

## Web Search: The Next Generation



Christopher  
Akiki



Sebastian  
Bischoff



Niklas  
Deckers



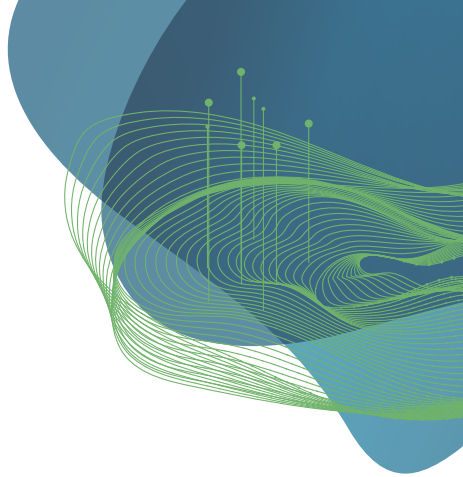
Lukas  
Gienapp



Wolfgang  
Kircheis



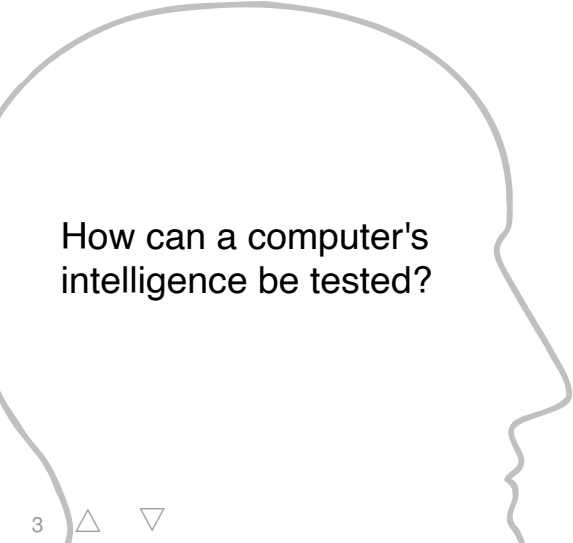
Martin  
Potthast



# 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, ...

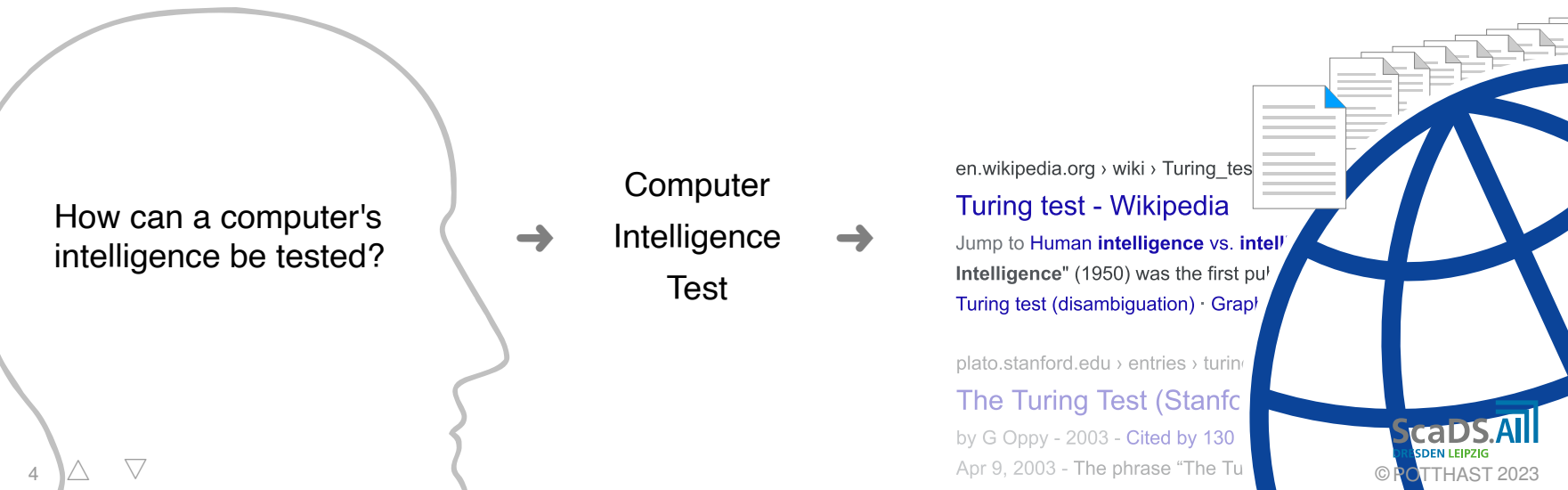


How can a computer's intelligence be tested?



