RAG – dive into basics

< Let’s explore RAG concept>

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About me:

- Senior Software Engineer
- Working in EPAM DIAL stream
- Co-Organizer of Codeus community

There are no magic! It is simple REST API!

+

calls to database

Before we start:

- Raise your hand and ask questions if you have any
- It is better to ask questions when you have
- Also, type them in chat
- We will code together today
- We will need Open AI API key:
  - If you have yours, then use yours
  - Or I'll provide but it will be alive couple of hours

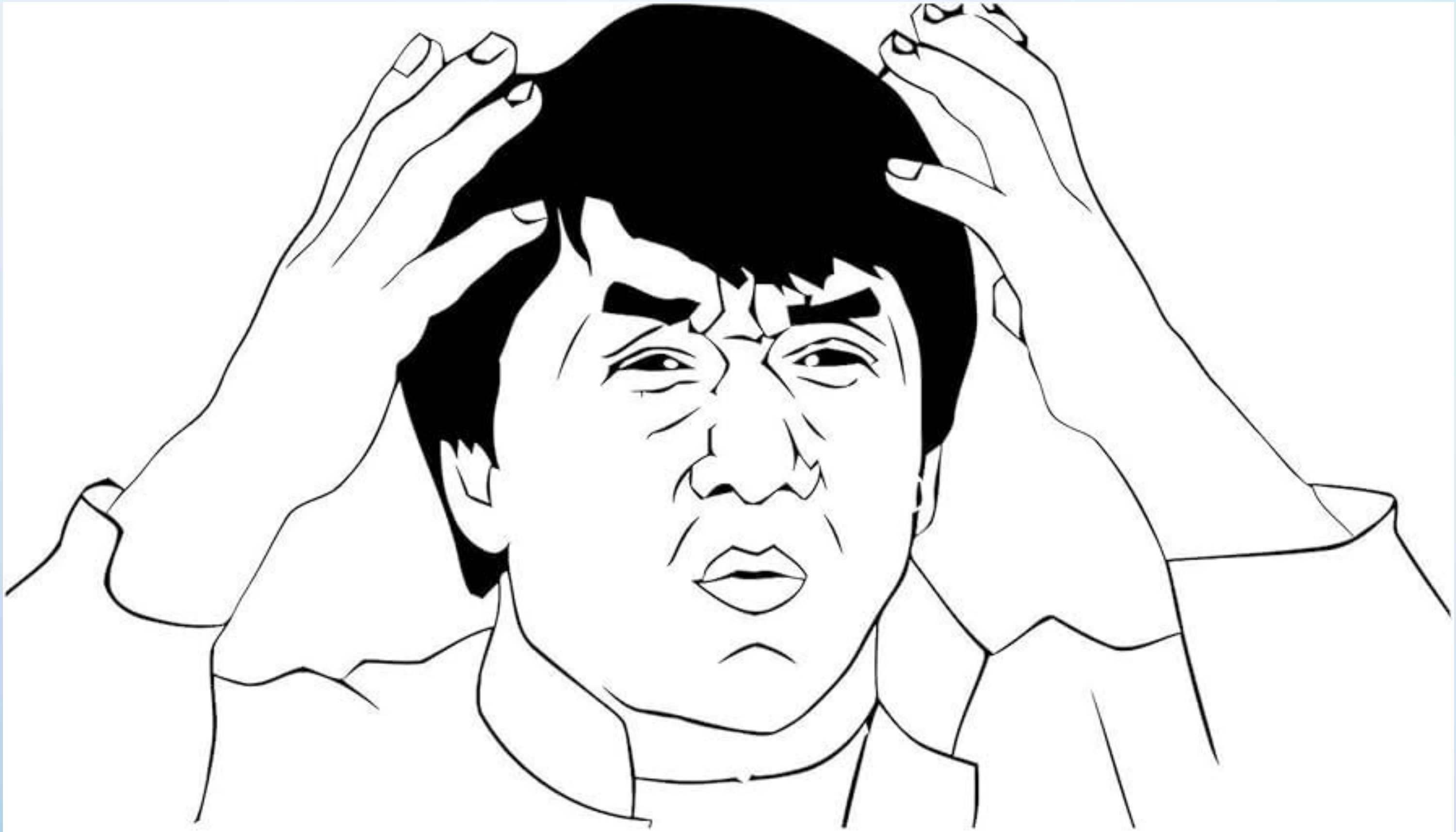
Agenda:

- **Presentation**
- **Coding:**
  - **Explore how to work with project**
  - **Implement important parts in *ChatApp***
  - **Implement the *OpenAIEmbeddingsClient***
  - **Implement the *TextProcessor***

Concept overview

<Let’s explore basics>

RAG = Retrieval-Augmented Generation



What does it mean?

Retrieval-augmented generation (RAG) is a technique that enables Gen AI models to retrieve and incorporate new information.
It modifies interactions with a LLM so that the model responds to user queries with reference to a specified set of documents, using this information to supplement information from its pre-existing training data.
This allows LLMs to use domain-specific and/or updated information. Use cases include providing chatbot access to internal company data or generating responses based on authoritative sources.

Concepts

<Let’s basically explore each concept>

R A G concept:

Retrieval

- The system searches through an external knowledge base (documents, databases, webpages, or vector stores) to find information relevant to the user query.

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Retrieval

- The system searches through an external knowledge base (documents, databases, webpages, or vector stores) to find information relevant to the user query.

- Often, this is done using vector embeddings (semantic search) to find relevant documents based on similarity measures.

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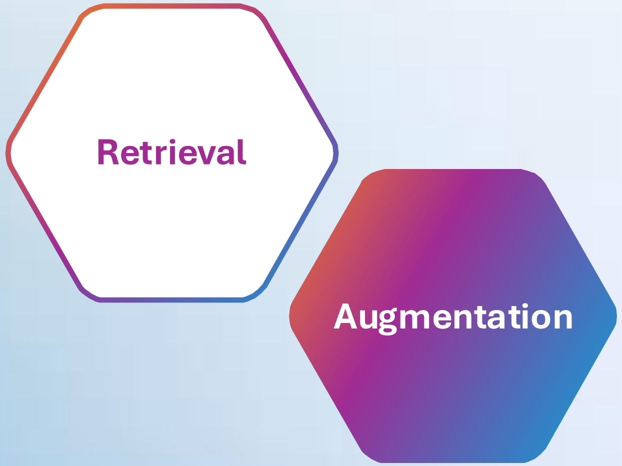
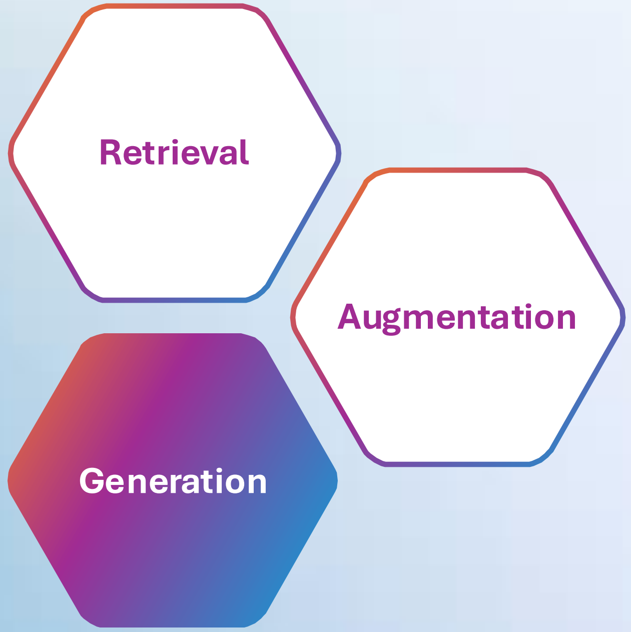
RAG concept:



The retrieved information is then used to extend or "augment" the context provided to the language model.

«User input + Retrieved data»

R A G concept:



The LLM generates response based on the provided information (user input + retrieved data)

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Retrieval-augmented generation (RAG) is a technique that helps us:

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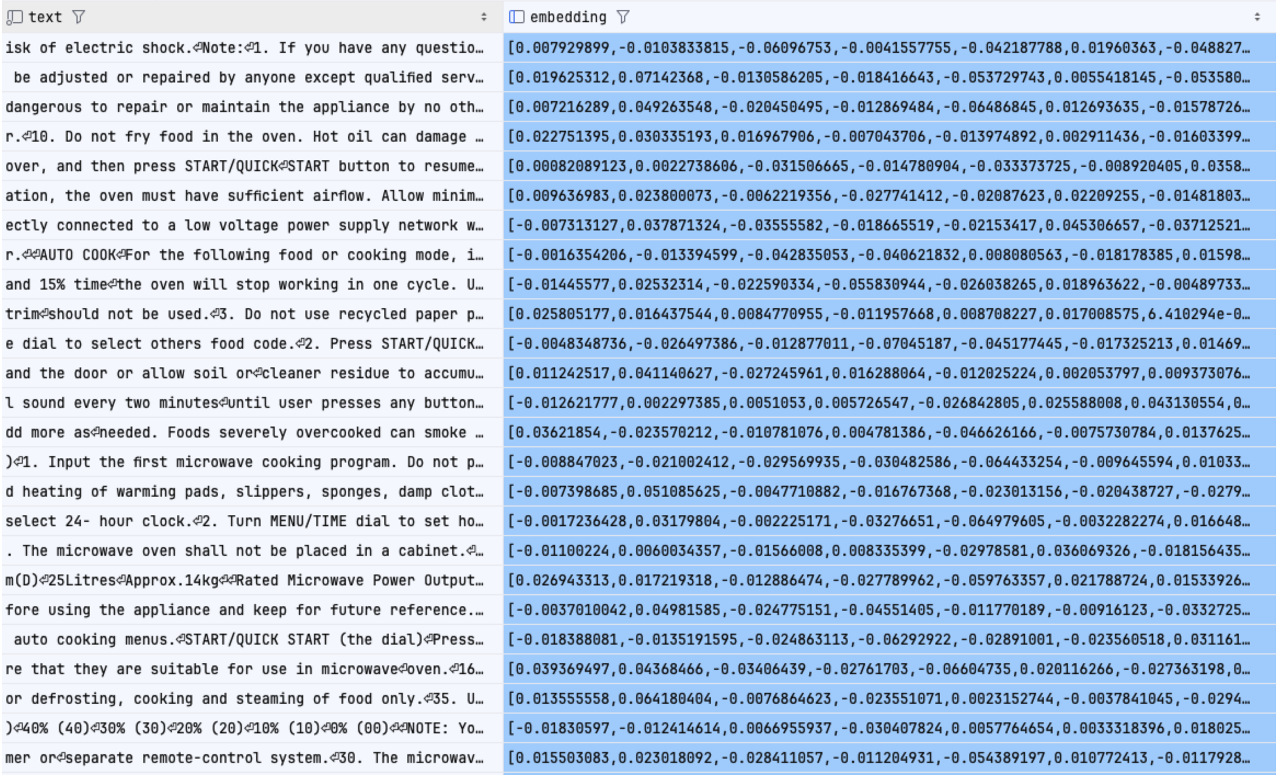
- Reduces hallucinations
- Enables up-to-date knowledge
- Enables domain specialization
- Reduces context window usage
- Reduces costs (not always*)

