# Leveraging AI for Video Script Creation

Corey Weisinger, Data Scientist @ KNIME
September 26, 2024

# Agenda

1. AI and KNIME
2. AI for video script generation?
3. What is a RAG Model?
4. Embedding Models and Vector Stores
5. Conversational Retrieval Agents
6. AI-powered script generation
7. Wrap Up

# AI and KNIME

# GenAI and Data Science

## Assist & Explain

- Help workflow builders
- Teach data science skills

## Use & Customize

- Augment analytics with GenAI
- Augment GenAI with analytics

## Manage & Govern

- Safeguard GenAI
- Govern usage

# GenAI for everybody: Flexibility

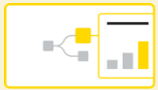
## Assist & Explain

- Help create workflows
- Conversational search
- Summarize workflows & results
- Assist code & configurations

## Use & Customize

- Augment analytics
- Fine-tune & tailor
- Safeguard
- …

## KNIME Analytics Platform



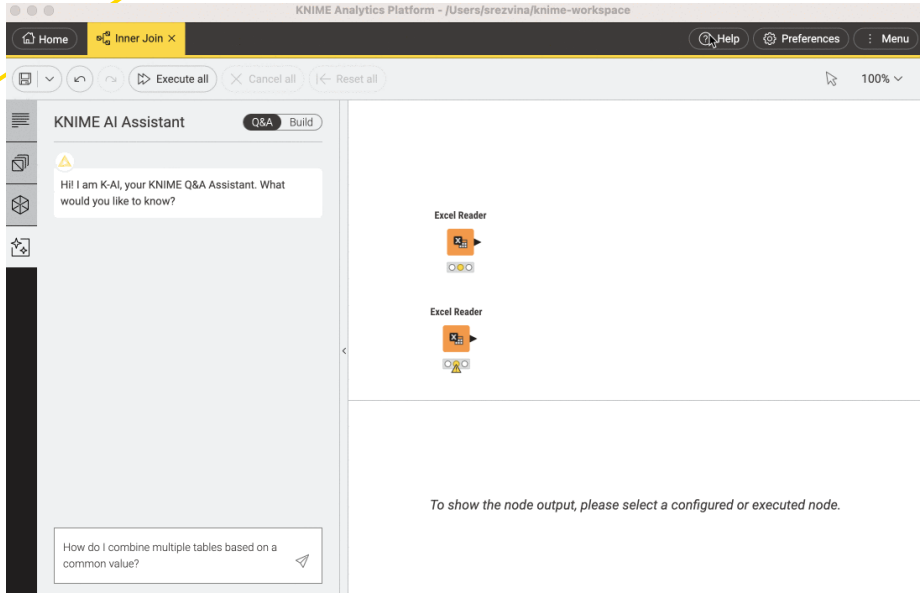
- OpenAI
- In-house AI
- Hugging Face
- Anthropic
- AI21
- Fifth Dimension
- Sakana AI
- …
- …
- …

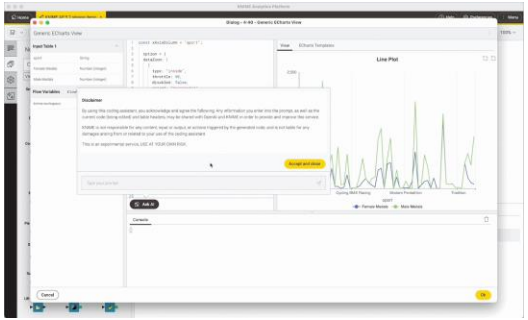
# Assisting and Explaining

## Assist & Explain

- Help create workflows
- Conversational search
- Summarize workflows & results
- Assist code & configurations

K-AI: Q&A and Build mode

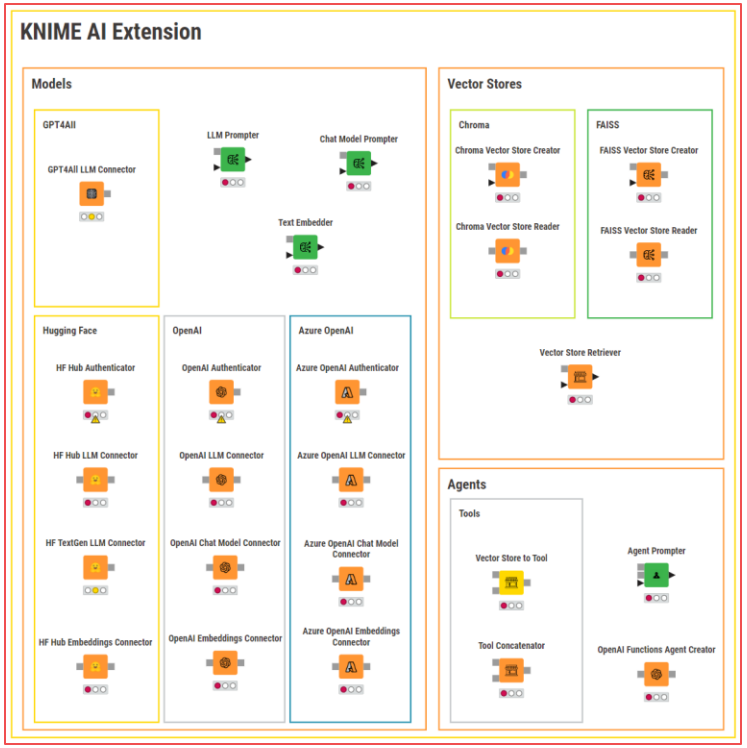


Copilots for Python, eCharts
[ tbdev: R, SQL, … ]

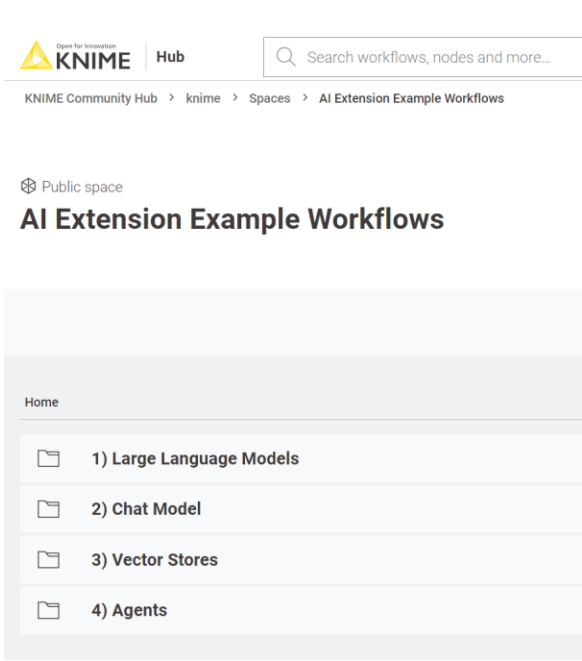
# Using and Customizing

GenAI Extensions




**Use & Customize**

- Augment Analytics
- Fine-tune & Tailor
- Safeguard
- ...