# 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.



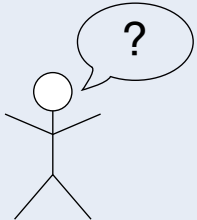


# Web Search Architecture



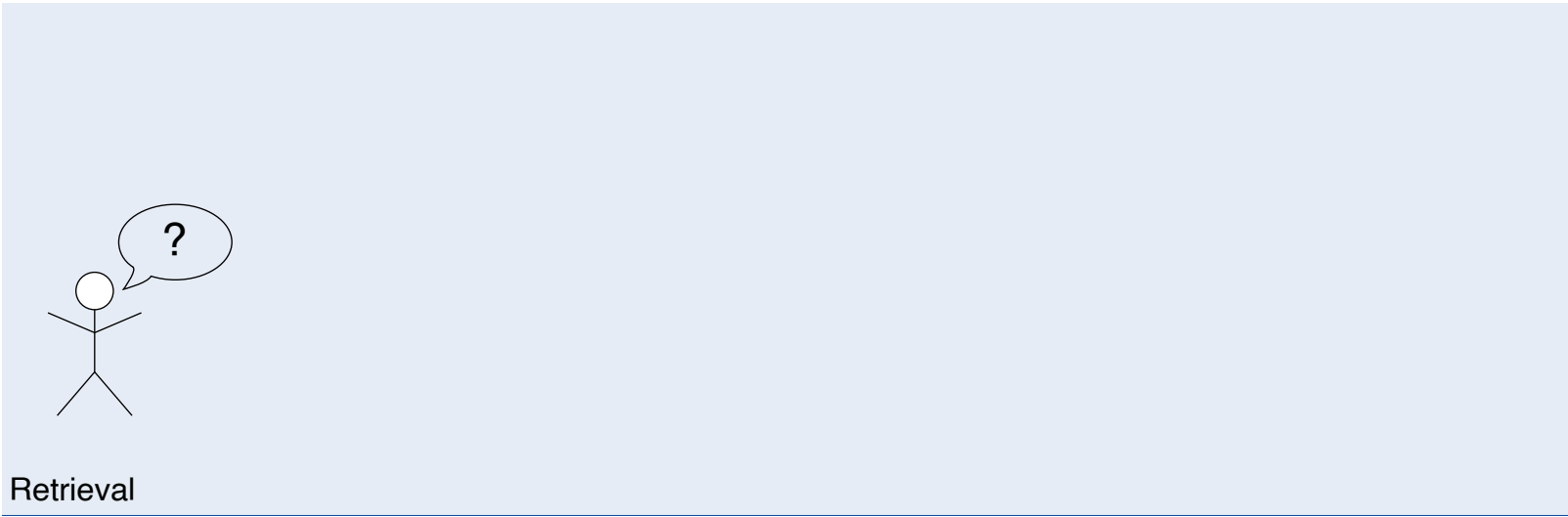
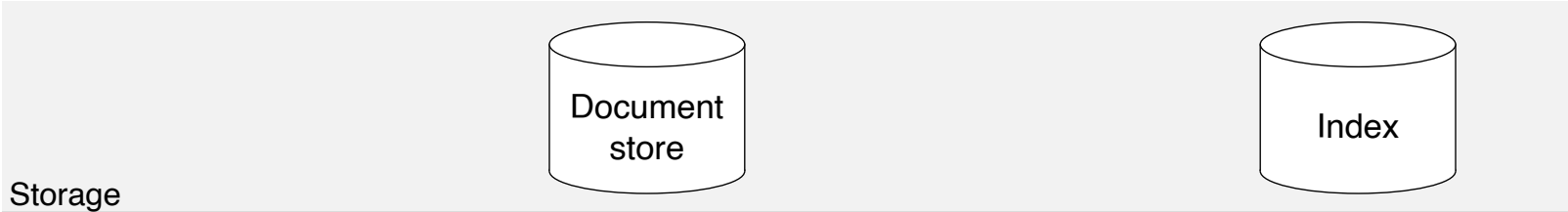
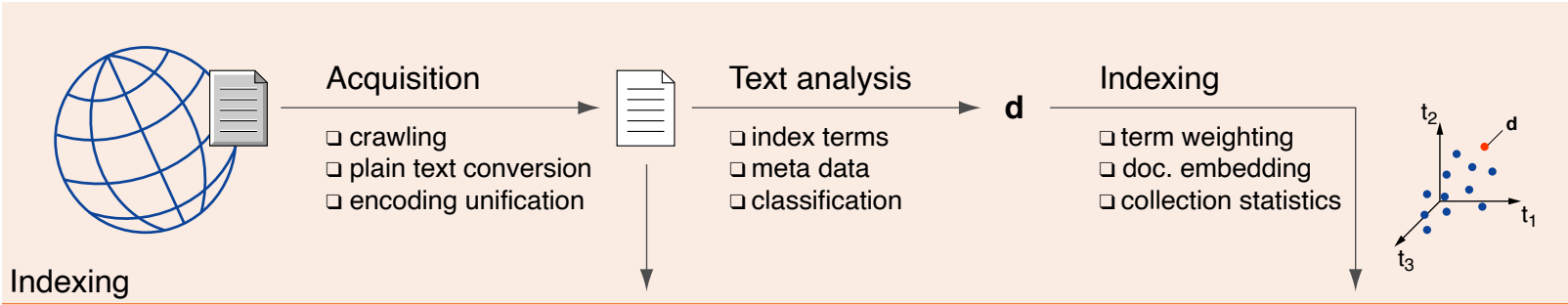
Indexing