[0.026394594,
0.0014399963,
-0.023680586,
…,
-0.019032994]

Embeddings

< Let’s explore what Embeddings are>

Embeddings:



text	embedding
isk of electric shock.⏎Note:⏎1. If you have any questio…	[0.007929899,-0.0103833815,-0.06096753,-0.0041557755,-0.042187788,0.01960363,-0.048827…
be adjusted or repaired by anyone except qualified serv…	[0.019625312,0.07142368,-0.0130586205,-0.018416643,-0.053729743,0.0055418145,-0.053580…
dangerous to repair or maintain the appliance by no oth…	[0.007216289,0.049263548,-0.020450495,-0.012869484,-0.06486845,0.012693635,-0.01578726…
r.⏎10. Do not fry food in the oven. Hot oil can damage …	[0.022751395,0.030335193,0.016967906,-0.007043706,-0.013974892,0.002911436,-0.01603399…
over, and then press START/QUICK⏎START button to resume…	[0.00082089123,0.0022738606,-0.031506665,-0.014780904,-0.033373725,-0.008920405,0.0358…
ation, the oven must have sufficient airflow. Allow minim…	[0.009636983,0.023800073,-0.0062219356,-0.027741412,-0.02087623,0.02209255,-0.01481803…
ectly connected to a low voltage power supply network w…	[-0.007313127,0.037871324,-0.03555582,-0.018665519,-0.02153417,0.045306657,-0.03712521…
r.⏎⏎AUTO COOK⏎For the following food or cooking mode, i…	[-0.0016354206,-0.013394599,-0.042835053,-0.040621832,0.008080563,-0.018178385,0.01598…
and 15% time⏎the oven will stop working in one cycle. U…	[-0.01445577,0.02532314,-0.022590334,-0.055830944,-0.026038265,0.018963622,-0.00489733…
trim⏎should not be used.⏎3. Do not use recycled paper p…	[0.025805177,0.016437544,0.0084770955,-0.011957668,0.008708227,0.017008575,6.410294e-0…
e dial to select others food code.⏎2. Press START/QUICK…	[-0.0048348736,-0.026497386,-0.012877011,-0.07045187,-0.045177445,-0.017325213,0.01469…
and the door or allow soil or⏎cleaner residue to accumu…	[0.011242517,0.041140627,-0.027245961,0.016288064,-0.012025224,0.002053797,0.009373076…
l sound every two minutes⏎until user presses any button…	[-0.012621777,0.002297385,0.0051053,0.005726547,-0.026842805,0.025588008,0.043130554,0…
dd more as⏎needed. Foods severely overcooked can smoke …	[0.03621854,-0.023570212,-0.010781076,0.004781386,-0.046626166,-0.0075730784,0.0137625…
)⏎1. Input the first microwave cooking program. Do not p…	[-0.008847023,-0.021002412,-0.029569935,-0.030482586,-0.064433254,-0.009645594,0.01033…
d heating of warming pads, slippers, sponges, damp clot…	[-0.007398685,0.051085625,-0.0047710882,-0.016767368,-0.023013156,-0.020438727,-0.0279…
select 24- hour clock.⏎2. Turn MENU/TIME dial to set ho…	[-0.0017236428,0.03179804,-0.002225171,-0.03276651,-0.064979605,-0.0032282274,0.016648…
. The microwave oven shall not be placed in a cabinet.⏎…	[-0.01100224,0.0060034357,-0.01566008,0.008335399,-0.02978581,0.036069326,-0.018156435…
m(D)⏎25Litres⏎Approx.14kg⏎⏎Rated Microwave Power Output…	[0.026943313,0.017219318,-0.012886474,-0.027789962,-0.059763357,0.021788724,0.01533926…
fore using the appliance and keep for future reference.…	[-0.0037010042,0.04981585,-0.024775151,-0.04551405,-0.011770189,-0.00916123,-0.0332725…
auto cooking menus.⏎START/QUICK START (the dial)⏎Press…	[-0.018388081,-0.0135191595,-0.024863113,-0.06292922,-0.02891001,-0.023560518,0.031161…
re that they are suitable for use in microwave⏎oven.⏎16…	[0.039369497,0.04368466,-0.03406439,-0.02761703,-0.06604735,0.020116266,-0.027363198,0…
or defrosting, cooking and steaming of food only.⏎35. U…	[0.013555558,0.064180404,-0.0076864623,-0.023551071,0.0023152744,-0.0037841045,-0.0294…
)⏎40% (40)⏎30% (30)⏎20% (20)⏎10% (10)⏎0% (00)⏎⏎NOTE: Yo…	[-0.01830597,-0.012414614,0.0066955937,-0.030407824,0.0057764654,0.0033318396,0.018025…
mer or⏎separate remote-control system.⏎30. The microwav…	[0.015503083,0.023018092,-0.028411057,-0.011204931,-0.054389197,0.010772413,-0.0117928…

Embeddings are numerical representations of data (like text, images, or audio) in a high-dimensional vector space where semantic similarities are preserved as geometric relationships.

Embeddings :

Input Text

Start with the raw text you want to convert.

Example: "I love machine learning."

Embeddings :

Input Text

Text Preprocessing (Optional but common)

Depending on the model, some preprocessing may be required:
- Lowercasing
- Removing punctuation

Example after preprocessing : ["I", "love", "machine", "learning", "."]

Note: Most modern embedding models like OpenAI's or SentenceTransformers handle this internally.

Embeddings :

Input Text

Text Preprocessing (Optional but common)

Tokenization

The text is split into tokens, usually using a tokenizer specific to the embedding model (e.g., BPE for OpenAI models).

Each token is mapped to an integer ID via a vocabulary.

Example:

"I" → 374	
"love" → 1438	
"machine" → 5826	
"learning" → 8372	
"." → 13	

https://platform.openai.com/tokenizer

Embeddings :

Input Text

Text Preprocessing (Optional but common)

Tokenization

Model Encoding

The token IDs are fed into a pre-trained embedding model, such as:
- OpenAI's embedding models (e.g., text-embedding-3-small)
- Sentence-BERT (SBERT)
- HuggingFace transformer models

The model computes embedding vectors for the text.

Output: a vector of real numbers (floats), typically of size 1536, 768, 384, etc.

Example: [0.0213, -0.5732, 0.9981, ..., 0.0724]

Embeddings :

Input Text

Text Preprocessing (Optional but common)

Tokenization

Model Encoding

Post-processing (optional)

Depending on the use case, you might:
- Normalize the embedding (e.g., L2 normalization)
- Average word embeddings for sentence-level tasks (if not already handled)
- Store the embedding in a vector database (e.g., PGVector, Pinecone, FAISS)

