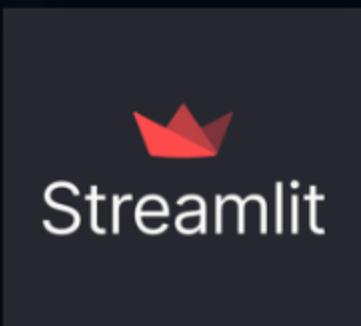


# YouTube Content Search

RAFAEL COELHO

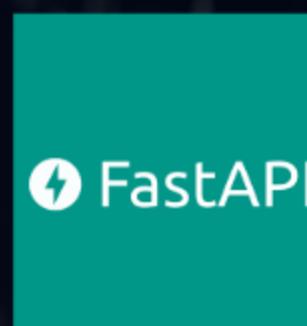
**THIS PROJECT WAS BUILT  
WITH THE FOLLOWING TOOLS:**



**STREAMLIT**



**PYTHON**



**FASTAPI**



**MLFLOW**



**MINIKUBE**



**LANGCHAIN**



**LANGGRAPH**



**NEO4J**



**DOCKER**



**KUBERNETES**

**THIS PROJECT WAS TESTED  
WITH SOME OPEN SOURCE LLMS:**



**META  
LLAMA 3.1,  
3.2, 3.3**



**GOOGLE  
GEMMA 2**

# YouTube Content Search

BY RAFAEL COELHO

**YouTube Content Search** allows you to  
use the following LLM API services:



GROQ



SAMBANOVA



SCALEWAY



OPENAI

# YouTube Content Search

Some available LLM models to use on  
**YouTube Content Search** platform:



