

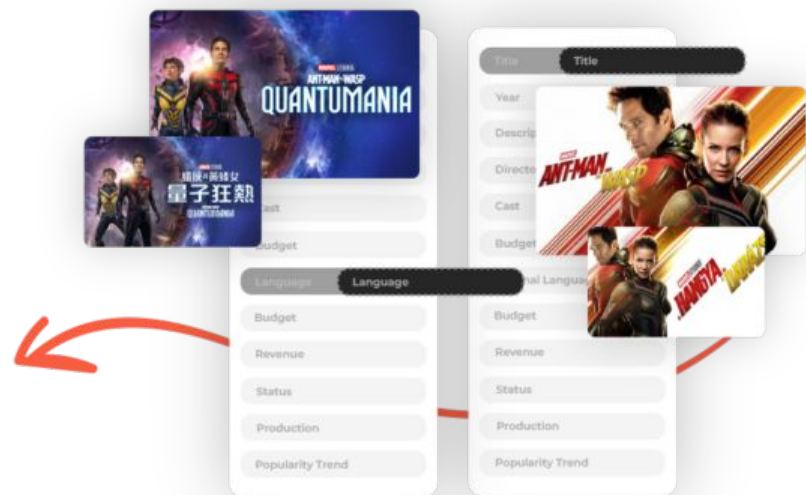


AI-Based Semantic Search

Last update: October 2025

Definition of Semantic Search

Semantic search denotes **search with meaning**, as distinguished from lexical search where the search engine looks for literal matches of the query words or variants of them, without understanding the overall meaning of the query.*



The journey of semantic searches

Until 2020s

It was based on the efforts and techs of the W3C to create a Semantic Web

“Elevate” search engines and hypertext links with:

- Graph databases
- Inference engines
- Ontology languages

It never got to a solid, widespread implementation

After 2020s

Extract abstract concepts (~ meaning) from free text and represent them with vectors, using AI

Take advantage of AI toolkit and fundamentals:

- Vectors, Linear Algebra
- Embedding models
- Large Language Models

No real need for Logic, rather use the concept of Similarity

Linear Algebra makes it easy to benchmark various implementations with traditional Information Retrieval architectures and concept

Why Semantic Search?

Reduced “paralysis of choice”

it answer a direct desire and request of the user

No cold start

No need to have past user interaction, it answer the current will

Reduced time-to-content

No need to remember titles, actor names, directors... when searching

Here-and-now

The semantic search will push what the user is asking for at the moment, even if it is far from past interactions

Improved user experience

Hybrid Search

Combining Semantic with
Term-based search

Why hybrid search?

To offer a **balanced and enhanced search experience** by combining the precision of term-based search with the semantic understanding of vector search.

Sparse and Dense representations of text seem to represent **complementary linguistic qualities** of their underlying embeddings.

Ensembling keyword and embedding models for search **helps with in-domain performance, out-of-domain generalization**, as well as multilingual transfer.

Some Examples

Showing you **movies about** **archeologist and religious relics**

Term



Semantic

Night at the Museum (2006)

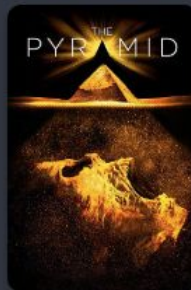


Genres: Children, Comedy, Fantasy, Adventure

Cast: Ben Stiller, Carla Gugino, Dick Van Dyke, Mickey Rooney, Bill Cobbs, Jake Cherry, Ricky Gervais, Robin...

Directors: Shawn Levy

The Pyramid (2014)



Genres: Horror, Thriller, Adventure

Cast: Ashley Hinshaw, Denis O'Hare, James Buckley, Christa-Marie Nicola, Amir K, Faycal Attougui, Joseph...

Directors: Grégory Levasseur

The Da Vinci Code (2006)

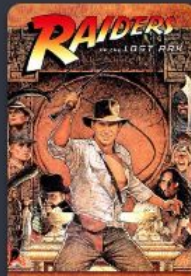


Genres: Mystery, Drama, Thriller

Cast: Tom Hanks, Audrey Tautou, Ian McKellen, Alfred Molina, Jean Reno, Paul Bettany, Jürgen Prochnow, Jean...

Directors: Ron Howard

Raiders of the Lost Ark (1981)



Genres: Adventure, Action

Cast: Harrison Ford, Karen Allen, Paul Freeman, Wolf Kahler, Ronald Lacey, John Rhys-Davies, Denholm Elliott,...

Directors: Steven Spielberg

Showing you **movies about space wars**

Term



Semantic

2001: A Space Odyssey (1968)



Genres: Science fiction

Cast: Keir Dullea, Gary Lockwood, William Sylvester, Daniel Richter, Leonard Rossiter, Douglas Rain,...

Directors: Stanley Kubrick

Zathura: A Space Adventure (2005)



Genres: Children, Adventure, Science fiction, Fantasy

Cast: Josh Hutcherson, Jonah Bobo, Dax Shepard, Kristen Stewart, Tim Robbins, Derek Mears, Frank Oz,...

Directors: Jon Favreau

Star Trek: First Contact (1996)



Genres: Science fiction

Cast: Patrick Stewart, Jonathan Frakes, Brent Spiner, LeVar Burton, Michael Dorn, Gates McFadden, Marina Sirtis,...