Application

< Application components overview>

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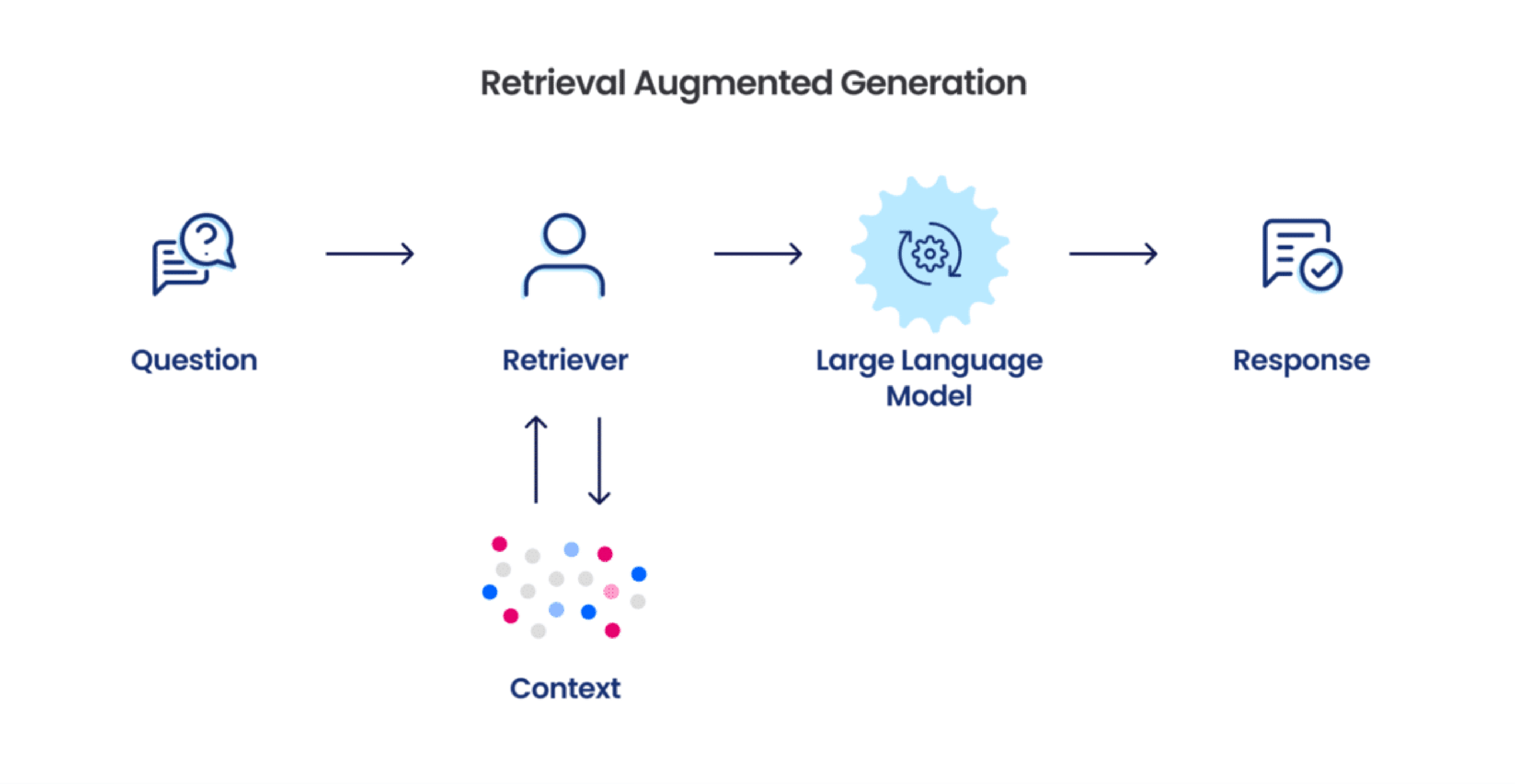
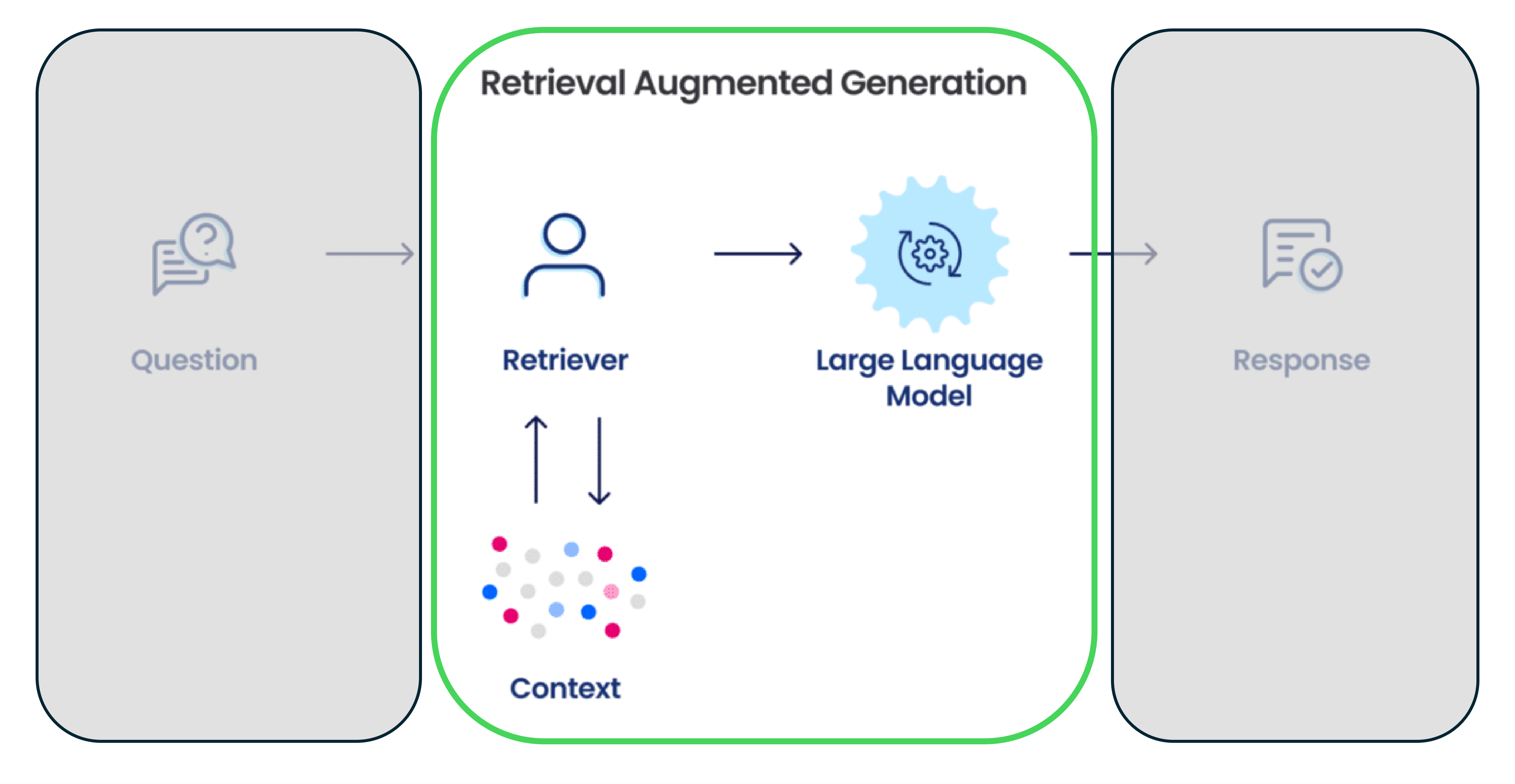
Chat with RAG under the hood:



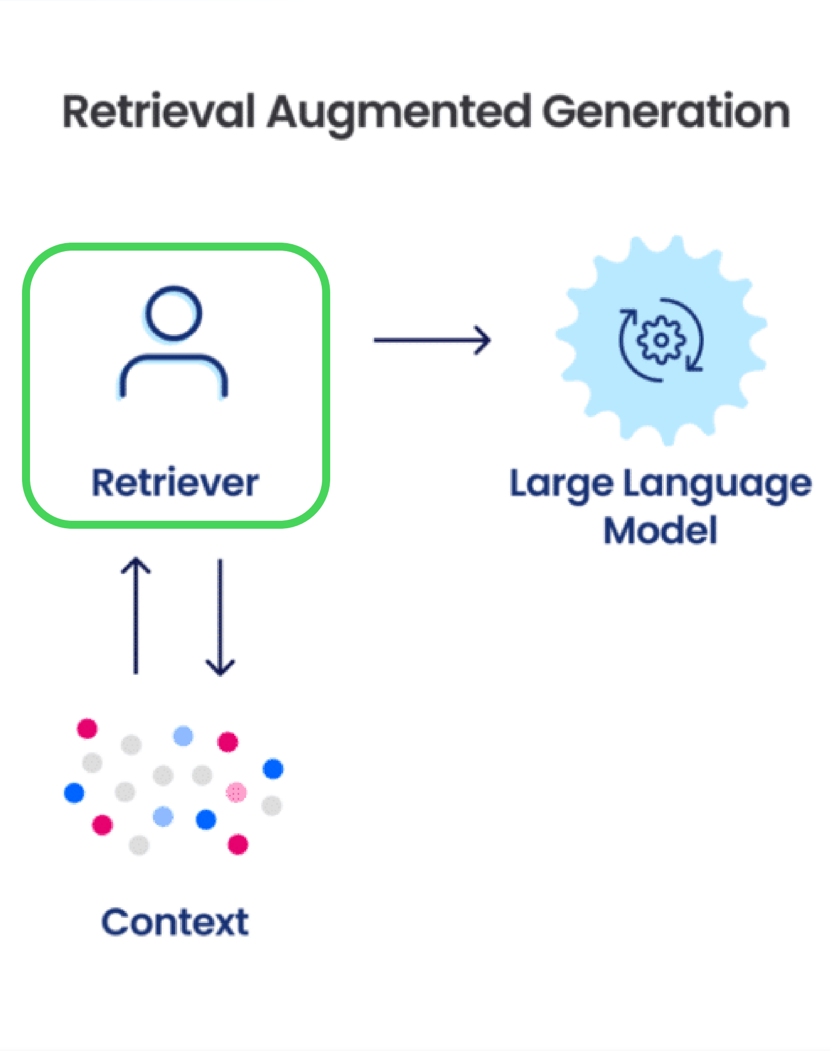
Retrieval Augmented Generation

Chat with RAG under the hood:



Retriever:

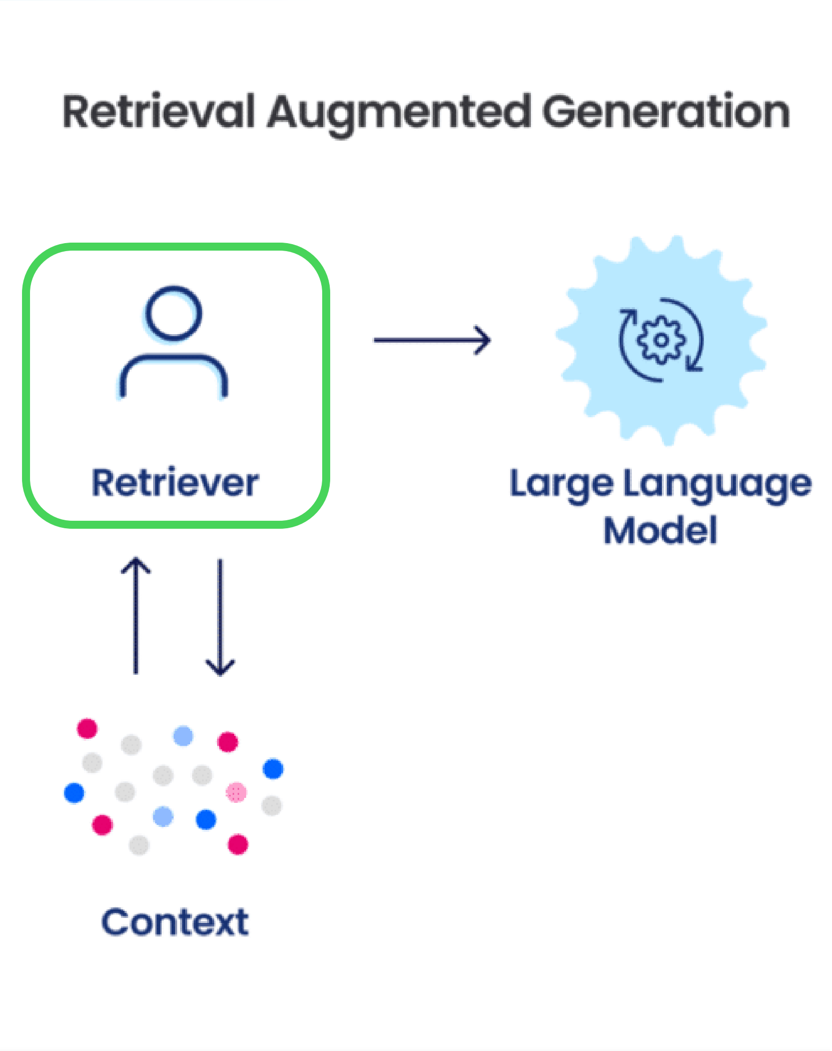
Convert user request into embeddings



Retriever:

Convert user request into embeddings

Embeddings can be generated via neural models



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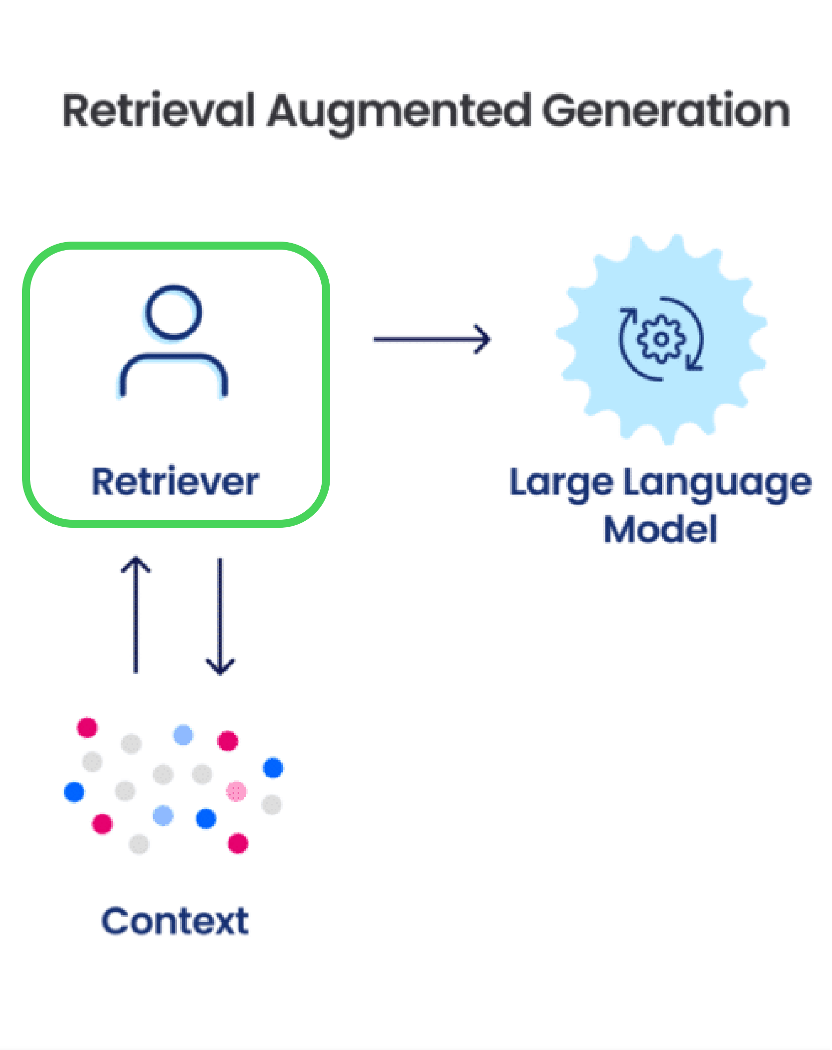
Retriever:

Convert user request into embeddings

Embeddings can be generated via neural models

Open AI models:
text-embedding-3-small (1536)
text-embedding-3-large (3072)



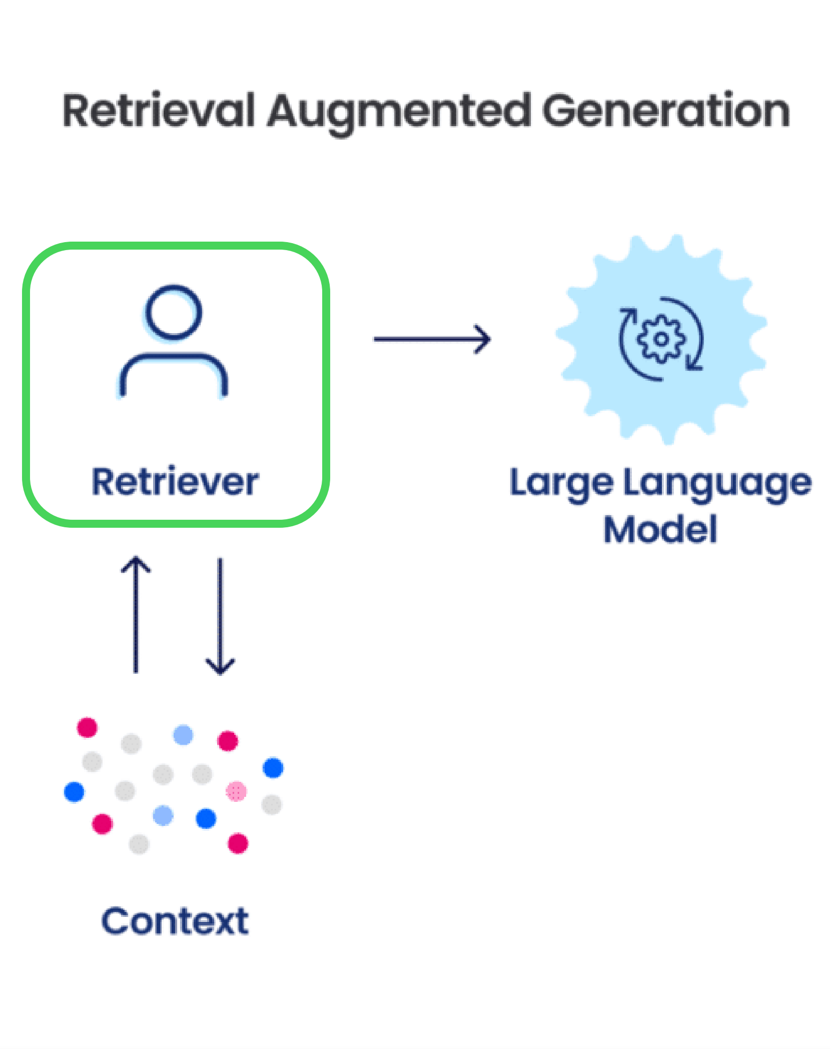
Retriever:

Convert user request into embeddings

Embeddings can be generated via neural models

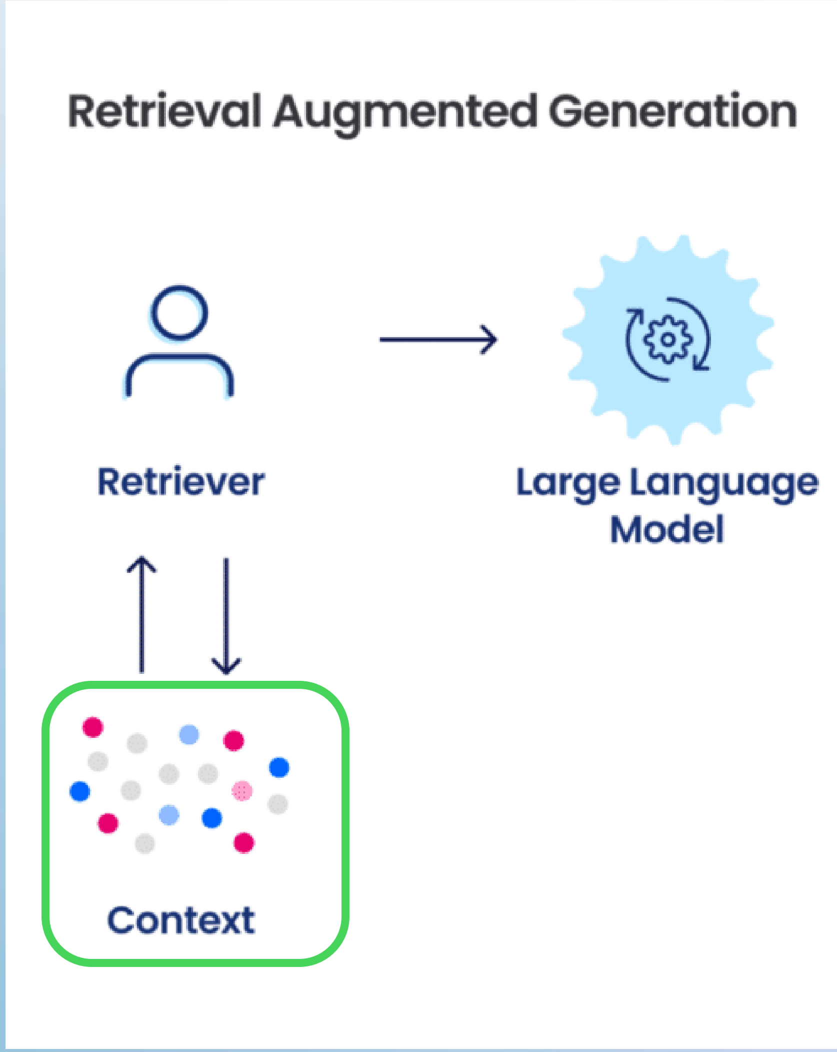
Open AI models:
text-embedding-3-small (1536)
text-embedding-3-large (3072)

Hugging Face models:
sentence-transformers/all-MiniLM-L6-v2
...