META LLAMA



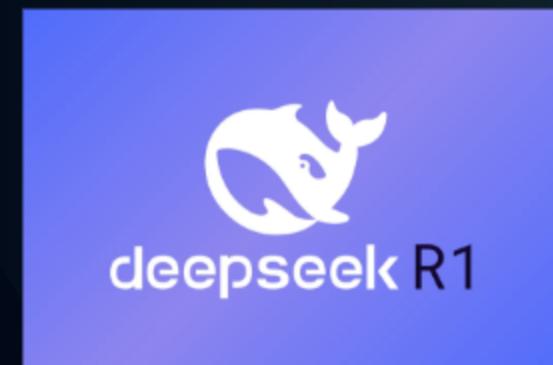
GOOGLE  
GEMMA 2



MISTRAL  
AI



QWEN 2.5



DEEPSEEK R1



OPENAI

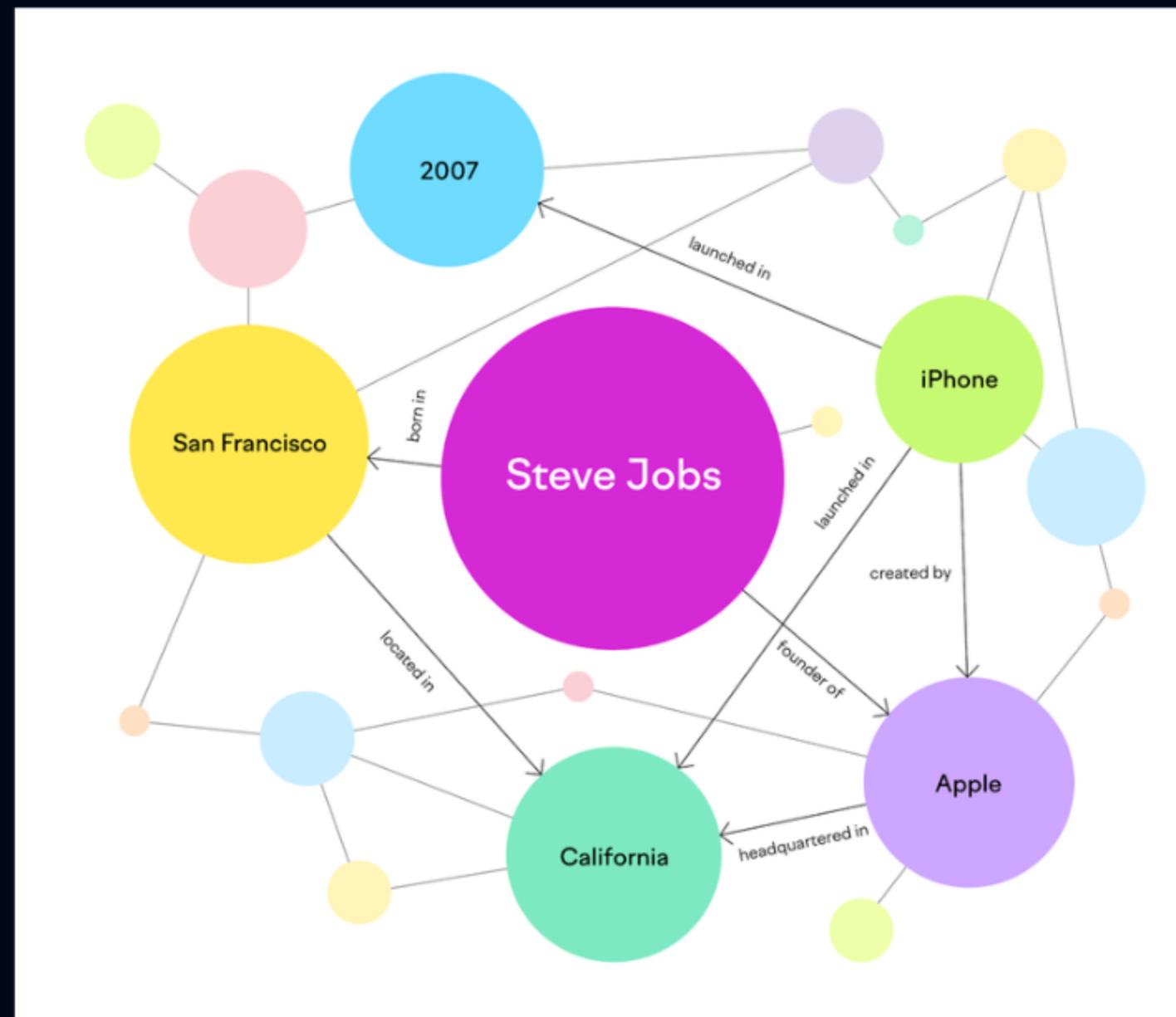


GPT 4O  
GPT 4O MINI  
O1  
O1 MINI  
O3 MINI  
O1 PREVIEW

# YouTube Content Search

BY RAFAEL COELHO

## KNOWLEDGE GRAPHS



## AI Agents

This platform leverages the power of AI Agents using LangChain and LangGraph to get important informations from YouTube videos, extract relationships between entities identified from video transcriptions and store these informations into a Graph Database called Neo4J.

## Efficiency and accuracy

Knowledge Graphs enable more precise information retrieval than traditional RAGs with vector databases by explicitly modeling relationships between entities. Unlike vector-based RAG, which relies on semantic similarity, KGs structurally capture connections (e.g., 'X works\_for Y → Y located\_in Z'), allowing for accurate, multi-hop reasoning and logically consistent answers. This makes KGs superior for complex queries requiring relational understanding.

# YouTube Content Search

BY RAFAEL COELHO

**YouTube Content Search** is a platform that connects the user to open source Large Language Models like **Llama 3.1** (Meta), **Gemma 2** (Google), and others through services like Groq and OpenAI. By using this platform, you can search for informations through 4 options:

## 1) Search

The **Search** option calls AI Agents to search for videos autonomously, based on the context and filters the user provides.

## 3) Channel

The **Channel** option calls AI Agents to retrieve informations from video transcriptions of a YouTube channel that the user has interest to know more about.

## 2) Video

The **Video** option extract the informations from a specific video requested by user.

## 4) Playlist

The **Playlist** option works in a similar way that **Channel** options does, but retrieving transcription informations coming from YouTube playlists instead.

And all these options allows the user to ask anything it wants about the videos transcriptions obtained and processed by AI Agents, and one of these AI Agents will answer accurately the questions by consulting and retrieving its own Knowledge Graph.

# YouTube Content Search

BY RAFAEL COELHO

Author: Rafael Silva Coelho

Deploy

⋮

Settings

View application graphs

Clear memory

Search type

Search

Context to search

What are the best universities in world to become specialist in Data Science and Machine Learning?  
Press Ctrl+Enter to submit form.