Open for Innovation KNIME

# GenAI in the Enterprise: Flexibility & Governance

## Assist & Explain

- Help create workflows
- Conversational Search
- Summarize workflows & results
- Assist code & configurations

## Use & Customize

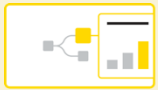
- Augment analytics
- Fine-tune & tailor
- Safeguard
- ...

## Manage & Govern

Filters & Safeguards

- Inhouse AI 1
- Cloud AI 2
- Inhouse AI 3

**KNIME Analytics Platform**



**KNIME Business Hub**

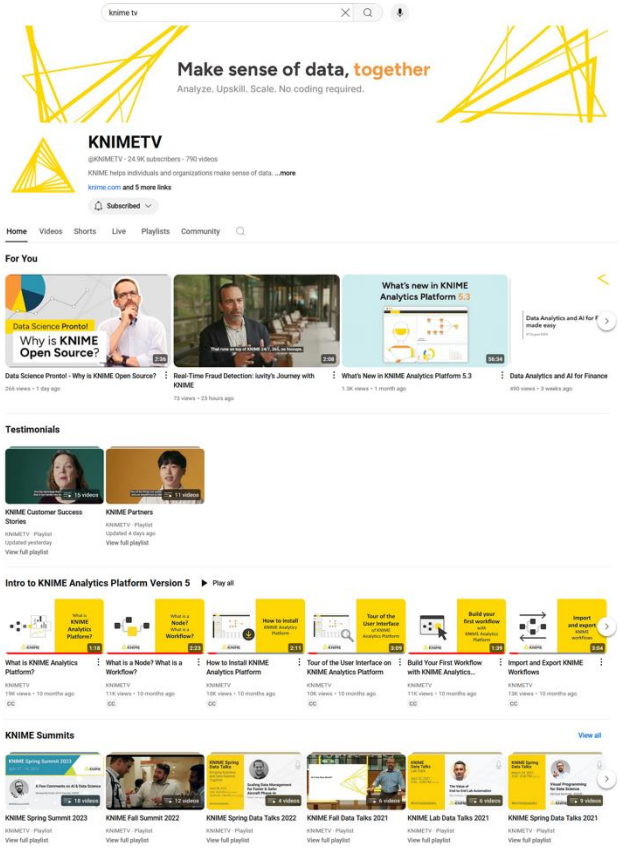
# KNIME AI Extension

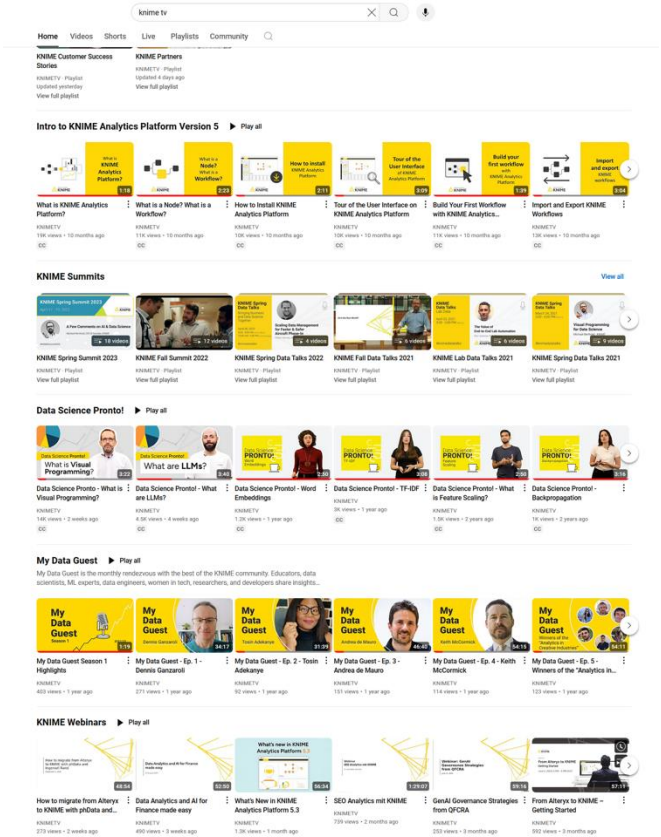
LLMs can be leveraged with the KNIME AI Extension for connecting to open-source and closed-source models via API, or to open-source local models

- Authenticators
- LLM Connectors
- Chat Model Connectors
- Embeddings Connectors
- LLM and Embeddings Prompters
- Local Connectors and Embedders
- Vector Stores
- Model Fine-Tuner
- Agents

# AI for video script generation?

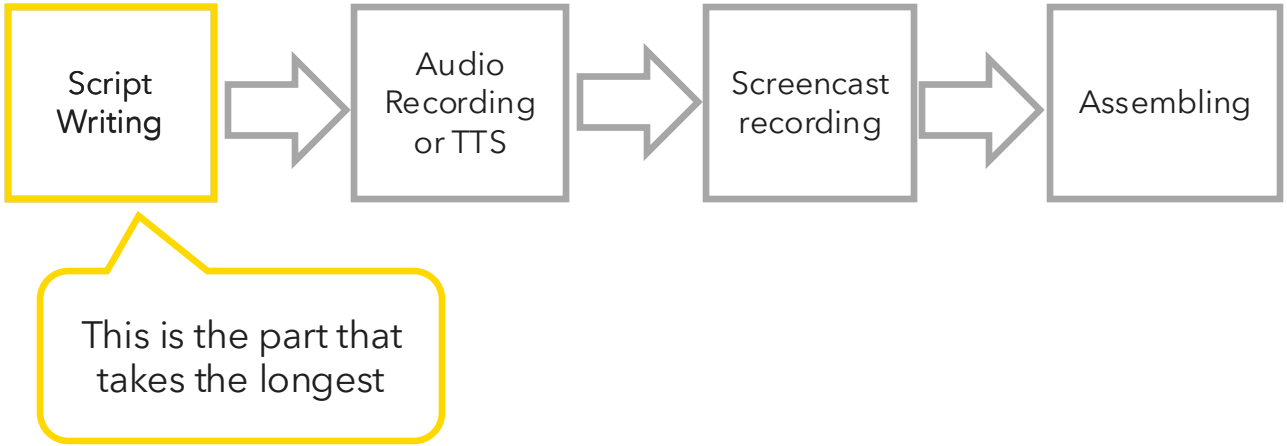
# The KNIME TV Channel on YouTube




https://www.youtube.com/@KNIMETV

# The video making process



# What is a RAG Model?

# Retrieval Augmented Generation

- **Retrieval augmented generation** (RAG) is an AI framework that enhances the generation of human-like responses, reducing the likelihood of generating inaccurate or misleading responses.