Storage

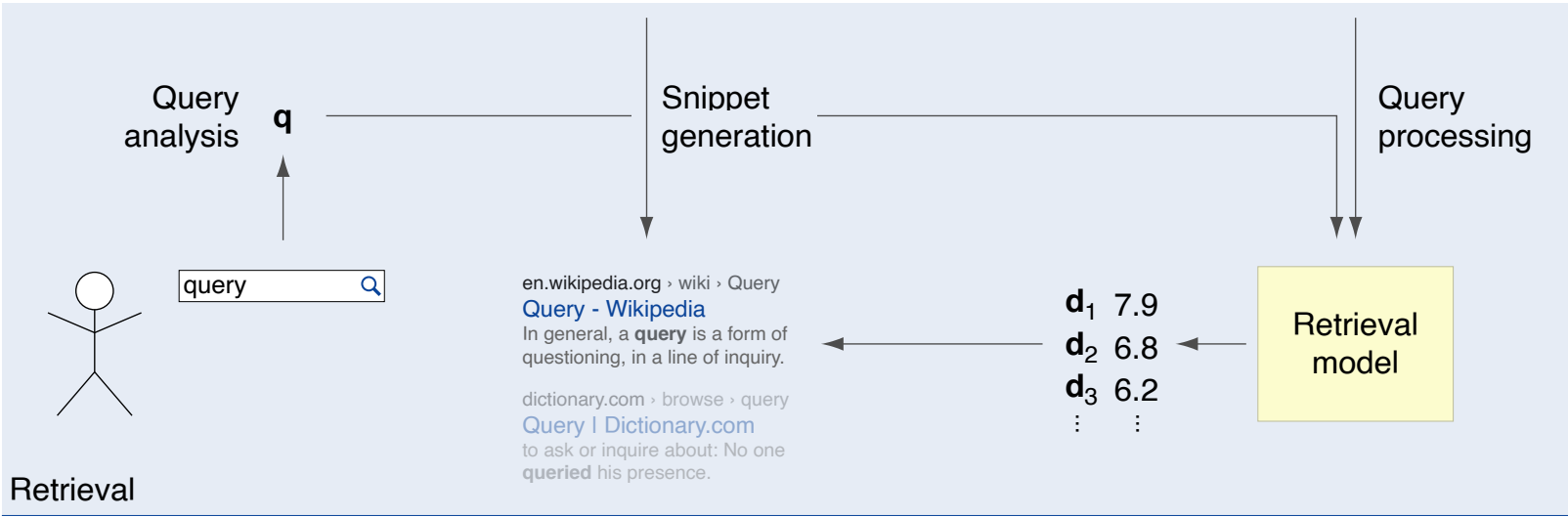
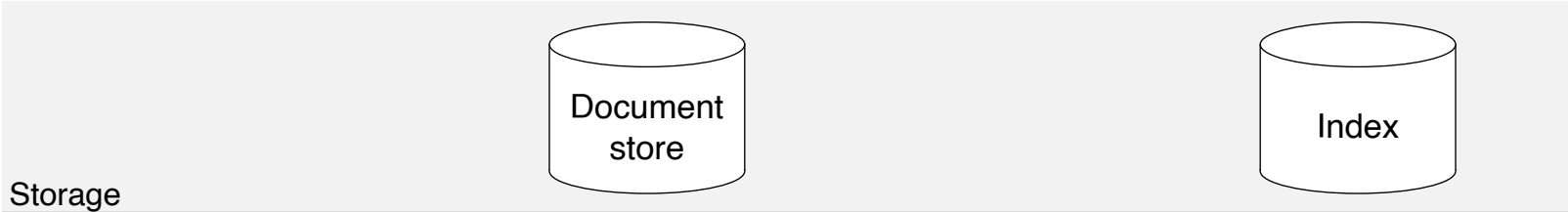
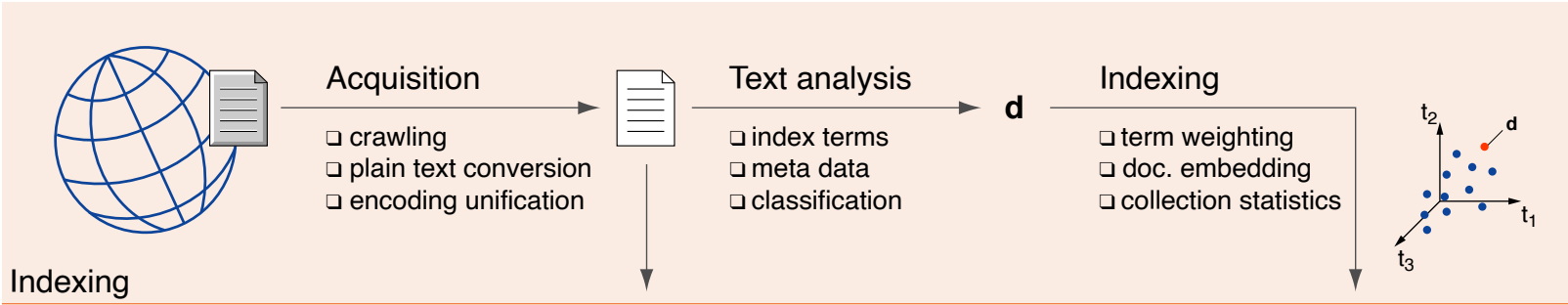