Maximum videos to search

2 - +

Upload date

None

Duration

None

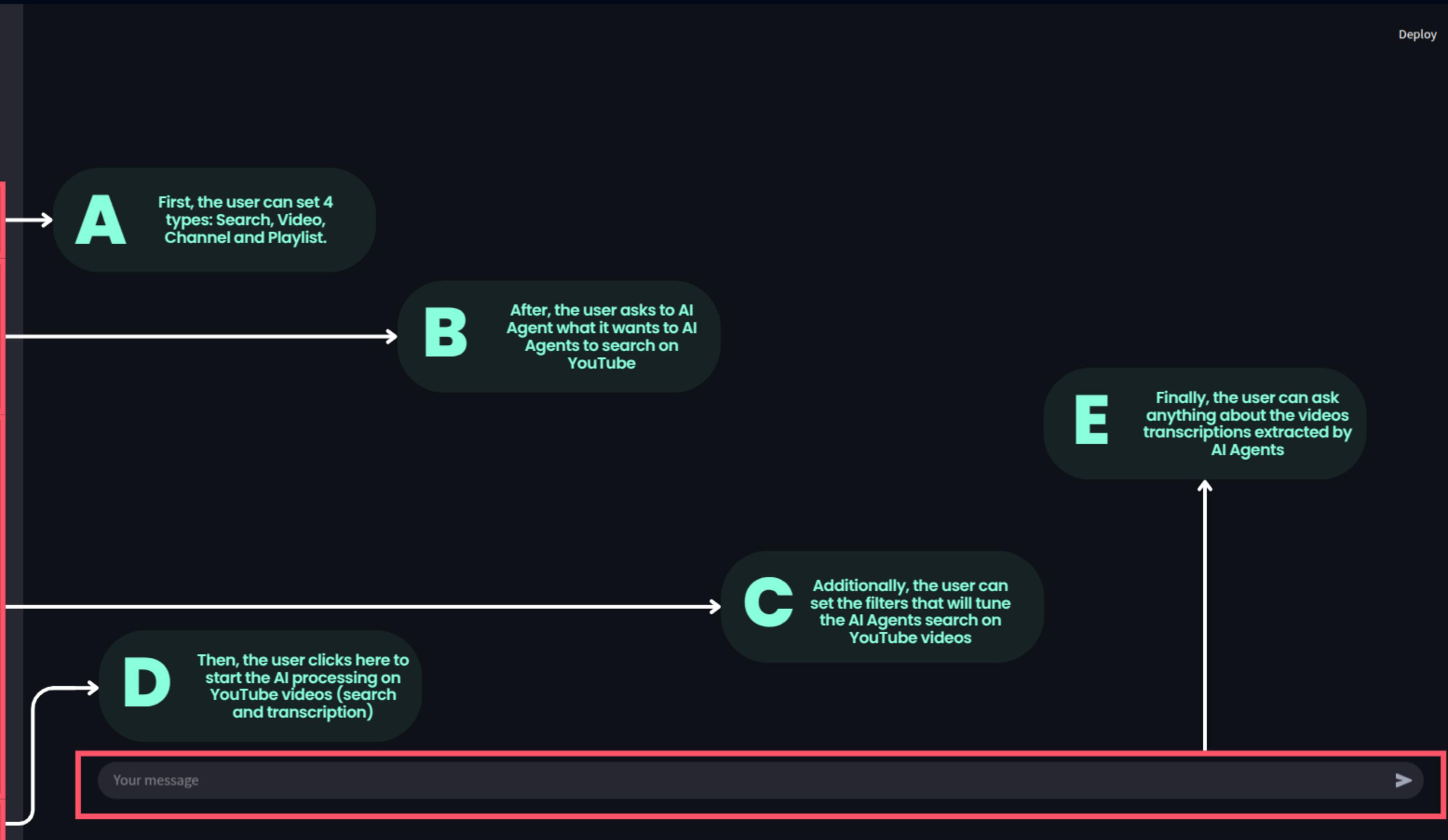
Features

Choose an option

Sort by

Upload Date

Set and search



# YouTube Content Search

BY RAFAEL COELHO

Author: Rafael Silva Coelho

Deploy

⋮

Settings

View application graphs

Clear memory

Search type

Search

Context to search  
What are the best universities in world to become specialist in Data Science and Machine Learning?