Directors: Jonathan Frakes

Valerian and the City of a Thousand Planets (2017)



Genres: Science fiction, Adventure, Action

Cast: Dane DeHaan, Cara Delevingne, Clive Owen, Rihanna, Ethan Hawke, Herbie Hancock, Kris Wu, Rutger...

Directors: Luc Besson

Showing you **movies about fater and son relationship**

Term  Semantic

The Generals Daughter (1999)



Genres: Thriller, Drama

Cast: John Travolta, Madeleine Stowe, James Cromwell, Timothy Hutton, Leslie Stefanson, Daniel von Bargen,...

Directors: Simon West

Meet the Parents (2000)

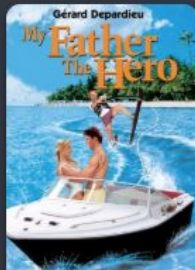


Genres: Comedy

Cast: Robert De Niro, Ben Stiller, Blythe Danner, Teri Polo, James Rebhorn, Jon Abrahams, Phyllis...

Directors: Jay Roach

My Father, the Hero (1994)



Genres: Comedy

Cast: Gérard Depardieu, Katherine Heigl, Dalton James, Lauren Hutton, Faith Prince, Stephen Tobolowsky, An...

Directors: Steve Miner

Child 44 (2015)



Genres: Mystery, Thriller

Cast: Tom Hardy, Gary Oldman, Noomi Rapace, Joel Kinnaman, Paddy Considine, Fares Fares, Jason Clarke,...

Directors: Daniel Espinosa

How to leverage hybrid approach

Voice search



More natural language searches requires fully semantic approach, giving more relevance to synopsis

Search for metadata (theme/genres)



User browsing the catalog starting from descriptive metadata should be prompted with extract matches, including exploration of similar concept

Open search



Queries are usually shorter and might include open questions (e.g. movies about a theme) or metadata. In this case an hybrid approach with term base on specific metadata is needed

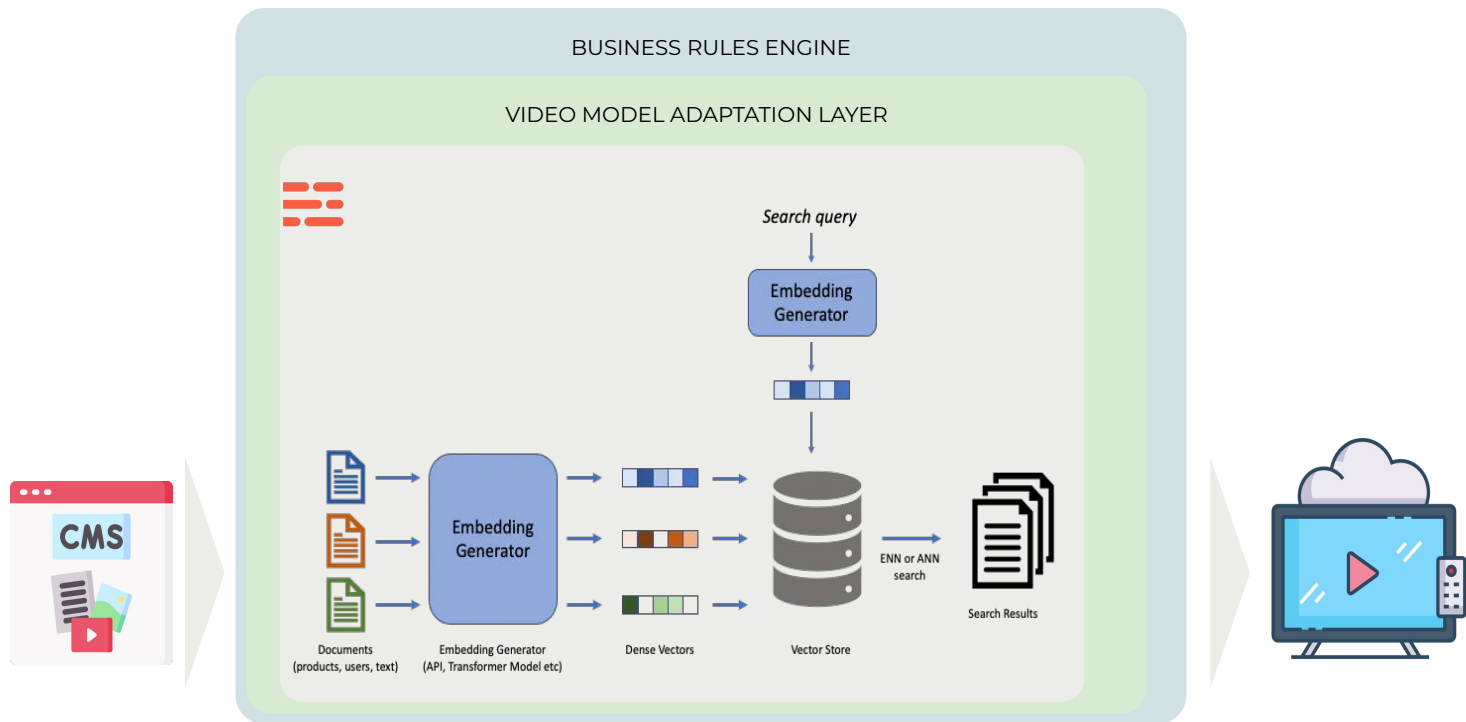
Search for strict metadata (actors/directors)



Direct search / clicks on a person should be managed through term-base approach only

ContentWise: scalable and repeatable approach

A modular system





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