Retrieval

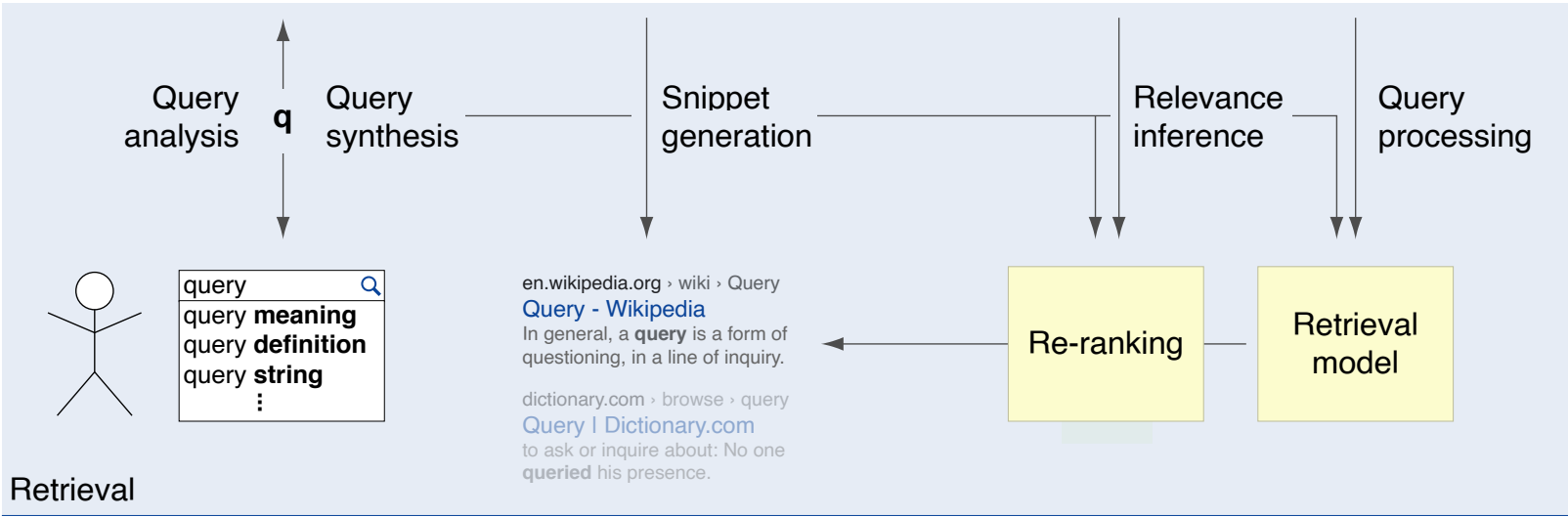
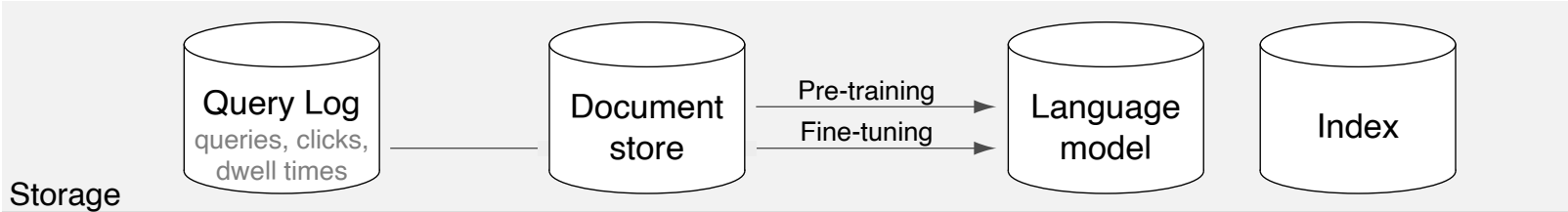
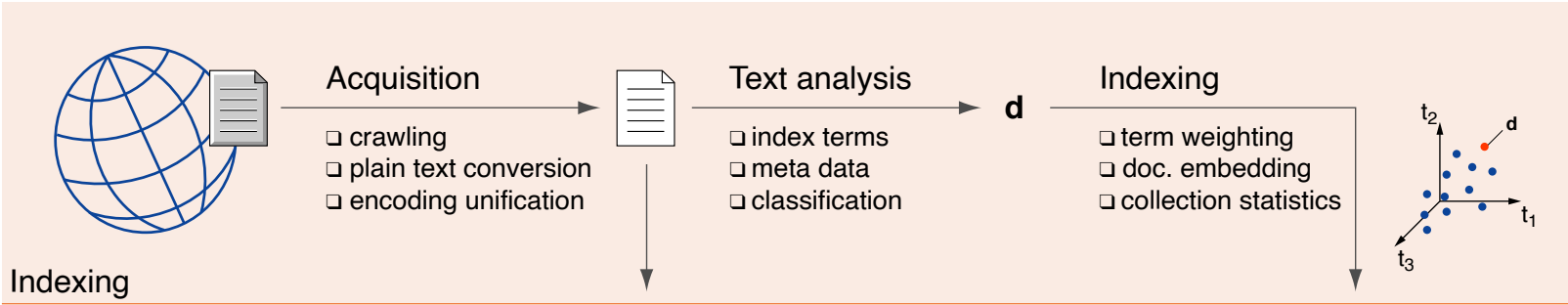
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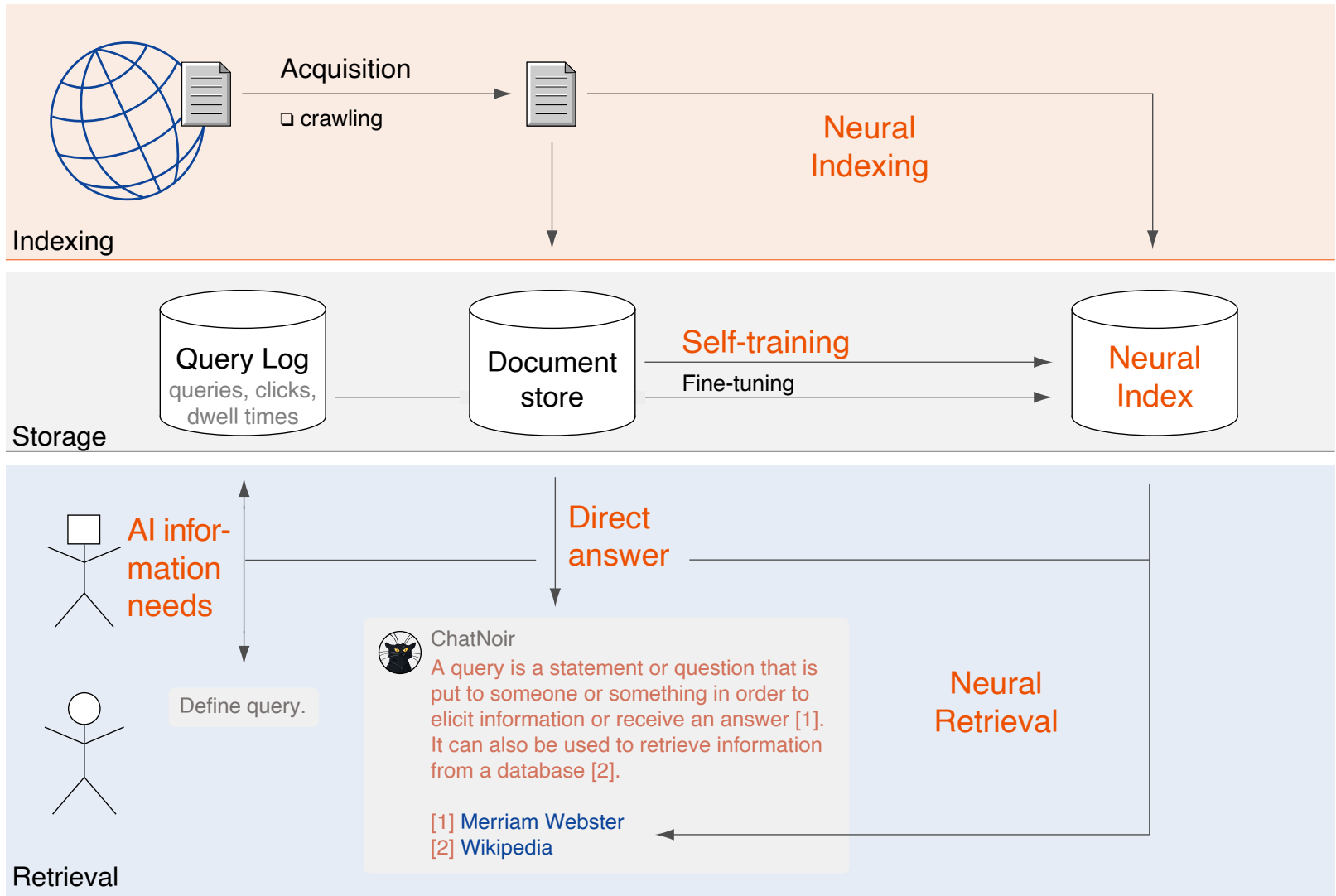
# Web Search Architecture