Maximum videos to search  
3 - +

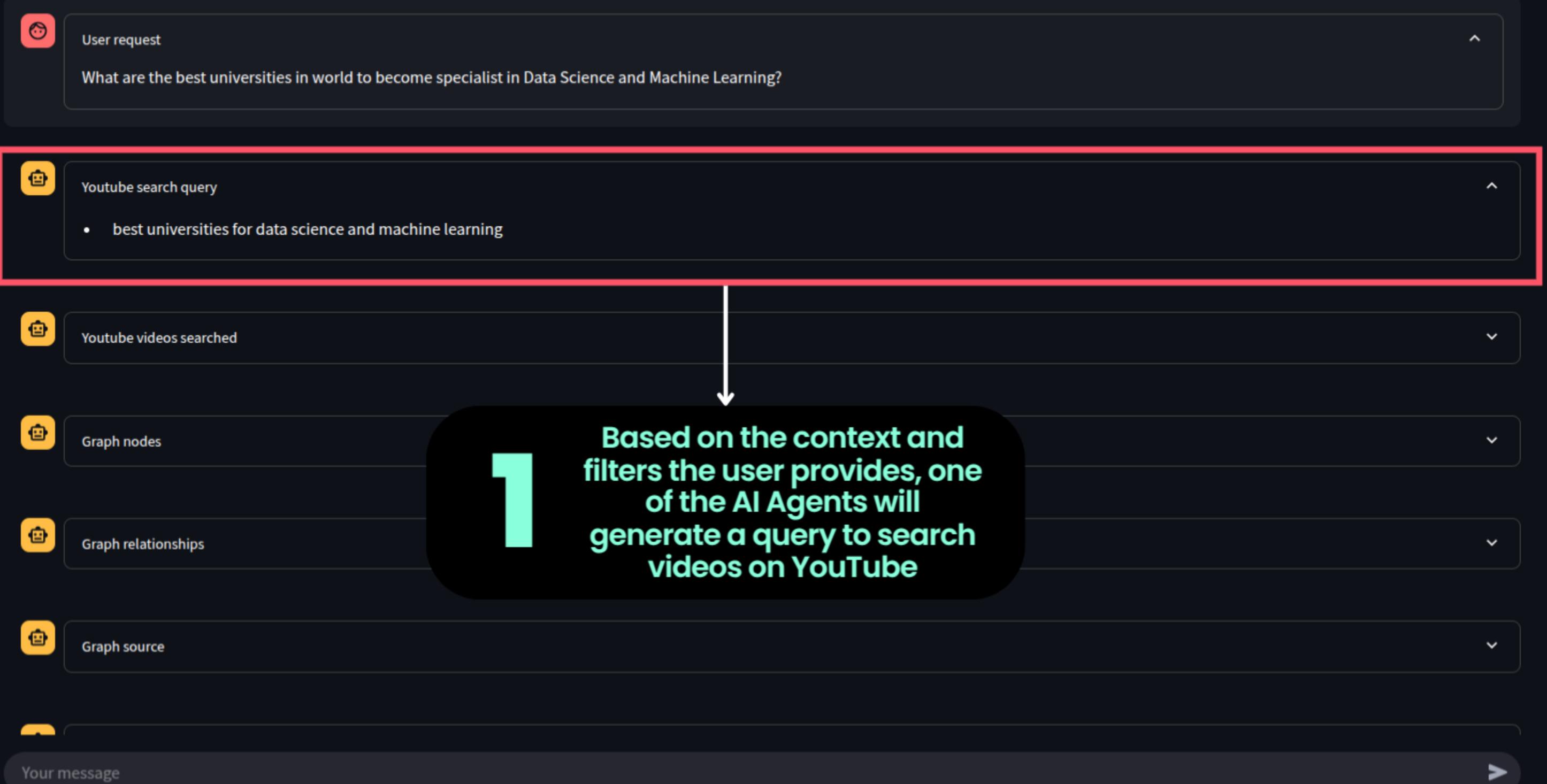
Upload date  
None

Duration  
None

Features  
Choose an option

Sort by  
Upload Date

Set and search



# YouTube Content Search

BY RAFAEL COELHO

Author: Rafael Silva Coelho

Deploy

⋮

Settings

View application graphs

Clear memory

Search type

Search

Context to search

What are the best universities  
in world to become specialist  
in Data Science and Machine  
Learning?

Maximum videos to search

3 - +

Upload date

None

Duration

None

Features

Choose an option

Sort by

Upload Date

Set and search



User request

What are the best universities in world to become specialist in Data Science and Machine Learning?

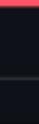


Youtube search query



Youtube videos searched

	title	author	publish_date	views	length	captions	video_id
0	Top 10 Data Science Masters Programs in the USA for 2024   MS in USA 🇺🇸	Gradvine	2023-12-06T02:23:01-08:00	36264	7	['a.en']	l6QTo0eTjgQ
1	PHD in machine learning or data science, is it worth?	codebasics	2021-04-08T07:30:04-07:00	61901	158	['a.nl', 'en']	m684QWvWDTA
2	So You're Considering A Masters Of Data Science...	Greg Hogg	2021-07-31T07:00:12-07:00	18626	466	['a.en']	g5QgJc7yix8



Graph nodes



Graph relationships

2

After querying YouTube, the  
AI Agent will return the  
videos searched to be  
processed

Your message



# YouTube Content Search

BY RAFAEL COELHO

Author: Rafael Silva Coelho

Deploy

⋮

Settings

View application graphs

Clear memory

Search type

Search

Context to search

What are the best universities  
in world to become specialist  
in Data Science and Machine  
Learning?

Maximum videos to search

3 - +

Upload date

None

Duration

None

Features

Choose an option

Sort by

Upload Date

Set and search



Graph nodes

id	type
Music	Genre
Pierce	Person
Beren	Entity
Korstje	Object
Ipad	Object
Journalist	Person
Sofie	Person
Lehigh	Organization
Rps	Event
Dhr	Title
..	..