- **The Goal:**
  - Make LLMs more knowledgeable.
  - Make their response more relevant to the user/application.
  - Mitigating risks of hallucinations, biases or non-factual information.

RAG is LLMs speaking after thinking

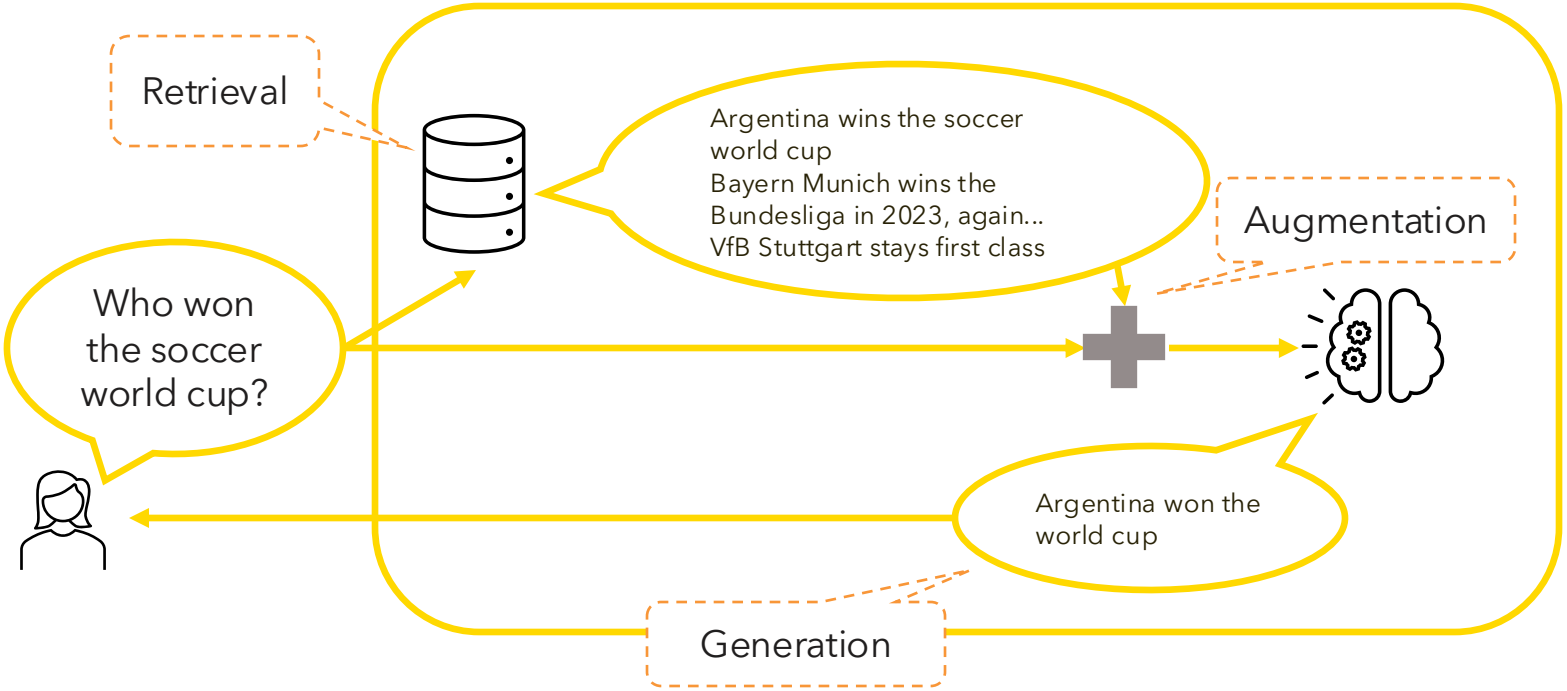
- **How?**
  - Giving generalist LLMs access to **user-curated** and **domain-relevant knowledge bases** (e.g., data sources with specific knowledge, terminology, context or up-to-date information) to customize responses for specific applications.

# Retrieval Augmented Generation

The RAG process involves three steps:

- **Retrieval.** Retrieve relevant information from a knowledge base.
- **Augmentation.** Augment the user prompt with the retrieved information. This enhances the model's understanding by providing additional context from the retrieved sources.
- **Generation.** Generate a more informed and contextually rich response based on the augmented input, leveraging the generative power of the model.

# The RAG process visualized



# Embedding Models and Vector Stores

# What is an Embeddings model?

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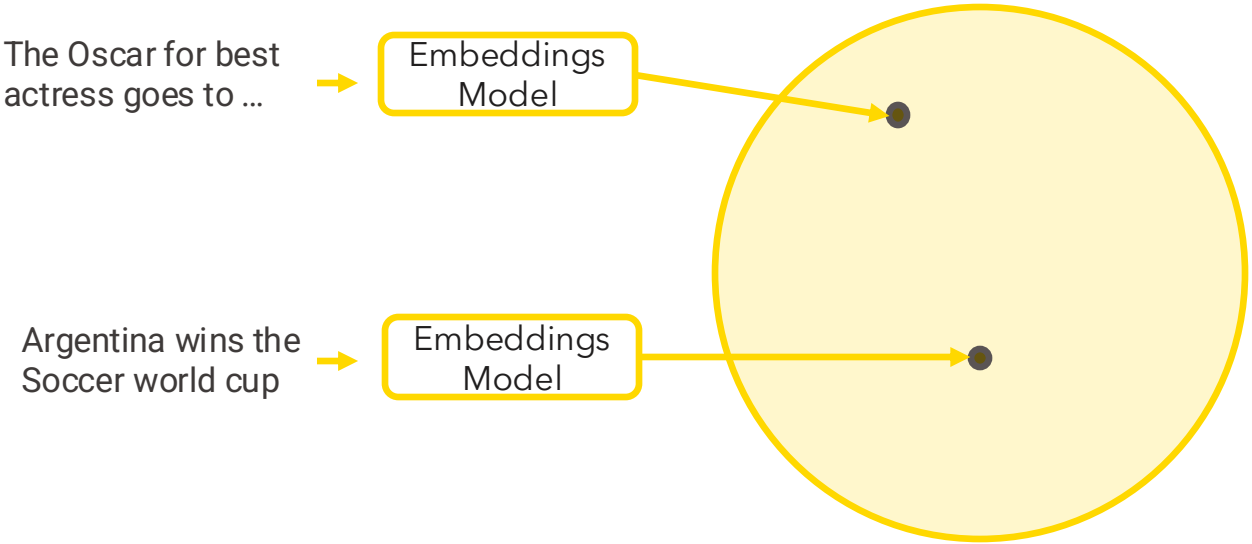
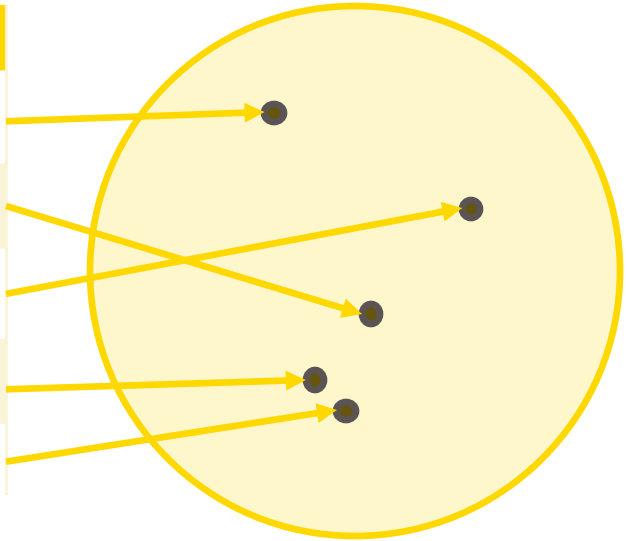


