb22 - Crawled Aug 2022
- Show more...

ChatNoir: First open conversational search engine.



Future AI must advertise responsibly.