⋮



Graph relationships



Graph source



Your message

3

Another AI Agent will get all  
videos transcriptions,  
process them and get their  
entities (graph nodes)

⋮

>

# YouTube Content Search

BY RAFAEL COELHO

Author: Rafael Silva Coelho

Deploy

Settings

View application graphs

Clear memory

Search type

Search

Context to search

What are the best universities in world to become specialist in Data Science and Machine Learning?

Maximum videos to search

3 - +

Upload date

None

Duration

None

Features

Choose an option

Sort by

Upload Date

Set and search

Graph relationships

source_id	source_type	target_id	target_type	type
Pierce	Person	Beren	Entity	IS_IN
Pierce	Person	Korstje	Object	HAS
Pierce	Person	Ipad	Object	HAS
Pierce	Person	Journalist	Person	IS
Pierce	Person	Sofie	Person	IS
Pierce	Person	Lehigh	Organization	WORKS_AT
Pierce	Person	Rps	Event	ATTENDS
Pierce	Person	Dhr	Title	HAS
Pierce	Person	Barbie	Object	HAS
Pierce	Person	Computer Vision	Field	WORKS_IN
		..		
		..		

Graph source

Assistant response

The best universities in North America to become a Data Scientist

1. University of British Columbia

Your message

>

4

Also, this AI Agent will map the relationship (graph edges) between entities, based on the transcriptions

# YouTube Content Search

BY RAFAEL COELHO

Author: Rafael Silva Coelho

Deploy

⋮

Settings

View application graphs

Clear memory

Search type

Search

Context to search

What are the best universities  
in world to become specialist  
in Data Science and Machine  
Learning?

Maximum videos to search

3 - +

Upload date

None

Duration

None

Features

Choose an option

Sort by

Upload Date

Set and search



Graph source  
[Music] oh

is doen pierce die wordt in beren zijn dat deze korstje mijn ipad sometimes en on va journalist feedback hier zo dat ding is berm mijn inkomen is hoe specifieke lehigh rps weekend is dhr lessen pierce die in nl be barbie in computer vision zodra en disk en of job drive you we they pay hoe jullie hi oké sofie houdt dan ps in specifiek veel liever dan zijn breezer project euro of nodig in der domain de compliment hi hoe voor die specifiek role you will get paid like crazy bart dat ding is you how to studio desserts je je financieel mes loadmaster de mango doen plius die zo modieus you money money save your situation is er that you can break toegang aan de manier in and if you can for your education kost jullie soort poeder kwast of je hart deed pijn over um den 13 jullie doen bios die is wordt wat die families het rif minister die en uw handboek staat om iemand zo'n daarna moesten dus hoe doe je een beetje was in dsm en zorg computer science met dsp sjalotjes en en staat working beneden zijn deze de machine learning ingenieur steden weer mido stepway de you start earning money pluis post-doc industry na leed is een de fundex ps den bing stoornissen in codes zo you get more practical nodig voor view volle desembrood nu nog wel af de meest lieve start working dual stack money money for toeval sec een ding is je wil ook een ander practical experience voor whitby genie jim ik hem lekker export lijn door mijn ex plek voor wanneer je lessen nob oké je focus on there you get hanger die heb ik kampen in je weblog familie in de cette option to become blijft moeilijk het syndroom practical detail which i know where you can take all problems in the fun domain jullie houden zonder problemen worden you might know how in durft nooit of stamboom noemt

ouden zonder problemen worden you might know how in durft nooit of stamboom noemt in periferie ingezet perzik you might come a video en custom gerust ik zal boos moderne hebben een jungle medicijn story circuit in een churro oorlog practical guide over de vriend in zijn than sorry voor de lagg trouwens zo die zit er in als u nu toe concealer up before you make a decision of been psd in dsf hope you find this would you for you hij ook en ik kan mijn zoon question please post in de comment box billen

it's not necessarily worth the money and the time component spent on that [Music] one of the most common questions i get asked is do you need a masters in data science or analytics to get a job in data science machine learning in all of those fields we different variables that come into play for if you in both a masters and phd and although you might have remasters and there are jobs that do require a master's and sometimes even a phd to even as he as a minimum

5

And these are all videos  
transcriptions in chunks, that  
were processed in order to  
store entities and relationships  
into the graph database

# YouTube Content Search

BY RAFAEL COELHO

Author: Rafael Silva Coelho

- Settings
- View application graphs
- Clear memory

Search type

Search

Context to search

What are the best universities  
in world to become specialist  
in Data Science and Machine  
Learning?

Maximum videos to search

3 - +

Upload date

None

Duration

None

Features

Choose an option

Sort by

Upload Date

Set and search



Graph nodes



Graph relationships



Graph source

# 6

Finally, another AI Agent  
answers the question made by  
the user, based on all videos  
transcriptions obtained.