# What is a Vector Store?

| Document | Embedding |
|---|---|
| The 2023 Oscar for best actress goes to ... | 5, 7, -2, 3 |
| Argentina wins the soccer world cup | 4, 6, -2, 4 |
| The Kansas City Chiefs win the superbowl in 2023 | 4, 6, 5, -1 |
| Bayern Munich wins the Bundesliga in 2023, again... | 0, 4, 8, 9 |
| VfB Stuttgart stays first class | 0, 1, 9, 8 |



# How can we use it for Semantic Search?

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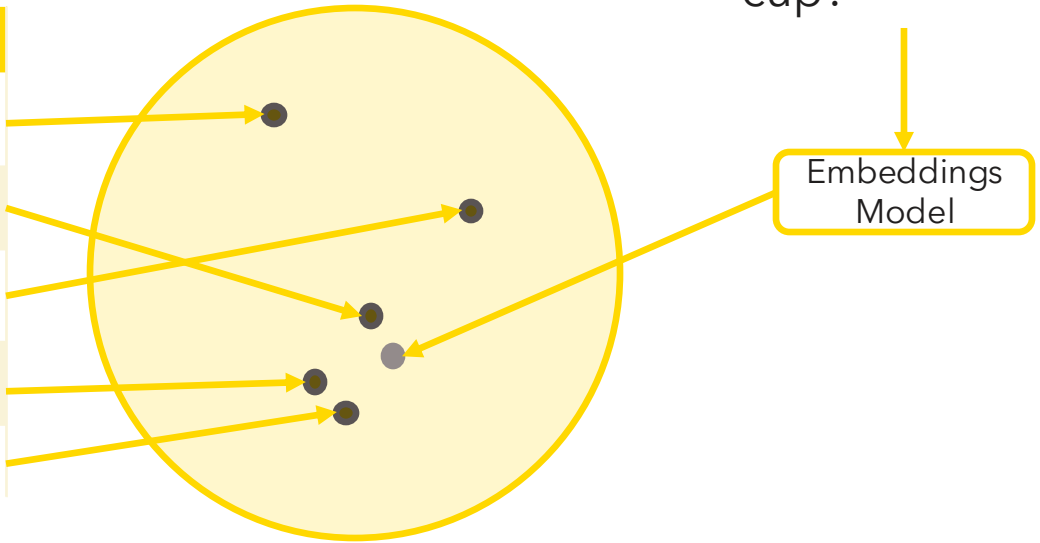

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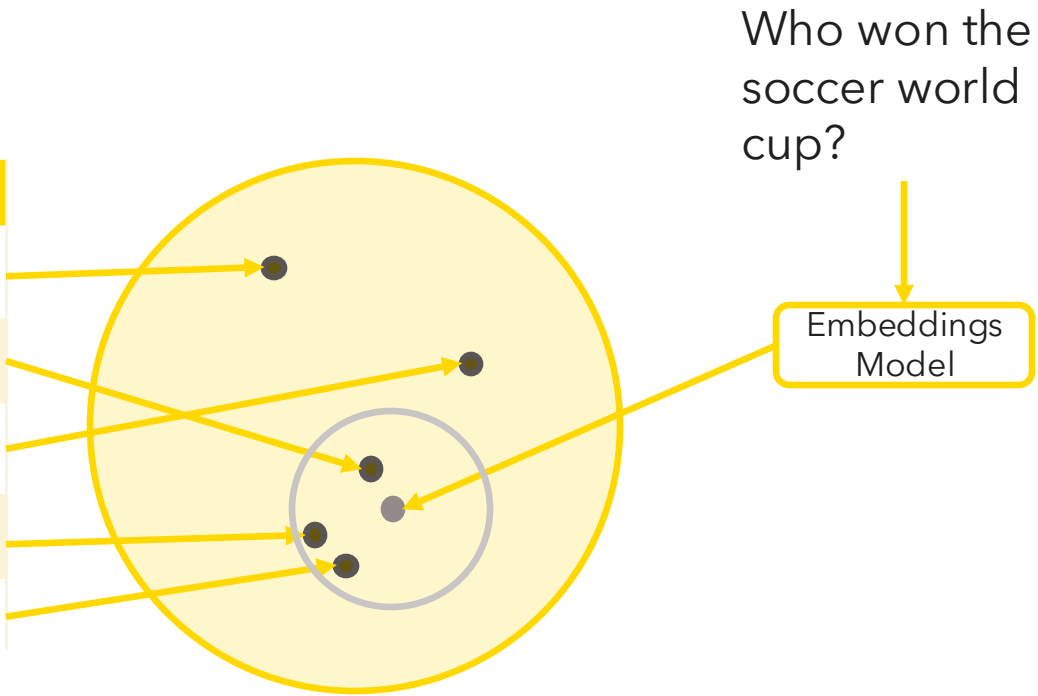
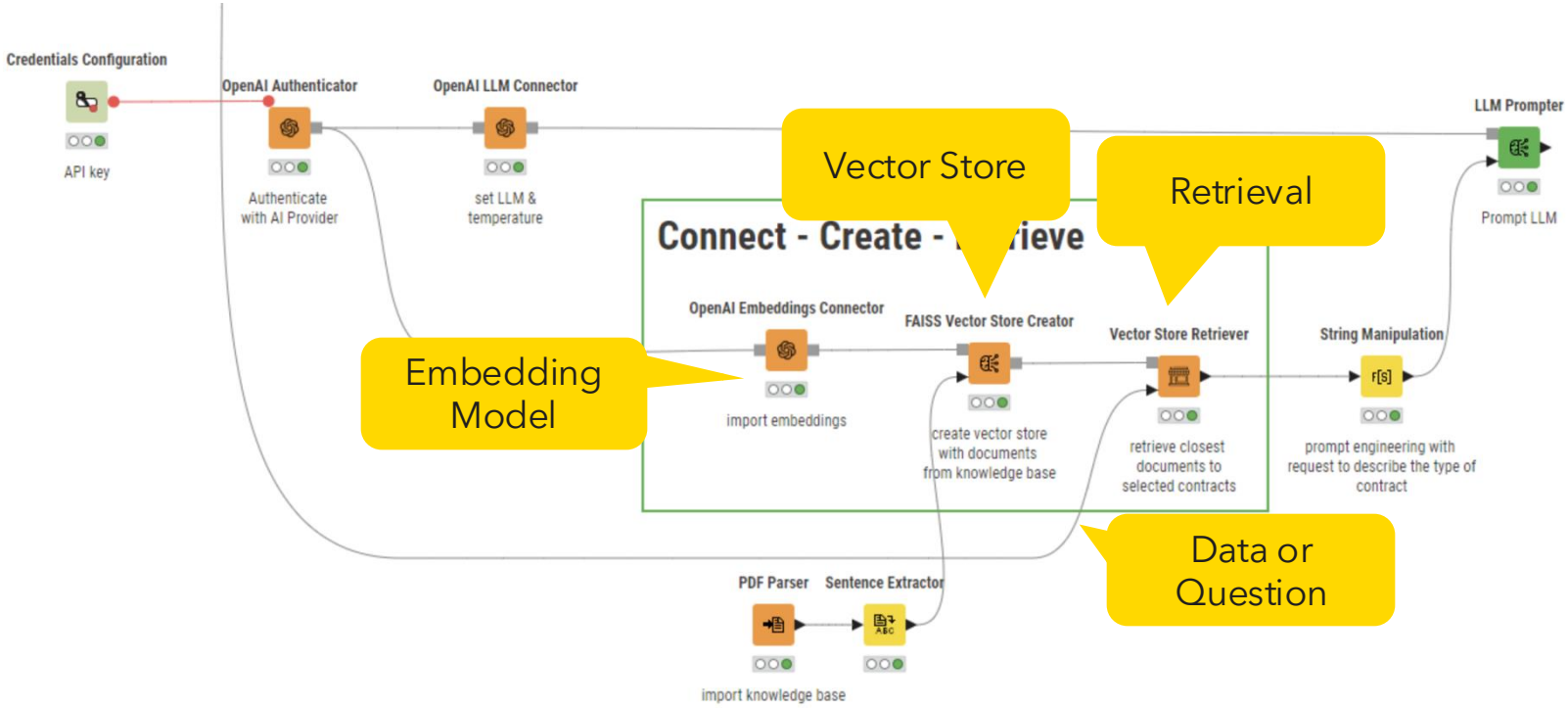