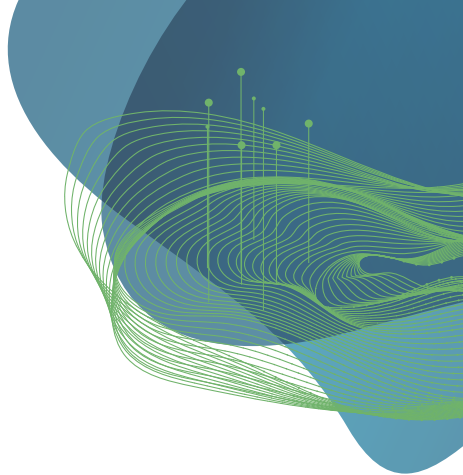


# Web Search Architecture



# 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.





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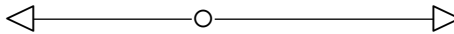
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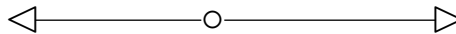
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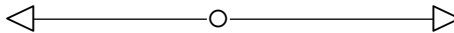
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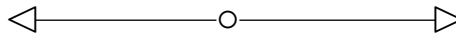
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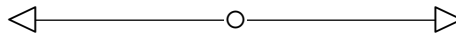




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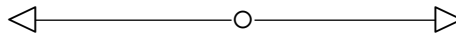
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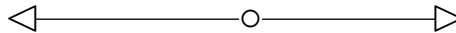
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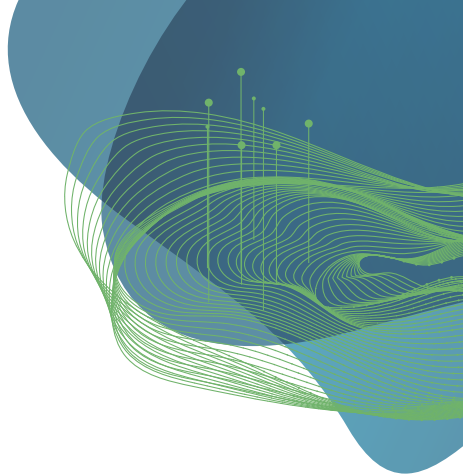
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# Direct Answers with ChatNoir



ChatNoir

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

How can a computer's intelligence be tested?

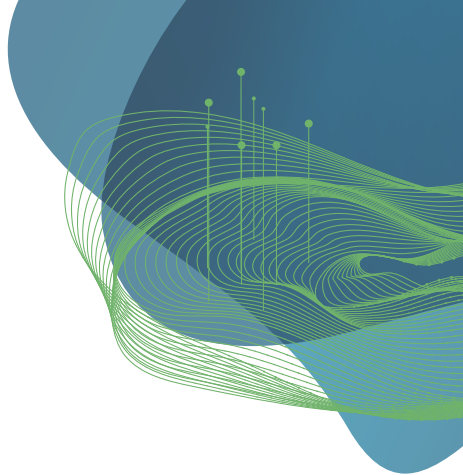


ChatNoir

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/](http://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/](http://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.geeksforgoeks.org/turing-test-artificial-intelligence/](http://www.geeksforgoeks.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...