Assistant response

The best universities in North America to become a specialist in Data Science and Machine Learning are:

1. University of British Columbia
2. McGill University
3. University of Waterloo
4. University of Toronto

In the USA, the top universities for Data Science and Machine Learning are:

1. Stanford
2. MIT
3. Caltech

These universities are highly regarded and can provide a strong foundation in Data Science and Machine Learning. However, it's worth noting that having a degree from one of these universities is not the only factor in becoming a specialist in the field. Practical experience, online courses, and certifications, such as those offered by Coursera, can also be valuable in demonstrating expertise.

Your message

Deploy



# YouTube Content Search

BY RAFAEL COELHO

Author: Rafael Silva Coelho

Deploy

⋮

- Settings
- View application graphs
- Clear memory

Search type  
Search

Context to search  
What are the best universities in world to become specialist in Data Science and Machine Learning?

Maximum videos to search  
3 - +

Upload date  
None

Duration  
None

Features  
Choose an option

Sort by  
Upload Date

Set and search



## Assistant response

The best universities in North America to become a specialist in Data Science and Machine Learning are:

1. University of British Columbia
2. McGill University
3. University of Waterloo
4. University of Toronto

In the USA, the top universities for Data Science

1. Stanford
2. MIT
3. Caltech

These universities are highly regarded and can provide a strong foundation in Data Science and Machine Learning. However, it's worth noting that having a degree from one of these universities is not the only factor in becoming a specialist in the field. Practical experience, online courses, and certifications, such as those offered by Coursera, can also be valuable in demonstrating expertise.

7

After all these steps, the user can ask anything about the videos retrieved, and then another AI Agent will answer the questions based on the Knowledge Graph generated over the video transcriptions.



## User request

What are all costs cited in the videos?



## Assistant response

The costs cited in the videos are time and money, specifically referring to the time and financial investment required for a master's degree.



Your message



# YouTube Content Search

BY RAFAEL COELHO

Author: Rafael Silva Coelho

Deploy

⋮

Settings

View application graphs

Clear memory

Search type

Search

Context to search

What are the best universities  
in world to become specialist  
in Data Science and Machine  
Learning?

Maximum videos to search

3

- +

Upload date

None

Duration

None

Features

Choose an option

Sort by

Upload Date

Set and search



User request

And what are all people and places cited in the videos?



Assistant response

The people and places cited in the videos are:

People:

- The speaker (no specific name mentioned)
- Professors (mentioned as a group, not specific individuals)
- People who have bypassed master's and PhD degrees (mentioned as a group, not specific individuals)

Places:

- University of British Columbia
- McGill University
- University of Waterloo
- University of Toronto
- Stanford
- MIT
- Caltech
- University of Waterloo

7

After all these steps, the user can ask anything about the videos retrieved, and then another AI Agent will answer the questions based on the Knowledge Graph generated over the video transcriptions.

Your message



# YouTube Content Search

BY RAFAEL COELHO

Deploy

## YouTube Content Search

Author: Rafael Silva Coelho

Settings

View application graphs

Clear memory

8

By clicking on “View application graph” button, you can take a look at the AI Agents graph structure (LangGraph) and the processing flow that makes all these processes possible.

Video URL

<https://www.youtube.com/watch?v>

Set and search

View Neo4j context graph

Your message



Assistant response  
This video is al...



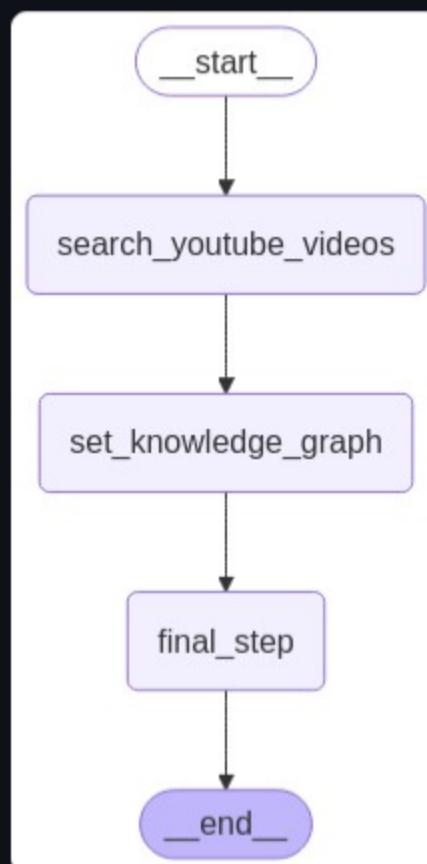
User request  
What are all cc...