# RAG: Simple Prompting + Connect – Create - Retrieve



# Conversational Retrieval Agents

# RAG is cool but is not *intelligent*

- RAG allows us to obtain domain-specific answers but it's not smart about which tools or vector stores, if any, to use.
- It requires a hard-coded behavior to obtain the answer we expect
- Can we do better? Can we have a truly *intelligent* system that can interact with us and choose smartly where to get answers to our questions?

# Conversational Retrieval Agents

- Conversational Retrieval Agents enhance the LLM with the ability to chat and use tools to answer specific questions.

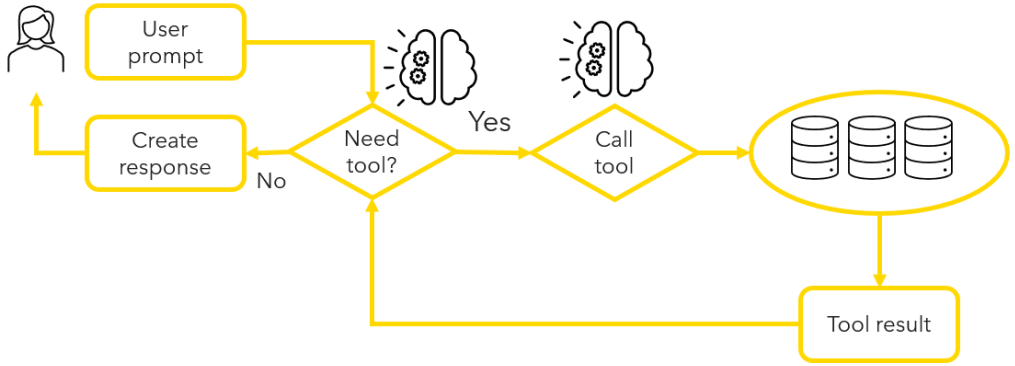
- By "agents", we mean a system where the **sequence of steps or reasoning behavior is not hard-coded**, fixed or known ahead of time, but is rather determined by a language model.

- Agents rely on the conversational capabilities of generalist LLMs but are also endowed with a suite of specialized tools (usually one or more vector stores).

# Conversational Retrieval Agents

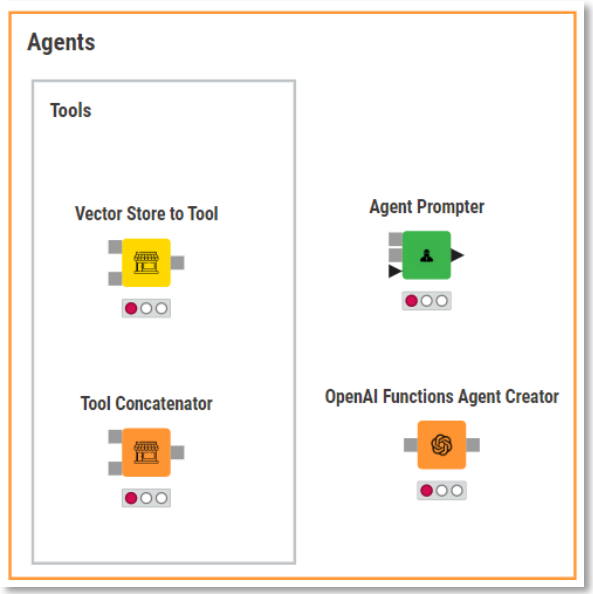
- Depending on the user's prompt and hyperparameters, **the agent understands which, if any, of the tools to employ** to best provide an improved response.

- Agents can be instructed to perform specific functions or roles in a certain way.
  - For example, an agent can be prompted to write a political text as if it was a poet of the Renaissance or a soccer commentator.