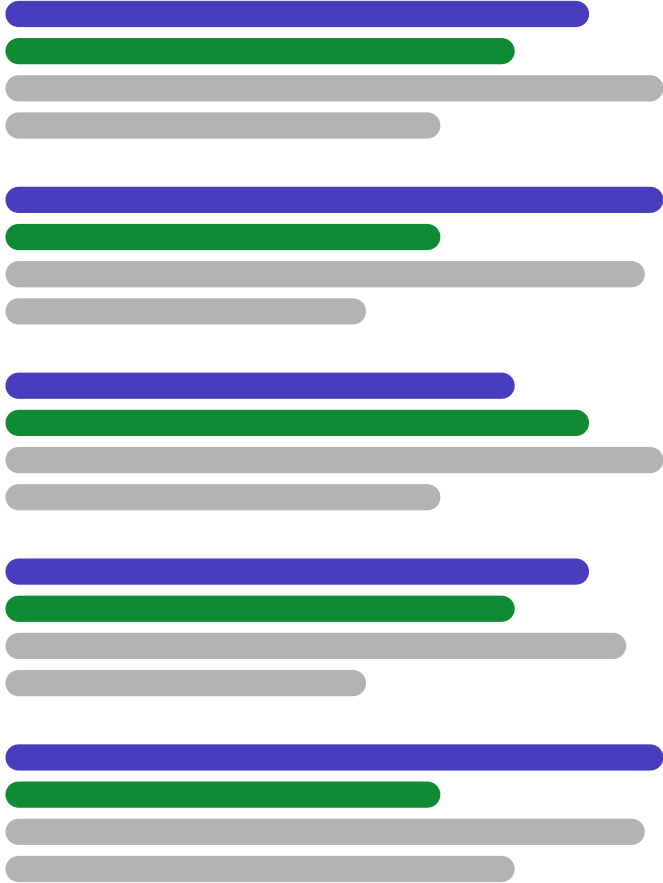


# Native Advertising in Search



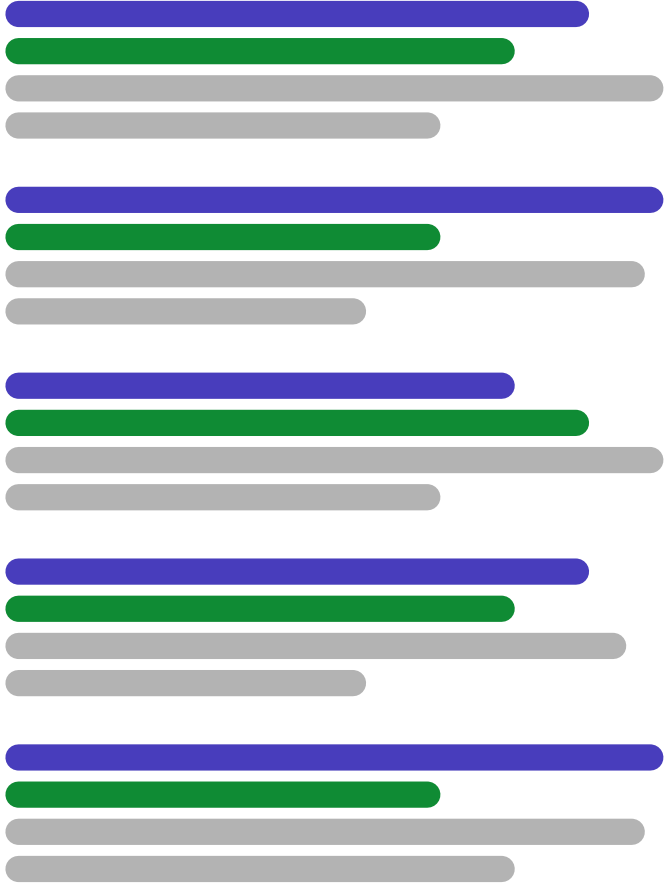
# Native Advertising in Search

Query

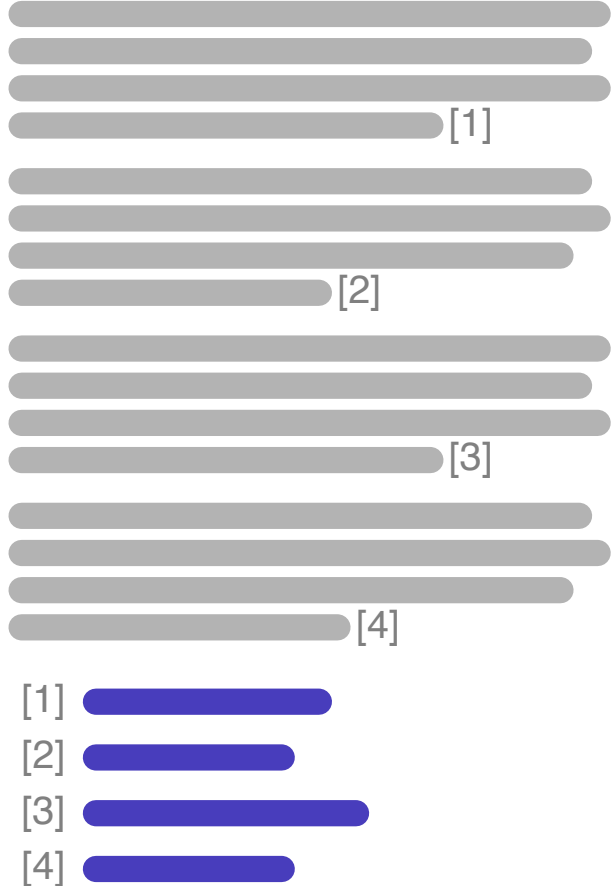


# Native Advertising in Search

## Query



## Question



# Native Advertising in Search

## Query

Ad [grey bar]

Ad [grey bar]

[grey bar]

[grey bar]

[grey bar]

[grey bar]

[grey bar]

[grey bar]

[grey bar]

[grey bar]

[grey bar]

## Question

[1]

[2]

[3]

[4]

[1]

[2]

[3]

[4]