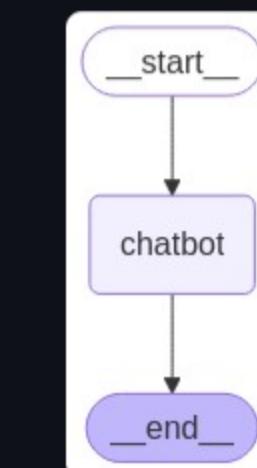
System response  
...es, and daily life.

## Application graphs

### YouTube Content Search



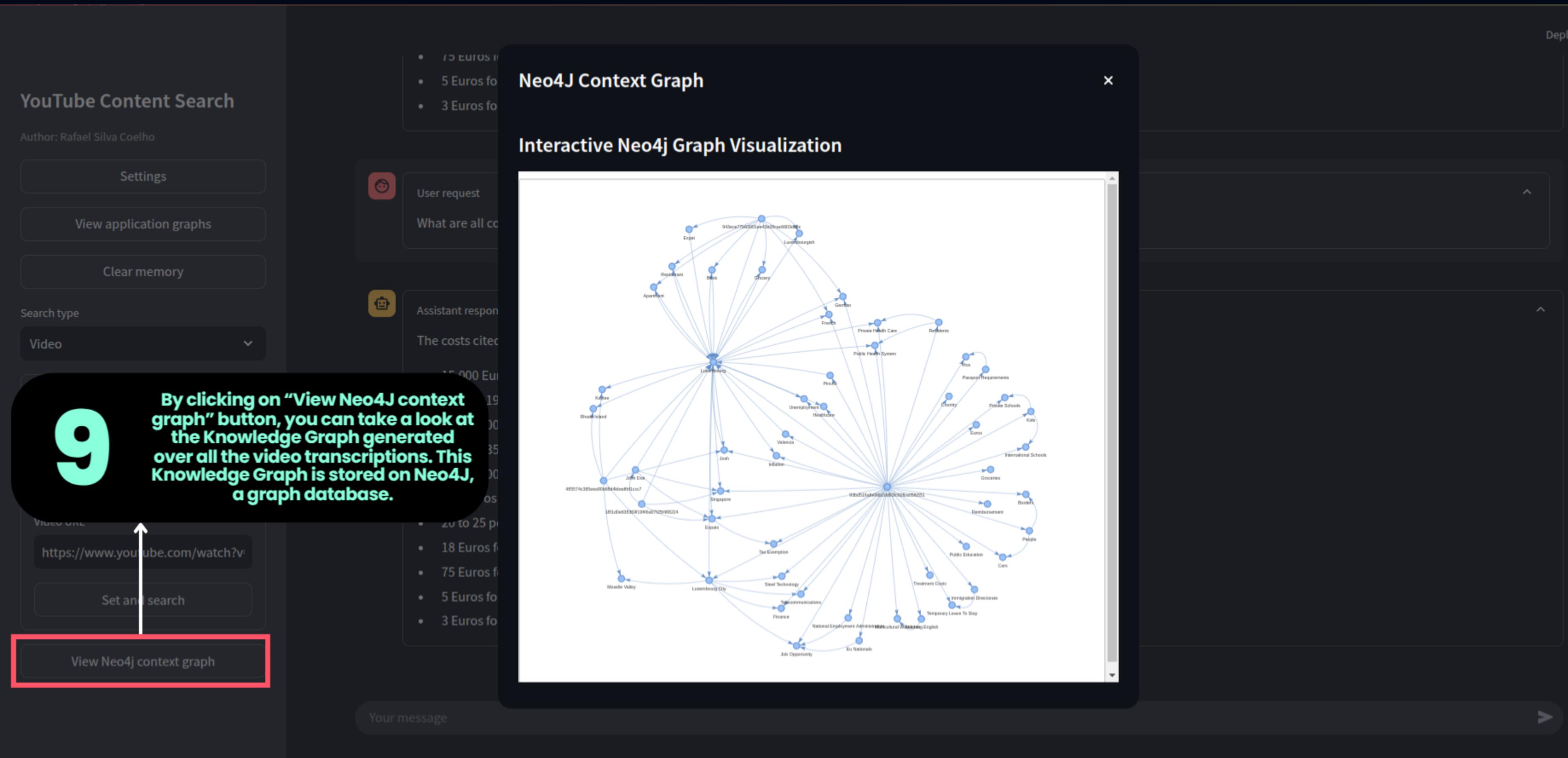
### YouTube Chatbot



# YouTube Content Search

BY RAFAEL COELHO

## Deploy



# YouTube Content Search

BY RAFAEL COELHO

FastAPI 0.1.0 OAS 3.1

/openapi.json

# 10

You can also check and test all  
FastAPI endpoints of this  
applications to inference, for  
example.