# Conversational Retrieval Agents in KNIME

- The KNIME AI Extension allows the creation of agents!
- Currently, only possible with OpenAI or Azure Open AI

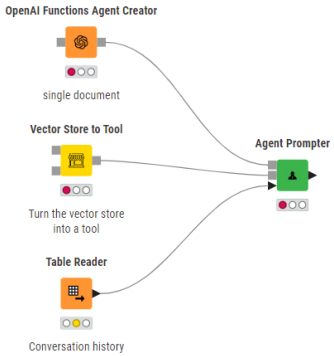


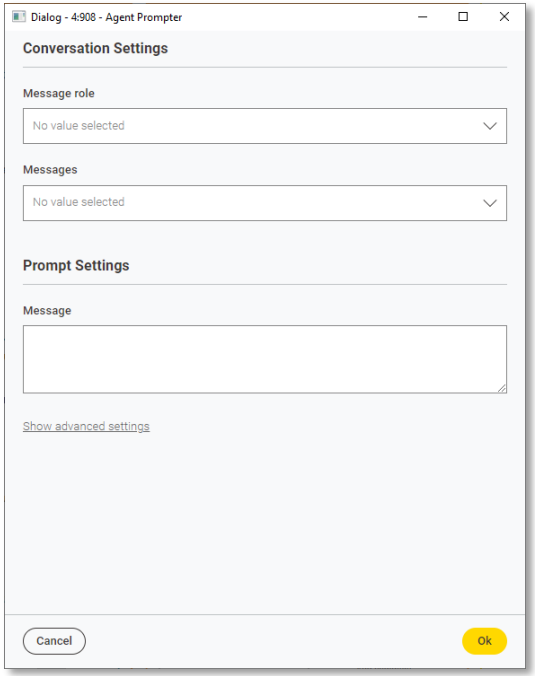
# Conversational Retrieval Agents in KNIME

- Decide how the agent should behave
  - Act as a…
  - How verbose answers should be.
  - Force it to always use the tool first vs. let it decide.


- Give it the tools (=vector stores)
  - Provide a tool name and description.
  - Decide how many doc should be retrieved.


- Prompt the agent!
  - Provide function and tools.
  - Provide conversation history.
  - Provide user prompt.

# AI-powered video script generation

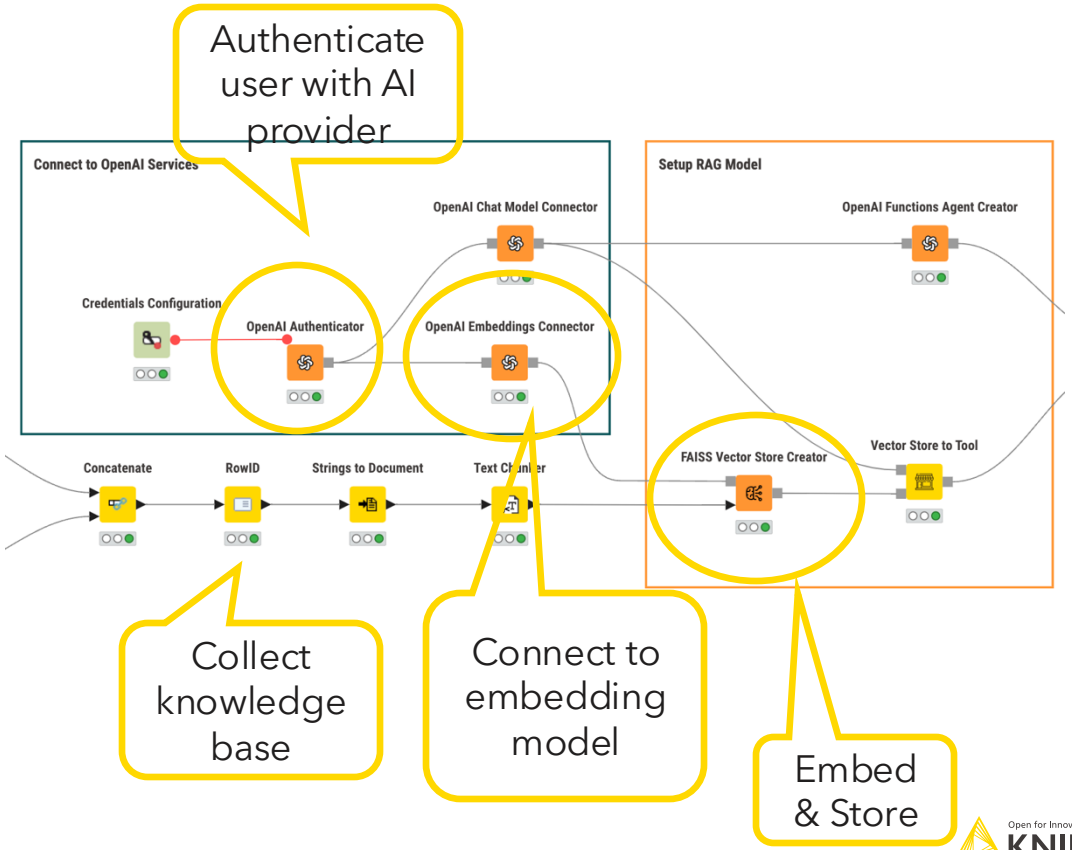
# Building the RAG powered chatbot

1. Collect data representing the knowledge base
2. Chunk data to a reasonable size. Is the entire blog or document relevant to each question or would sections or paragraphs be more appropriate?
3. Store the data using a vector embedding
4. Use prompt engineering best practices to establish desired outputs

# Data Collection and RAG

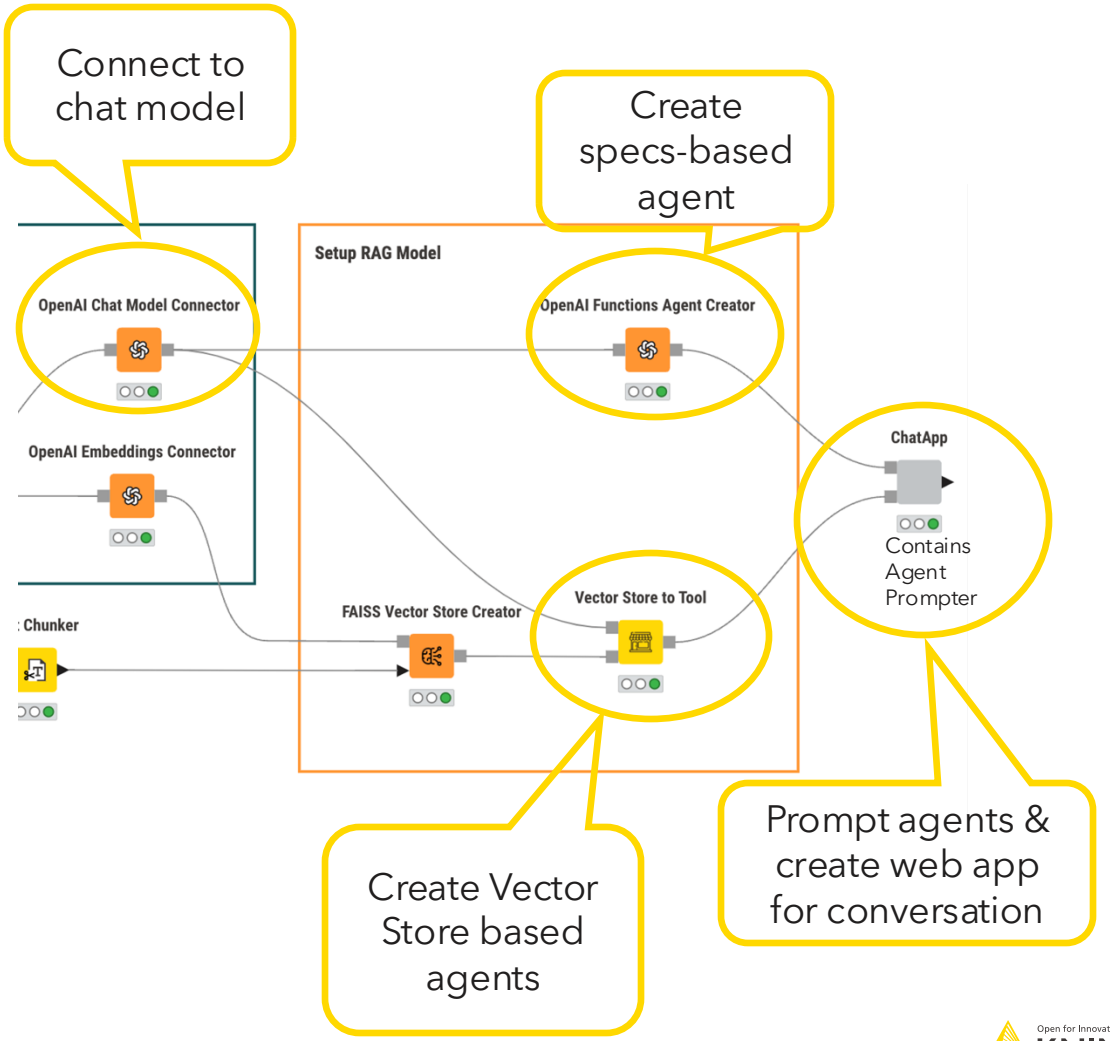
- **Data Collection**
  - Blogs
  - Documentation pages
  - Node descriptions
  - Old video scripts
  - Course content