# Native Advertising in Search

## Query

Blue bar  
Green bar  
Ad [Grey bar]  
[Grey bar]

Blue bar  
Green bar  
Ad [Grey bar]  
[Grey bar]

Blue bar  
Green bar  
[Grey bar]  
[Grey bar]

Blue bar  
Green bar  
[Grey bar]  
[Grey bar]

Blue bar  
Green bar  
[Grey bar]  
[Grey bar]

## Question

[Grey bar]  
[Grey bar]  
[Grey bar]  
[Grey bar] [1]

[Grey bar]  
[Grey bar]  
[Grey bar]  
[Grey bar] [2]

[Grey bar]  
[Grey bar]  
[Grey bar]  
[Grey bar] [3]

[Grey bar]  
[Grey bar]  
[Grey bar]  
[Grey bar] [4]

- [1] Blue bar
- [2] Blue bar
- [3] Blue bar
- [4] Blue bar

# Native Advertising in Search

## Query

Blue bar  
Green bar  
Ad [Grey bar]  
[Grey bar]

Blue bar  
Green bar  
Ad [Grey bar]  
[Grey bar]

Blue bar  
Green bar  
[Grey bar]  
[Grey bar]

Blue bar  
Green bar  
[Grey bar]  
[Grey bar]

Blue bar  
Green bar  
[Grey bar]  
[Grey bar]

## Question

[Grey bar]  
[Grey bar]  
[Grey bar]  
[Grey bar] [1]

[Grey bar]  
[Grey bar]  
[Grey bar]  
[Grey bar] [2]

[Grey bar]  
[Grey bar]  
[Grey bar]  
[Grey bar] [3]

[Grey bar]  
[Grey bar]  
[Grey bar]  
[Grey bar] [4]

[1] [Blue bar] Ad

[2] [Blue bar]

[3] [Blue bar] Ad

[4] [Blue bar]

# Native Advertising in Search

Query

Two sets of search results are highlighted in yellow. Each set consists of a blue bar, a green bar, and a grey bar labeled 'Ad'.

Four sets of search results are shown below the highlighted area. Each set consists of a blue bar, a green bar, and a grey bar.

Question

A list of search results is shown. The first result has a yellow bar and is ranked [1]. The second result has a grey bar and is ranked [2]. The third result has a yellow bar and is ranked [3]. The fourth result has a grey bar and is ranked [4].

[1] Ad

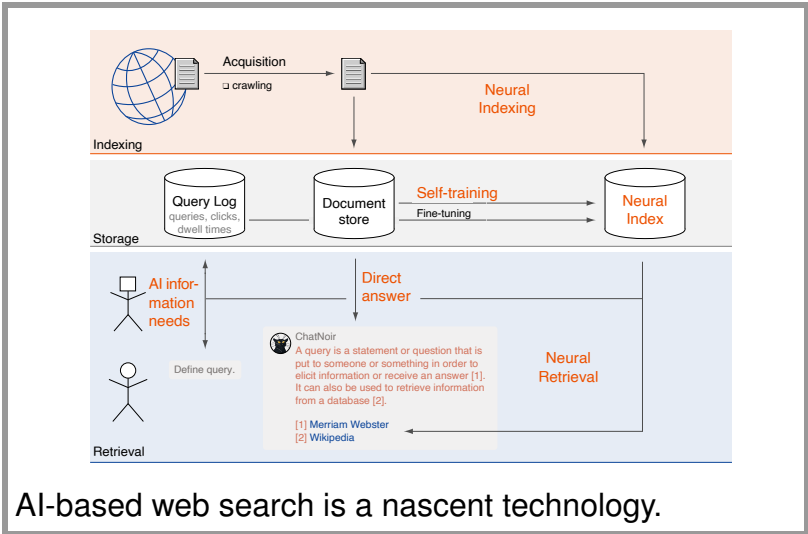
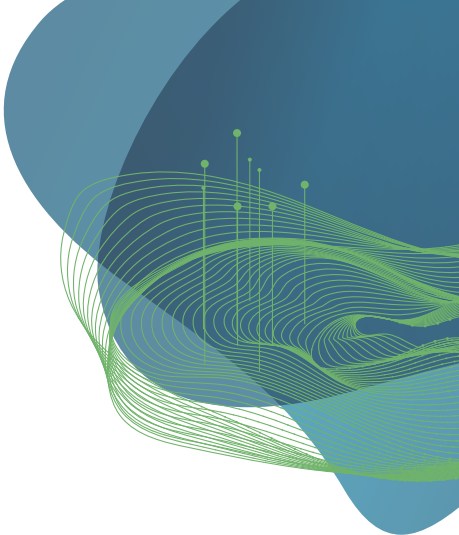
[2]

[3] Ad

[4]

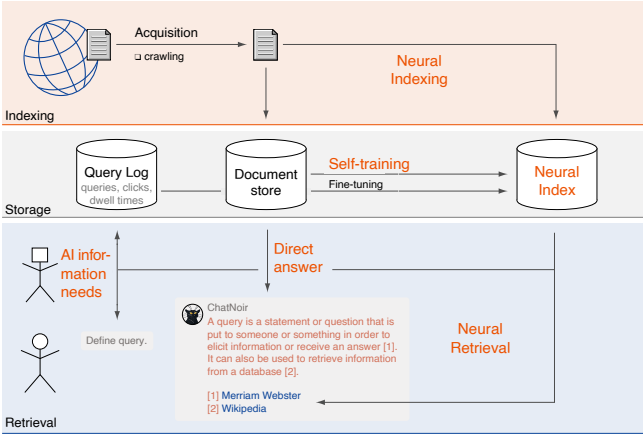


# Summary



AI-based web search is a nascent technology.