default

GET /settings/frameworks Get Framework

GET /settings/frameworks/models Get Framework Models

GET /search\_type Get Search Type

GET /search/upload\_date Get Search Upload Date

GET /search/duration Get Search Duration

GET /search/features Get Search Duration

GET /search/sort\_by Get Search Duration

GET /agents\_config Get Agents Config

PUT /agents\_config Update Agents Config

GET /model\_config Get Model Config

PUT /model\_config Update Agents Config

GET /youtube\_content\_search/clear\_neo4j\_graph Clear Neo4J Graph

GET /youtube\_content\_search Set Model

# YouTube Content Search

BY RAFAEL COELHO

### Database Information

Use database: neo4j\$

**Node labels:**

- \*(54) City Concept Country
- Currency Document Entity
- Establishment
- Geographical feature Group
- Industry Institution Language
- Location Person Profession
- Property State Store Valley
- Vehicle \_\_Entity\_\_

**Relationship types:**

- \*(105) ATTEND CAPITAL
- CHOOSE CROSS
- EXPRESSED\_INTEREST\_IN HAS
- HAVE ISSUE LIVED\_IN
- LIVES\_IN LIVE\_IN LOCATED\_IN
- LOCATION MENTIONS OFFER
- PAY\_INTO POPULATED\_BY
- PRIORITY RECEIVE REGULATE
- REQUIRE RESIDENT
- SIMILAR\_TO SIZE\_COMPARISON
- SPEAKS USE WORKS\_WITH

**Property keys:**

### neo4j\$

```
neo4j$ MATCH (n) RETURN n LIMIT 25
```

The screenshot shows the Neo4j browser interface. On the left, there's a sidebar with 'Database Information' and a list of node labels and relationship types. The main area displays a graph visualization of nodes and relationships. A central yellow node represents 'Luxemb...' (Luxembourg). Other nodes include '93bd518...', '943ece7...', '485574c...', 'Josh', 'Kaytee', 'Rhode Island', 'Moselle Valley', 'Luxemb...', 'Borders', 'Cars', 'People', 'Groceries', 'Country', 'Euros', 'German', 'French', 'Public Health System', 'Healthcare', 'Expat', 'Apartment', 'Grocery', 'Restaurant', 'Bank', and 'Moselle Valley'. Relationships like 'LOCATED\_IN', 'HAS', 'SPEAKS', 'LIVES\_IN', 'MENTIONS', 'CROSS', and 'USE' are visible between nodes. On the right, there's an 'Overview' section showing a summary of node labels and relationship types.

**Relationship types:**

- \* (50) MENTIONS (28) CAPITAL (1)
- SIZE\_COMPARISON (1) RESIDENT (2)
- LOCATION (1) LIVES\_IN (1) SPEAKS (3)
- HAS (4) LOCATED\_IN (4) USE (1) CROSS (1)

\$ :play start

**neo4j**

Try the preview! Switch to the pre-latest features.

The Neo4J interface is also available if the user wants to check the Knowledge Graph of the videos transcriptions, that is stored into the graph database.

**Cypher basics**

Intro to Graphs with Cypher

What is a graph database?  
How can I query a graph?

# YouTube Content Search

BY RAFAEL COELHO

mlflow 2.21.2 Experiments Models Prompts GitHub Docs

## Experiments

YouTube Content Search Provide Feedback Add Description

Runs Evaluation Experimental Traces

Search experiments

Default YouTube Content Search

Request ID Time created Status Request Response Run name Execution time Tags

Request ID	Time created	Status	Request	Response	Run name	Execution time	Tags
3f94ecce41da4bbfbdf7fc516...	2 hours ago	OK	{"question": "What are all costs cited in the video?"}			0.5s	
d54a3a4d2d514e6da63a418...	2 hours ago	OK	{"question": "What are all costs cited in the video?"}	> "The costs cited in the video include:\n\n- 15,000 Euros per year per kid for private international schools\n- 1600 to 1900 Euros for a one-bedroom apartment in the city center\n- 13 to 1600 Euros for a one-bedroom apartment outside the city center..."		1.6s	
4d3d7e73569546989563395...	2 hours ago	OK	{"question": "What is this video about?"}			3.7s	
22637e00a6844d48b8be8a9...	2 hours ago	OK	{"question": "What is this video about?"}	"This video is about living in Luxembourg as an expat, covering topics such as the country's culture, cost of living, job opportunities, and daily life."		32.2s	
7ea0a97b19774fae943fe80d...	2 hours ago	OK	> {"input": " are a lot of similarities to another place that we lived which"}	> {"raw": {"content": "", "additional_kwargs": {"tool_calls": [{"id": "1"}]}}		20.6s	

To check the AI Agents behavior, there is a MLflow interface available to trace all requests and responses flow.

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< Previous Next >

# Let's work together!



## E-MAIL

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