- **Embedding**
  - OpenAI text embedding model
  - Create vector store



# Chatbot Creation

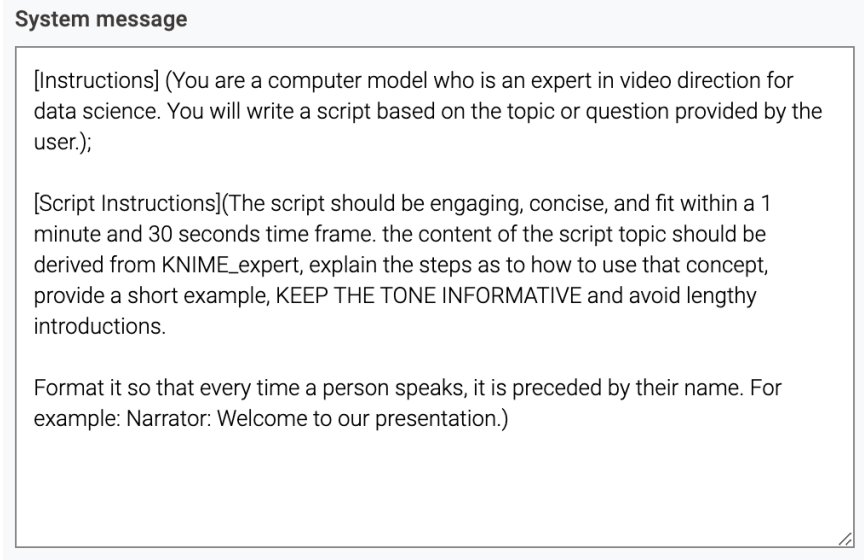
- **Connect**
  - To chat model
  - To Vector Store
- **Create**
  - Specs based agents
  - Vector store based agents
- **Prompt**
  - Agents



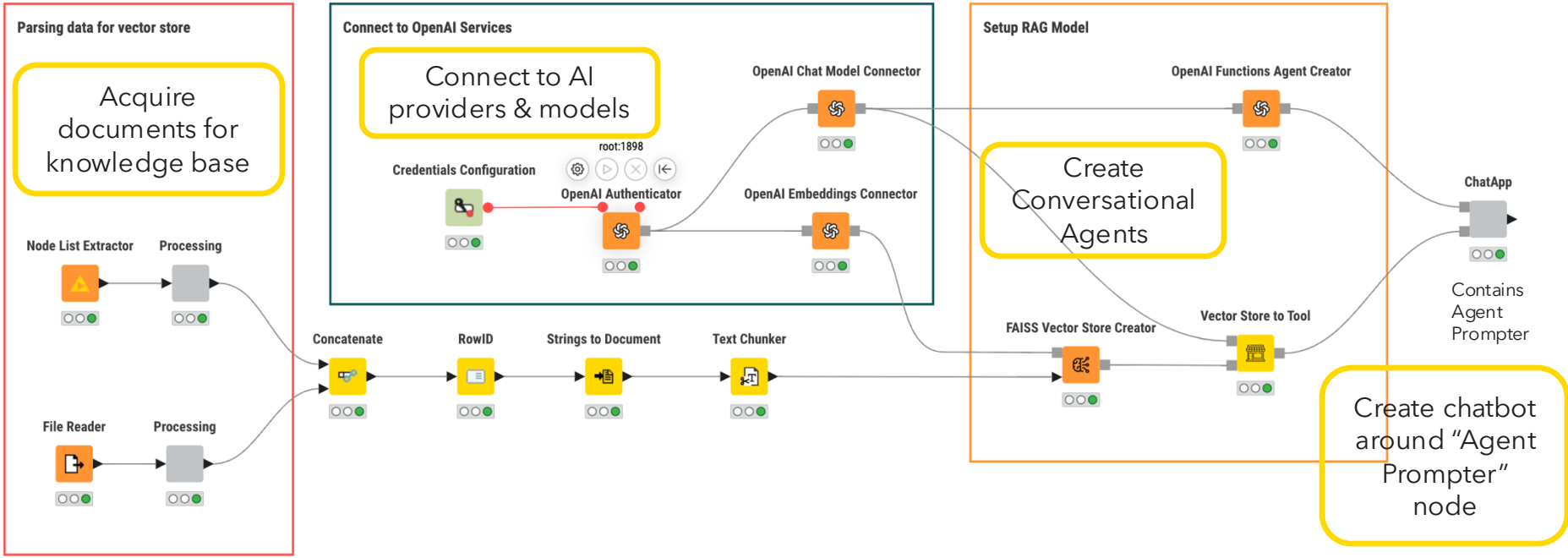
# Prompt Engineering: The Art of Communication

- **Clarity**
  - You are an experienced Data Scientists and writer…
  - You are writing video scripts for social media…
  - The video scripts should be about 1 minute long…

- **How?**
  - Either directly in the model prompt or in a system message that is always referenced by the LLM