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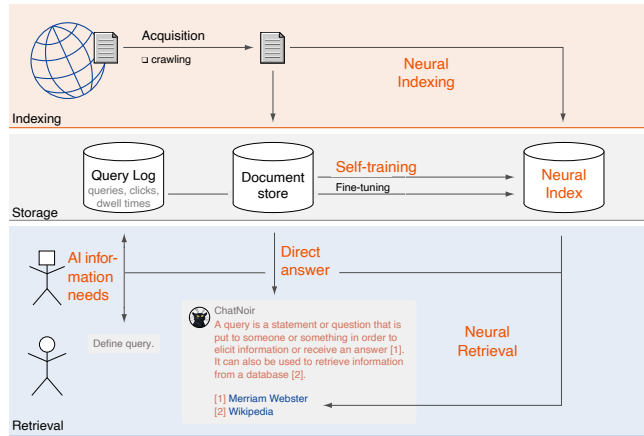


AI-based web search is a nascent technology.



For image search, the index is infinite.

# Summary



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For image search, the index is infinite.

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

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 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-test/](http://www.wired.com/.../pass-turing-test/)

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 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.

[www.shivonit.com/](http://www.shivonit.com/)

[2] [Machine Intelligence - Shivon Zilis](#)  
 ClueWeb22 - Crawled Aug 2022 |  
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[www.geekforgeeks.org/turing-test-artificial-intelligence/](http://www.geekforgeeks.org/turing-test-artificial-intelligence/)

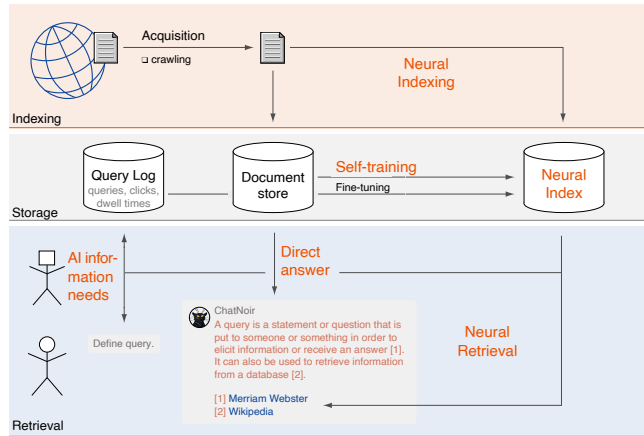
[3] [Turing Test in Artificial Intelligence - Geekforgeeks](#)  
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 If a machine engages in a conversation with a human how to process the data it has been developed by machine. He has proposed the following skills of the test as follows: The Turing helps the conversation between humans.

Show more...

ChatNoir: First open conversational search engine.



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[www.wired.com/.../pass-turing-ai-test/](https://www.wired.com/.../pass-turing-ai-test/)  
 [1] [How to Pass the Turing Artificial Intelligence Test | WIRED](#)  
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 How to Pass the Turing Artificial Intelligence Test | WIRED WIRED Staff Science Jun 19, 2012 5:00 PM  
 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.

[www.shivewill.com/](https://www.shivewill.com/)  
 [2] [Machine Intelligence - Shivon Zilis](#)  
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 Teams need to figure out how to test newfound capabilities, and applications need to change to reflect a system of record; they also need to coach employees and learn from the data they enter.

[www.geekforgeeks.org/turing-test-artificial-intelligence/](https://www.geekforgeeks.org/turing-test-artificial-intelligence/)  
 [3] [Turing Test in Artificial Intelligence - GeeksforGeeks](#)  
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 If a machine engages in a conversation with a human how to process the data it has been developed by machine. He has proposed the following skills of the test as follows: The Turing helps the conversation with humans.  
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ChatNoir: First open conversational search engine.

**Query**

Ad [1]

Ad [2]

[3]

[4]

**Question**

[1]

[2]

[3]

[4]

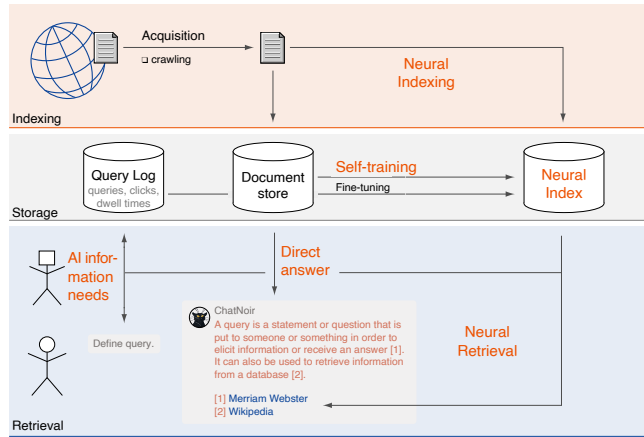
[1] Ad

[2]

[3] Ad

[4]

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?

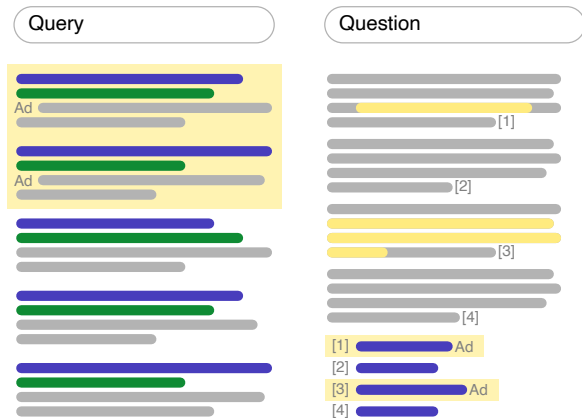
How can a computer's intelligence be tested?

**ChatNoir**  
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