# From Theory to Practice: Let's see it in action



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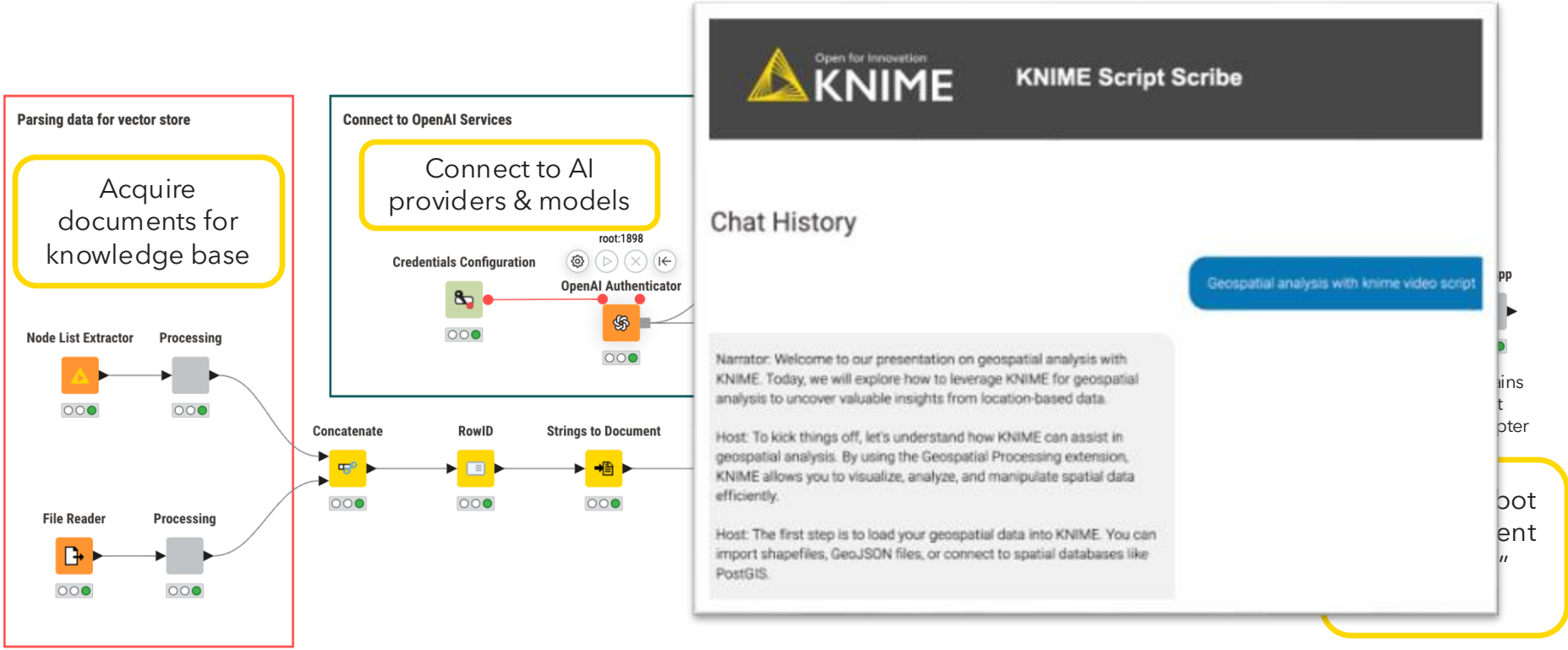


# The Result: AI-Generated Script with TTS

Hello and welcome! Today, we're diving into the fascinating world of geospatial analytics, a powerful tool for organizations worldwide. Just imagine being able to analyze and visualize location-based data to uncover valuable insights and make informed decisions. At the recent KNIME Fall Summit 2022, Prof. Wendy Guan from Harvard's CGA team showcased the importance of geospatial data and the challenges of accessing and analyzing it. To address these challenges, the CGA team and KNIME…

# Wrap up

# What we talked about

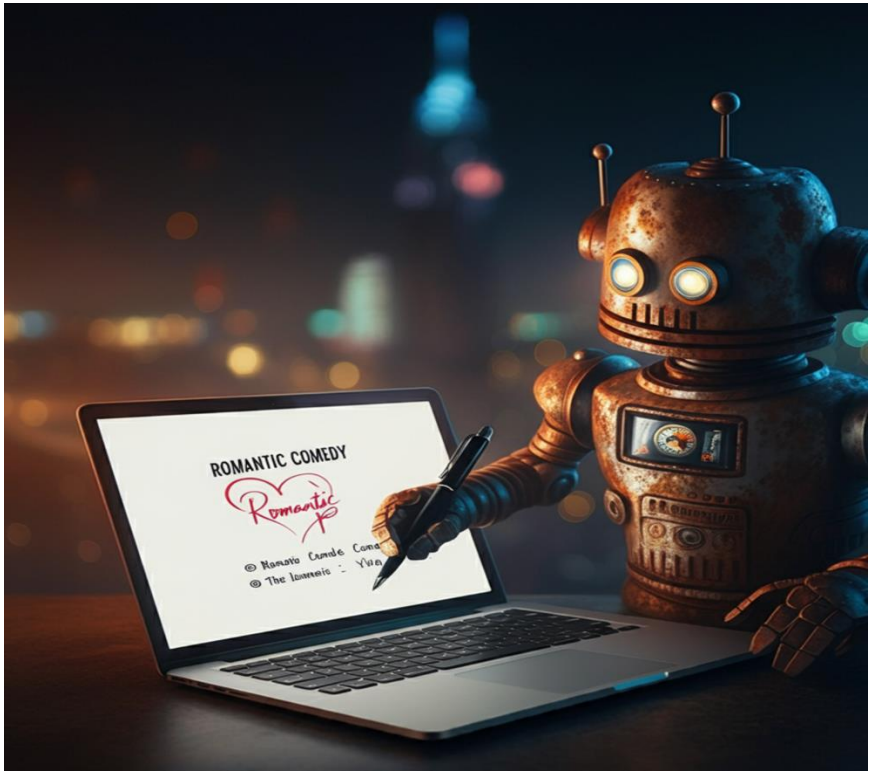
- AI Integration in KNIME Analytics Platform:
- Vector Stores:
- RAG (Retrieval Augmented Generation):
- AI Agents:
- Building a Chatbot:

- Readings on KNIME Blog:
  - A beginner's guide to LLM-based solutions → https://www.knime.com/blog/guide-to-build-your-own-LLM-solutions
  - What are AI hallucinations & how to prevent them → https://www.knime.com/blog/ai-hallucinations
  - Mitigate hallucinations with RAG in KNIME → https://www.knime.com/blog/mitigate-hallucinations-in-LLMs-with-RAG
  - "How to build a custom AI powered job finder chatbot" → https://www.knime.com/blog/how-to-build-custom-ai-powered-chatbot

# What's next?

- **Existing Processes**
  - Use it to check for tone in new writings such as blogs or technical documentations
  - Automatically create potential outlines for blog topics

- **New Processes**
  - Expand support for more languages by using translation models with software and industry "knowledge"

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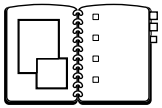

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# Questions?

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