Retrieval Augmented Generation

Context:



‘Context’ is some Vector DB with data and its embeddings and some API to communicate with such DB

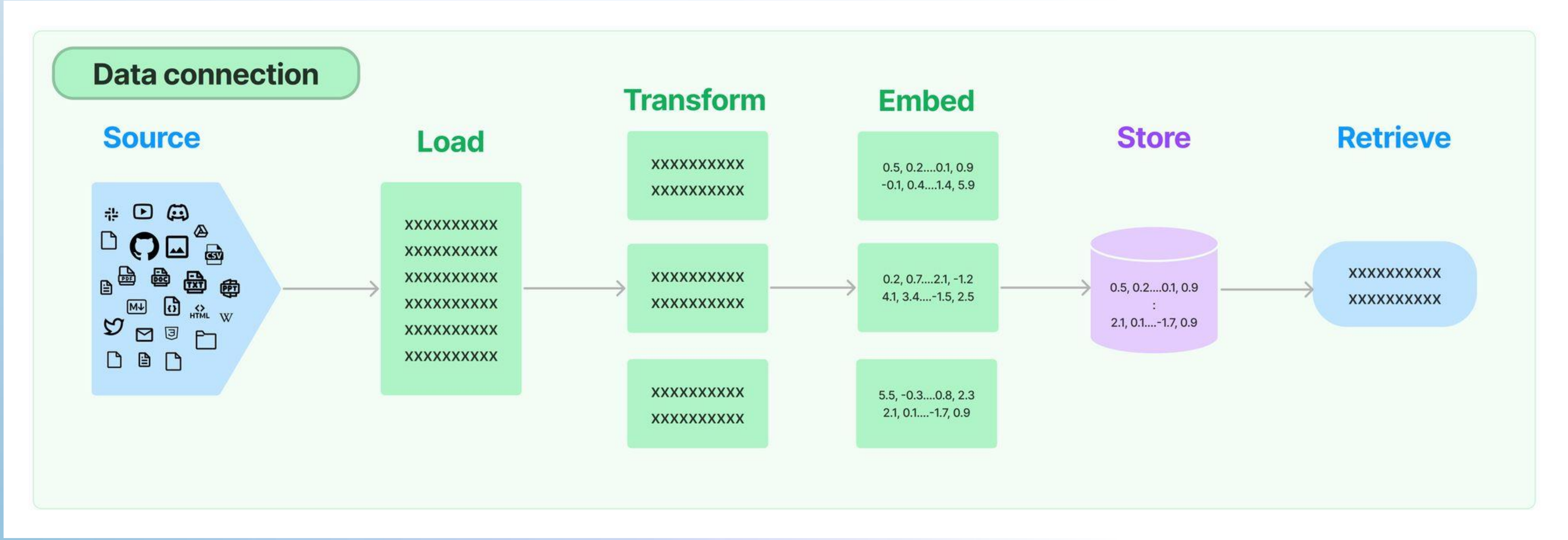
Context:

As a Source for context generation can be taken:

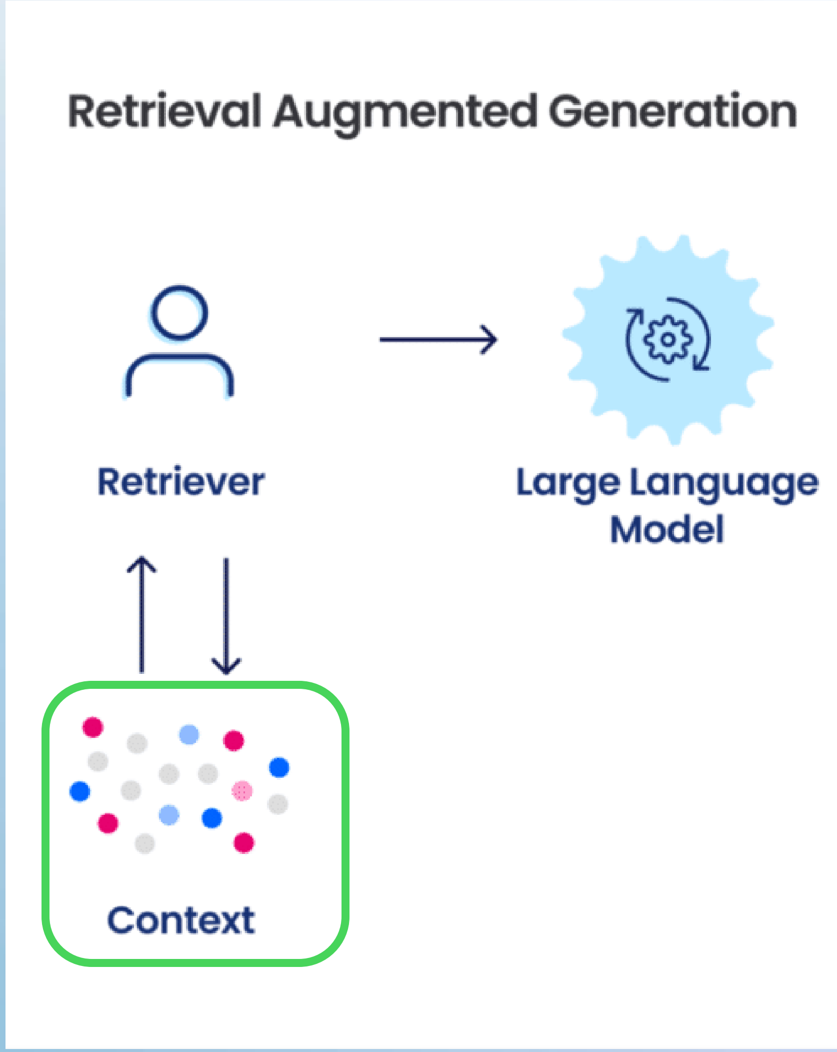
- .TXT, .PDF, .XLSX, .XML, .HTML DOCUMENTS
- CONFLUENCE
- GITHUB
- DISCORD
- WEB RESOURCE

Context:

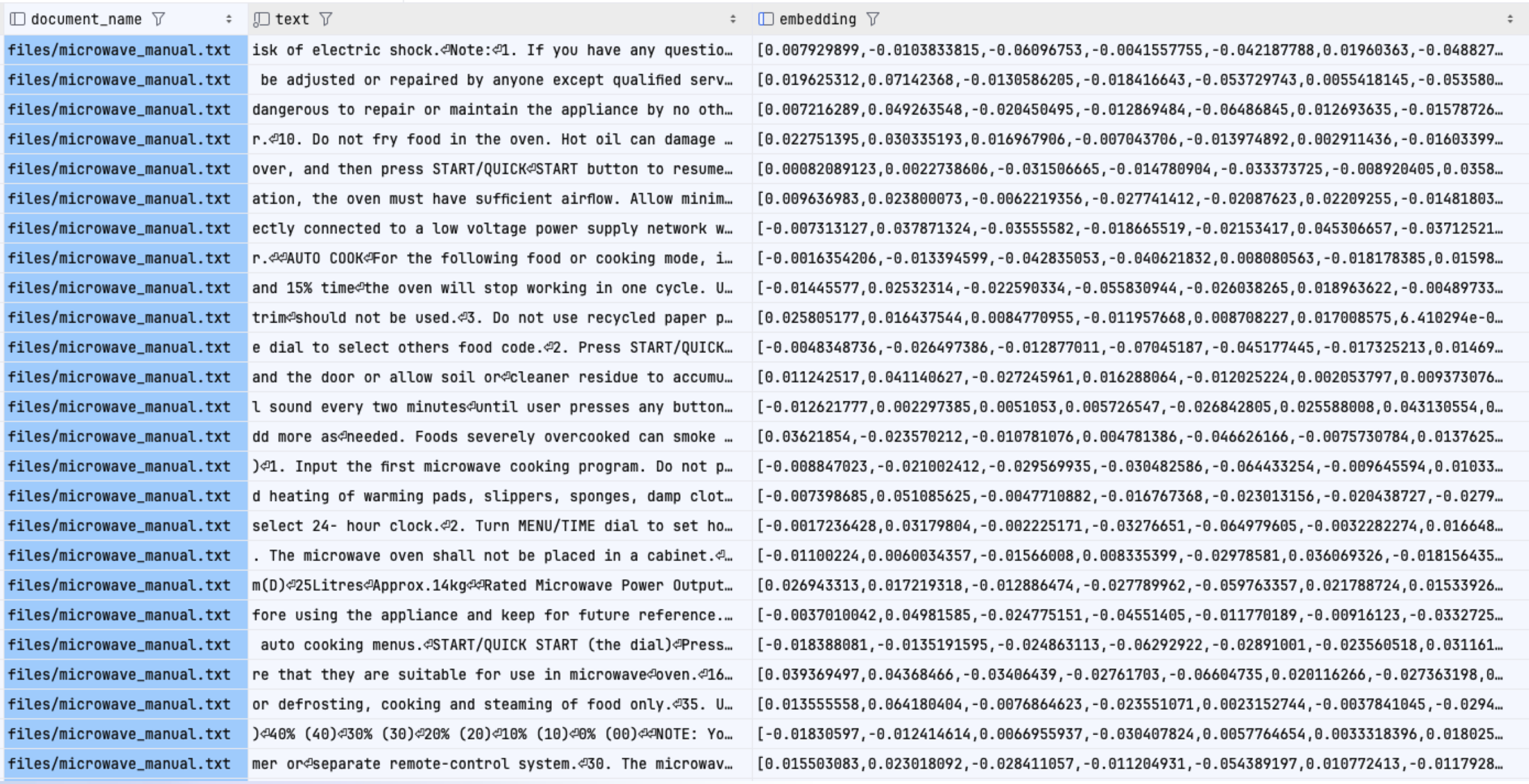
Pipeline of data transformation:



Context:



‘document_name’ contains some metadata related to document



document_name	text	embedding
files/microwave_manual.txt	isk of electric shock.⏎Note:⏎1. If you have any questio…	[0.007929899,-0.0103833815,-0.06096753,-0.0041557755,-0.042187788,0.01960363,-0.048827…
files/microwave_manual.txt	be adjusted or repaired by anyone except qualified serv…	[0.019625312,0.07142368,-0.0130586205,-0.018416643,-0.053729743,0.0055418145,-0.053580…
files/microwave_manual.txt	dangerous to repair or maintain the appliance by no oth…	[0.007216289,0.049263548,-0.020450495,-0.012869484,-0.06486845,0.012693635,-0.01578726…
files/microwave_manual.txt	r.⏎10. Do not fry food in the oven. Hot oil can damage …	[0.022751395,0.030335193,0.016967906,-0.007043706,-0.013974892,0.002911436,-0.01603399…
files/microwave_manual.txt	over, and then press START/QUICK⏎START button to resume…	[0.00082089123,0.0022738606,-0.031506665,-0.014780904,-0.033373725,-0.008920405,0.0358…
files/microwave_manual.txt	ation, the oven must have sufficient airflow. Allow minim…	[0.009636983,0.023800073,-0.0062219356,-0.027741412,-0.02087623,0.02209255,-0.01481803…
files/microwave_manual.txt	ectly connected to a low voltage power supply network w…	[-0.007313127,0.037871324,-0.03555582,-0.018665519,-0.02153417,0.045306657,-0.03712521…
files/microwave_manual.txt	r.⏎⏎AUTO COOK⏎For the following food or cooking mode, i…	[-0.0016354206,-0.013394599,-0.042835053,-0.040621832,0.008080563,-0.018178385,0.01598…
files/microwave_manual.txt	and 15% time⏎the oven will stop working in one cycle. U…	[-0.01445577,0.02532314,-0.022590334,-0.055830944,-0.026038265,0.018963622,-0.00489733…
files/microwave_manual.txt	trim⏎should not be used.⏎3. Do not use recycled paper p…	[0.025805177,0.016437544,0.0084770955,-0.011957668,0.008708227,0.017008575,6.410294e-0…
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files/microwave_manual.txt	m(D)⏎25Litres⏎Approx.14kg⏎⏎Rated Microwave Power Output…	[0.026943313,0.017219318,-0.012886474,-0.027789962,-0.059763357,0.021788724,0.01533926…
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files/microwave_manual.txt	auto cooking menus.⏎START/QUICK START (the dial)⏎Press…	[-0.018388081,-0.0135191595,-0.024863113,-0.06292922,-0.02891001,-0.023560518,0.031161…
files/microwave_manual.txt	re that they are suitable for use in microwave⏎oven.⏎16…	[0.039369497,0.04368466,-0.03406439,-0.02761703,-0.06604735,0.020116266,-0.027363198,0…
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files/microwave_manual.txt	)⏎40% (40)⏎30% (30)⏎20% (20)⏎10% (10)⏎0% (00)⏎⏎NOTE: Yo…	[-0.01830597,-0.012414614,0.0066955937,-0.030407824,0.0057764654,0.0033318396,0.018025…
files/microwave_manual.txt	mer or⏎separate remote-control system.⏎30. The microwav…	[0.015503083,0.023018092,-0.028411057,-0.011204931,-0.054389197,0.010772413,-0.0117928…

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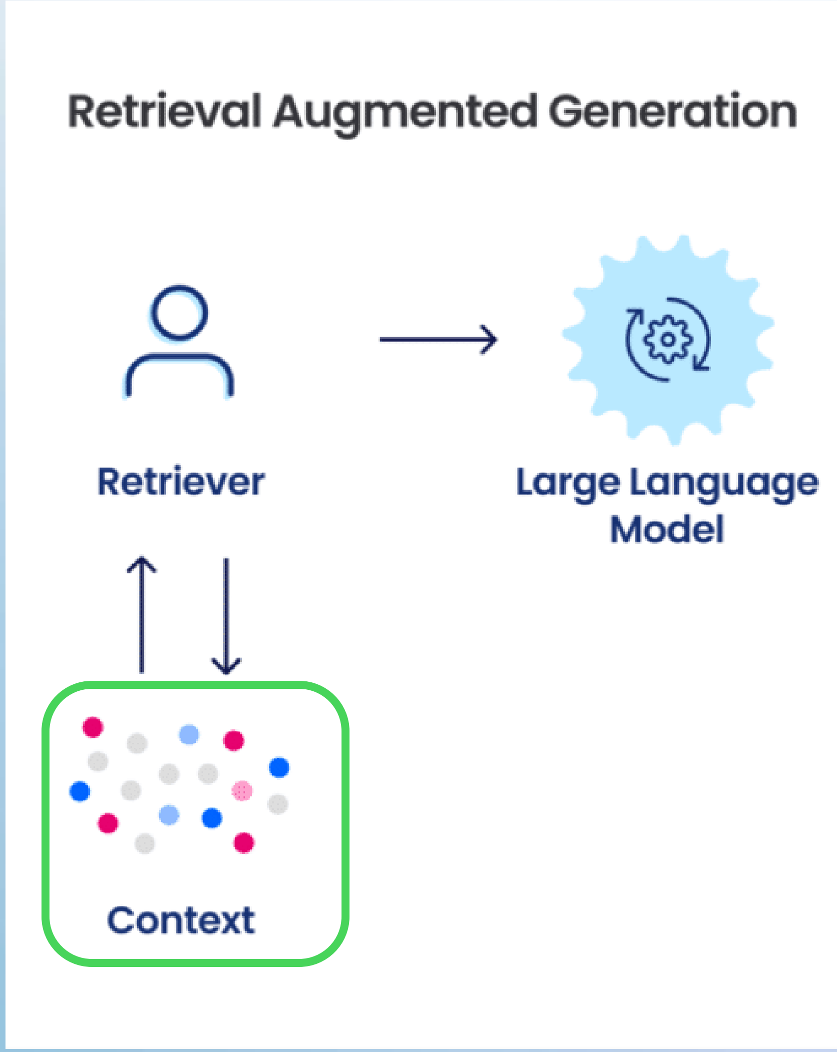
Context:



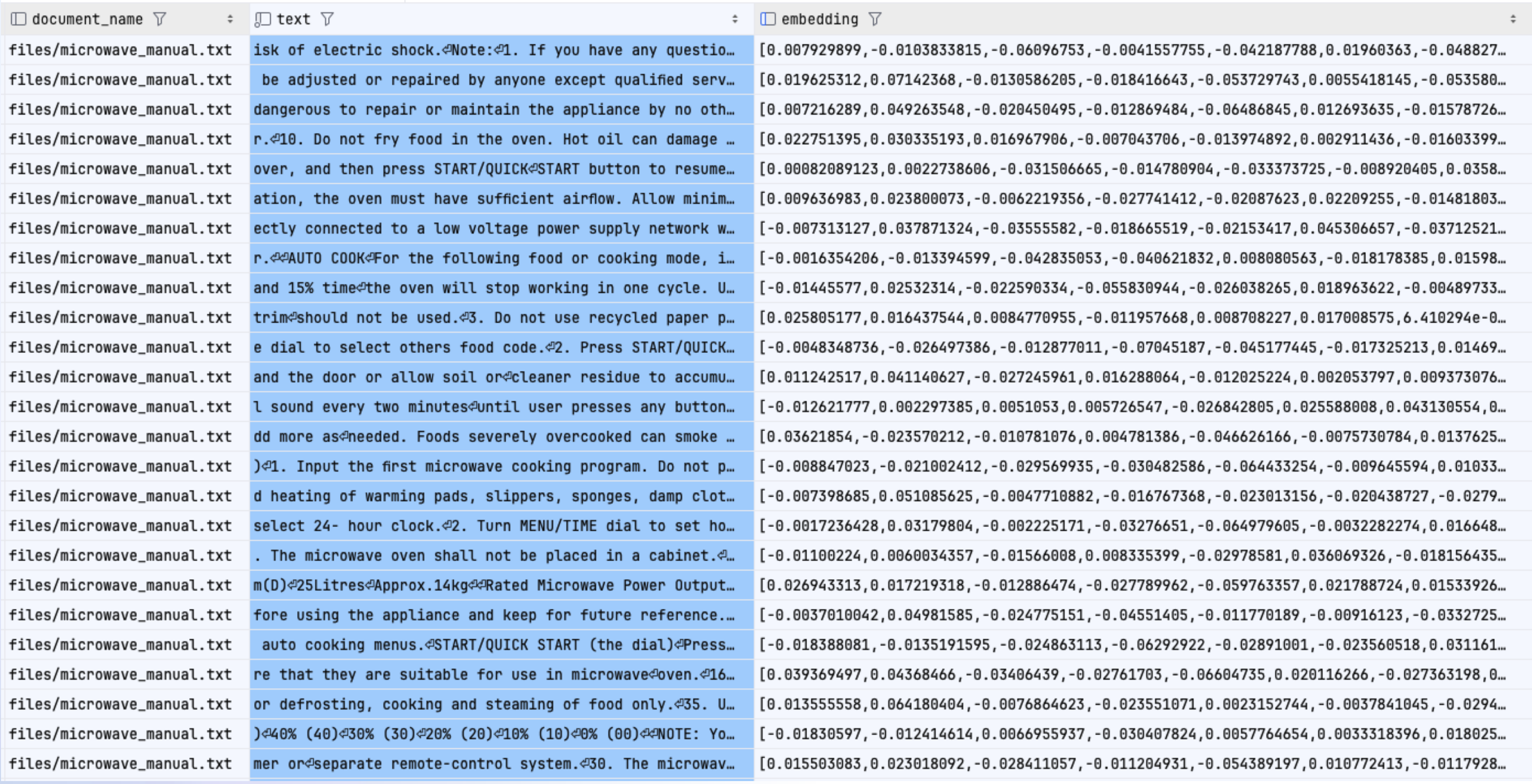
Retrieval Augmented Generation

Retriever

Large Language Model

Context

‘text’ is chunk of document data



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files/microwave_manual.txt	r.⏎10. Do not fry food in the oven. Hot oil can damage …	[0.022751395,0.030335193,0.016967906,-0.007043706,-0.013974892,0.002911436,-0.01603399…
files/microwave_manual.txt	over, and then press START/QUICK⏎START button to resume…	[0.00082089123,0.0022738606,-0.031506665,-0.014780904,-0.033373725,-0.008920405,0.0358…
files/microwave_manual.txt	ation, the oven must have sufficient airflow. Allow minim…	[0.009636983,0.023800073,-0.0062219356,-0.027741412,-0.02087623,0.02209255,-0.01481803…
files/microwave_manual.txt	ectly connected to a low voltage power supply network w…	[-0.007313127,0.037871324,-0.03555582,-0.018665519,-0.02153417,0.045306657,-0.03712521…
files/microwave_manual.txt	r.⏎⏎AUTO COOK⏎For the following food or cooking mode, i…	[-0.0016354206,-0.013394599,-0.042835053,-0.040621832,0.008080563,-0.018178385,0.01598…
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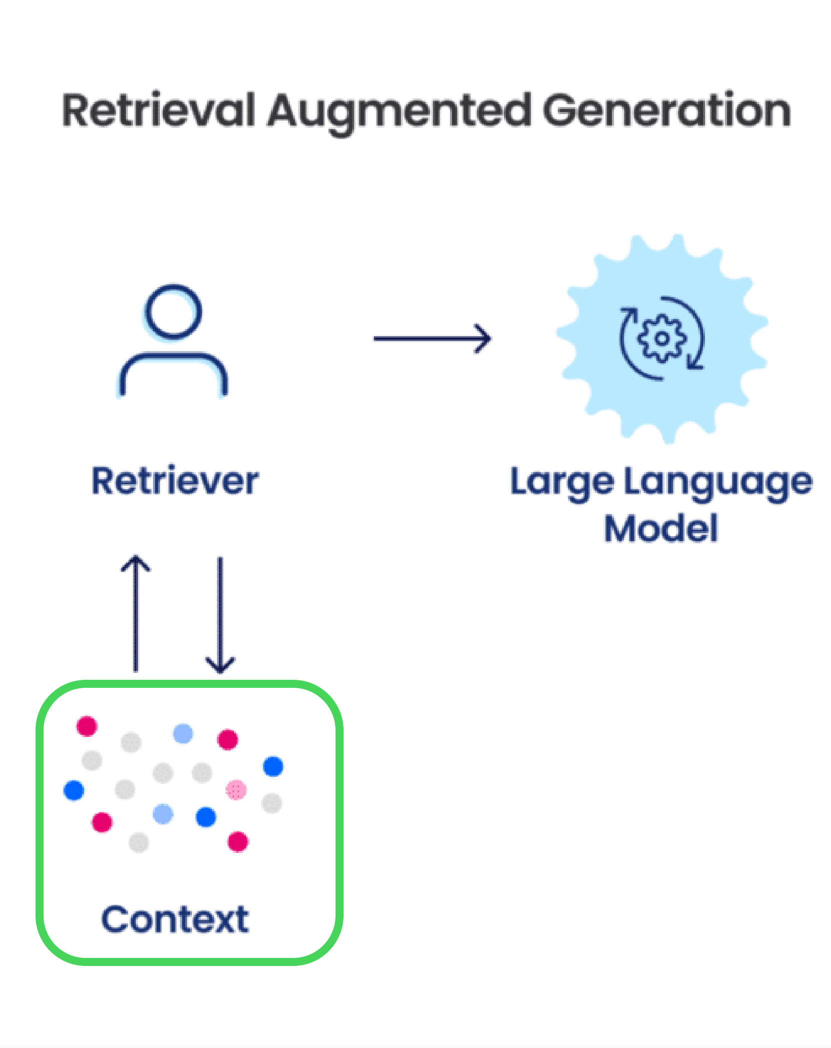
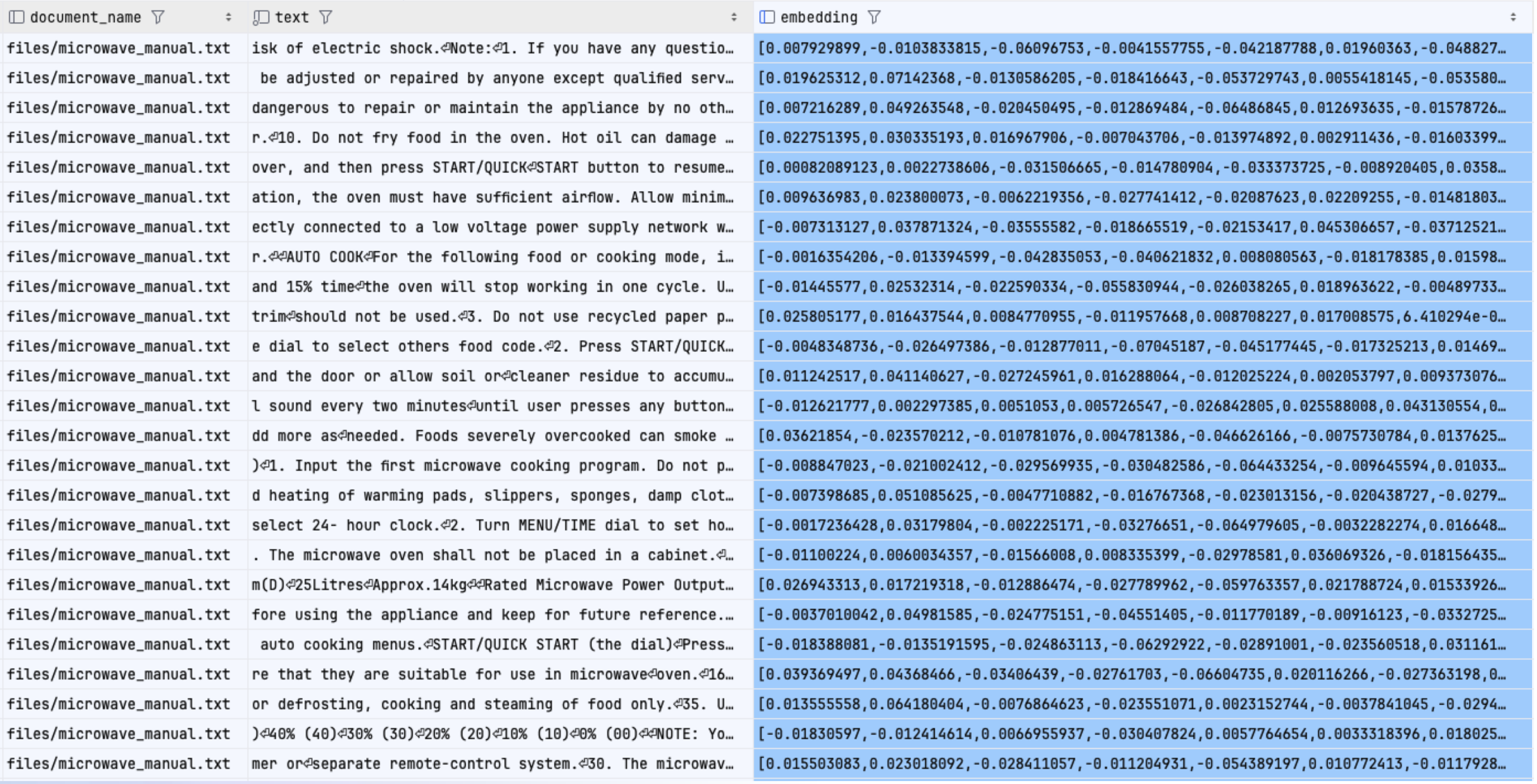
files/microwave_manual.txt	trim⏎should not be used.⏎3. Do not use recycled paper p…	[0.025805177,0.016437544,0.0084770955,-0.011957668,0.008708227,0.017008575,6.410294e-0…
files/microwave_manual.txt	e dial to select others food code.⏎2. Press START/QUICK…	[-0.0048348736,-0.026497386,-0.012877011,-0.07045187,-0.045177445,-0.017325213,0.01469…
files/microwave_manual.txt	and the door or allow soil or⏎cleaner residue to accumu…	[0.011242517,0.041140627,-0.027245961,0.016288064,-0.012025224,0.002053797,0.009373076…
files/microwave_manual.txt	l sound every two minutes⏎until user presses any button…	[-0.012621777,0.002297385,0.0051053,0.005726547,-0.026842805,0.025588008,0.043130554,0…
files/microwave_manual.txt	dd more as⏎needed. Foods severely overcooked can smoke …	[0.03621854,-0.023570212,-0.010781076,0.004781386,-0.046626166,-0.0075730784,0.0137625…
files/microwave_manual.txt	)⏎1. Input the first microwave cooking program. Do not p…	[-0.008847023,-0.021002412,-0.029569935,-0.030482586,-0.064433254,-0.009645594,0.01033…
files/microwave_manual.txt	d heating of warming pads, slippers, sponges, damp clot…	[-0.007398685,0.051085625,-0.0047710882,-0.016767368,-0.023013156,-0.020438727,-0.0279…
files/microwave_manual.txt	select 24- hour clock.⏎2. Turn MENU/TIME dial to set ho…	[-0.0017236428,0.03179804,-0.002225171,-0.03276651,-0.064979605,-0.0032282274,0.016648…
files/microwave_manual.txt	. The microwave oven shall not be placed in a cabinet.⏎…	[-0.01100224,0.0060034357,-0.01566008,0.008335399,-0.02978581,0.036069326,-0.018156435…
files/microwave_manual.txt	m(D)⏎25Litres⏎Approx.14kg⏎⏎Rated Microwave Power Output…	[0.026943313,0.017219318,-0.012886474,-0.027789962,-0.059763357,0.021788724,0.01533926…
files/microwave_manual.txt	fore using the appliance and keep for future reference.…	[-0.0037010042,0.04981585,-0.024775151,-0.04551405,-0.011770189,-0.00916123,-0.0332725…
files/microwave_manual.txt	auto cooking menus.⏎START/QUICK START (the dial)⏎Press…	[-0.018388081,-0.0135191595,-0.024863113,-0.06292922,-0.02891001,-0.023560518,0.031161…
files/microwave_manual.txt	re that they are suitable for use in microwave⏎oven.⏎16…	[0.039369497,0.04368466,-0.03406439,-0.02761703,-0.06604735,0.020116266,-0.027363198,0…
files/microwave_manual.txt	or defrosting, cooking and steaming of food only.⏎35. U…	[0.013555558,0.064180404,-0.0076864623,-0.023551071,0.0023152744,-0.0037841045,-0.0294…
files/microwave_manual.txt	)⏎40% (40)⏎30% (30)⏎20% (20)⏎10% (10)⏎0% (00)⏎⏎NOTE: Yo…	[-0.01830597,-0.012414614,0.0066955937,-0.030407824,0.0057764654,0.0033318396,0.018025…
files/microwave_manual.txt	mer or⏎separate remote-control system.⏎30. The microwav…	[0.015503083,0.023018092,-0.028411057,-0.011204931,-0.054389197,0.010772413,-0.0117928…

Context:

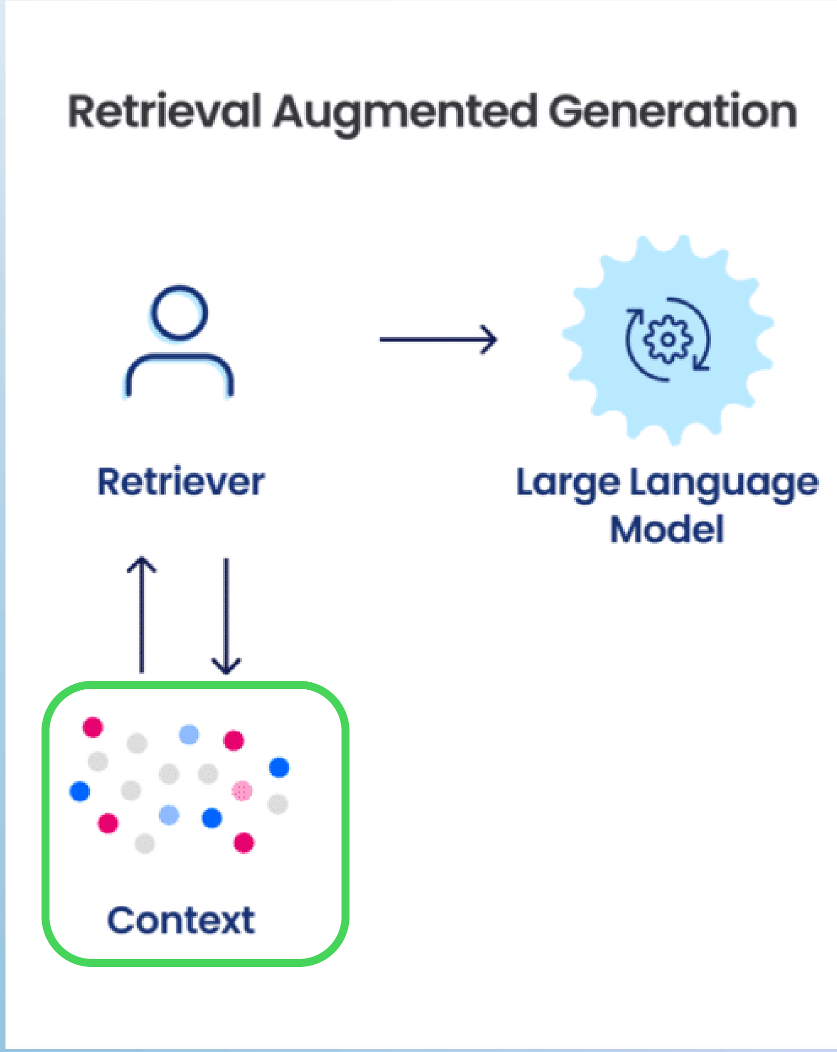


‘embedding’ is is numerical representation of text chunk



document_name	text	embedding
files/microwave_manual.txt	isk of electric shock.⏎Note:⏎1. If you have any questio…	[0.007929899,-0.0103833815,-0.06096753,-0.0041557755,-0.042187788,0.01960363,-0.048827…
files/microwave_manual.txt	be adjusted or repaired by anyone except qualified serv…	[0.019625312,0.07142368,-0.0130586205,-0.018416643,-0.053729743,0.0055418145,-0.053580…
files/microwave_manual.txt	dangerous to repair or maintain the appliance by no oth…	[0.007216289,0.049263548,-0.020450495,-0.012869484,-0.06486845,0.012693635,-0.01578726…
files/microwave_manual.txt	r.⏎10. Do not fry food in the oven. Hot oil can damage …	[0.022751395,0.030335193,0.016967906,-0.007043706,-0.013974892,0.002911436,-0.01603399…
files/microwave_manual.txt	over, and then press START/QUICK⏎START button to resume…	[0.00082089123,0.0022738606,-0.031506665,-0.014780904,-0.033373725,-0.008920405,0.0358…
files/microwave_manual.txt	ation, the oven must have sufficient airflow. Allow minim…	[0.009636983,0.023800073,-0.0062219356,-0.027741412,-0.02087623,0.02209255,-0.01481803…
files/microwave_manual.txt	ectly connected to a low voltage power supply network w…	[-0.007313127,0.037871324,-0.03555582,-0.018665519,-0.02153417,0.045306657,-0.03712521…
files/microwave_manual.txt	r.⏎⏎AUTO COOK⏎For the following food or cooking mode, i…	[-0.0016354206,-0.013394599,-0.042835053,-0.040621832,0.008080563,-0.018178385,0.01598…
files/microwave_manual.txt	and 15% time⏎the oven will stop working in one cycle. U…	[-0.01445577,0.02532314,-0.022590334,-0.055830944,-0.026038265,0.018963622,-0.00489733…
files/microwave_manual.txt	trim⏎should not be used.⏎3. Do not use recycled paper p…	[0.025805177,0.016437544,0.0084770955,-0.011957668,0.008708227,0.017008575,6.410294e-0…
files/microwave_manual.txt	e dial to select others food code.⏎2. Press START/QUICK…	[-0.0048348736,-0.026497386,-0.012877011,-0.07045187,-0.045177445,-0.017325213,0.01469…
files/microwave_manual.txt	and the door or allow soil or⏎cleaner residue to accumu…	[0.011242517,0.041140627,-0.027245961,0.016288064,-0.012025224,0.002053797,0.009373076…
files/microwave_manual.txt	l sound every two minutes⏎until user presses any button…	[-0.012621777,0.002297385,0.0051053,0.005726547,-0.026842805,0.025588008,0.043130554,0…
files/microwave_manual.txt	dd more as⏎needed. Foods severely overcooked can smoke …	[0.03621854,-0.023570212,-0.010781076,0.004781386,-0.046626166,-0.0075730784,0.0137625…
files/microwave_manual.txt	)⏎1. Input the first microwave cooking program. Do not p…	[-0.008847023,-0.021002412,-0.029569935,-0.030482586,-0.064433254,-0.009645594,0.01033…
files/microwave_manual.txt	d heating of warming pads, slippers, sponges, damp clot…	[-0.007398685,0.051085625,-0.0047710882,-0.016767368,-0.023013156,-0.020438727,-0.0279…
files/microwave_manual.txt	select 24- hour clock.⏎2. Turn MENU/TIME dial to set ho…	[-0.0017236428,0.03179804,-0.002225171,-0.03276651,-0.064979605,-0.0032282274,0.016648…
files/microwave_manual.txt	. The microwave oven shall not be placed in a cabinet.⏎…	[-0.01100224,0.0060034357,-0.01566008,0.008335399,-0.02978581,0.036069326,-0.018156435…
files/microwave_manual.txt	m(D)⏎25Litres⏎Approx.14kg⏎⏎Rated Microwave Power Output…	[0.026943313,0.017219318,-0.012886474,-0.027789962,-0.059763357,0.021788724,0.01533926…
files/microwave_manual.txt	fore using the appliance and keep for future reference.…	[-0.0037010042,0.04981585,-0.024775151,-0.04551405,-0.011770189,-0.00916123,-0.0332725…
files/microwave_manual.txt	auto cooking menus.⏎START/QUICK START (the dial)⏎Press…	[-0.018388081,-0.0135191595,-0.024863113,-0.06292922,-0.02891001,-0.023560518,0.031161…
files/microwave_manual.txt	re that they are suitable for use in microwave⏎oven.⏎16…	[0.039369497,0.04368466,-0.03406439,-0.02761703,-0.06604735,0.020116266,-0.027363198,0…
files/microwave_manual.txt	or defrosting, cooking and steaming of food only.⏎35. U…	[0.013555558,0.064180404,-0.0076864623,-0.023551071,0.0023152744,-0.0037841045,-0.0294…
files/microwave_manual.txt	)⏎40% (40)⏎30% (30)⏎20% (20)⏎10% (10)⏎0% (00)⏎⏎NOTE: Yo…	[-0.01830597,-0.012414614,0.0066955937,-0.030407824,0.0057764654,0.0033318396,0.018025…
files/microwave_manual.txt	mer or⏎separate remote-control system.⏎30. The microwav…	[0.015503083,0.023018092,-0.028411057,-0.011204931,-0.054389197,0.010772413,-0.0117928…

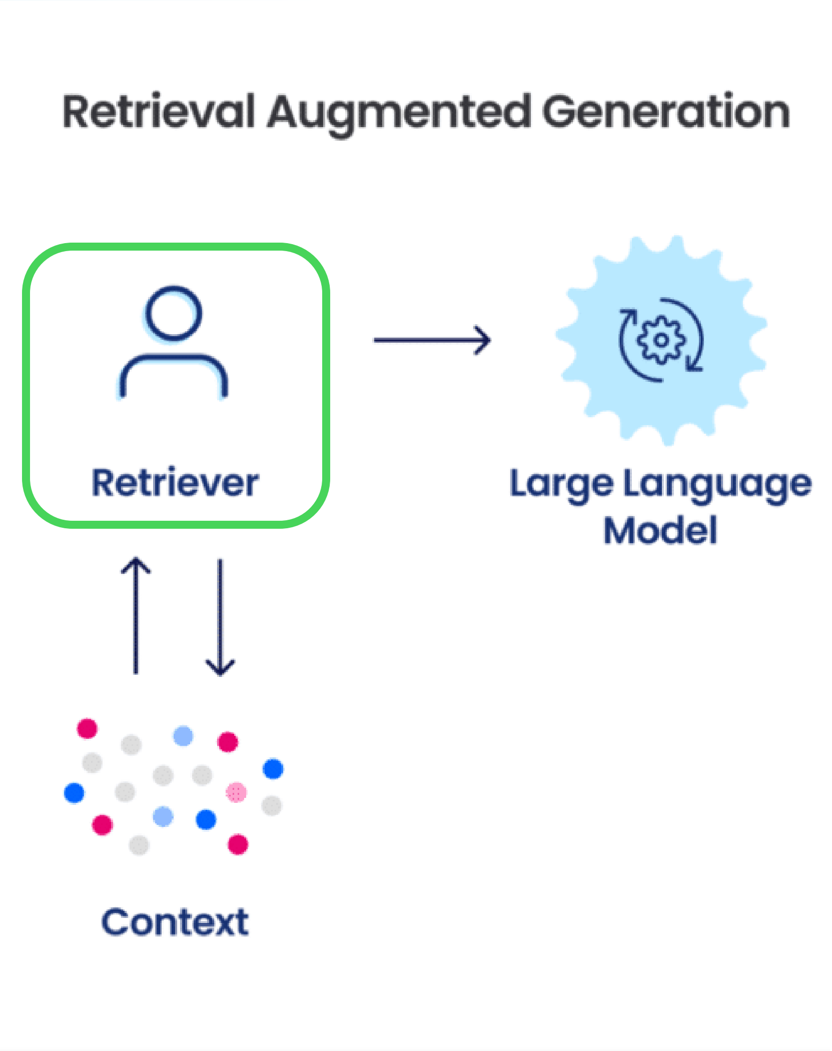
Context:



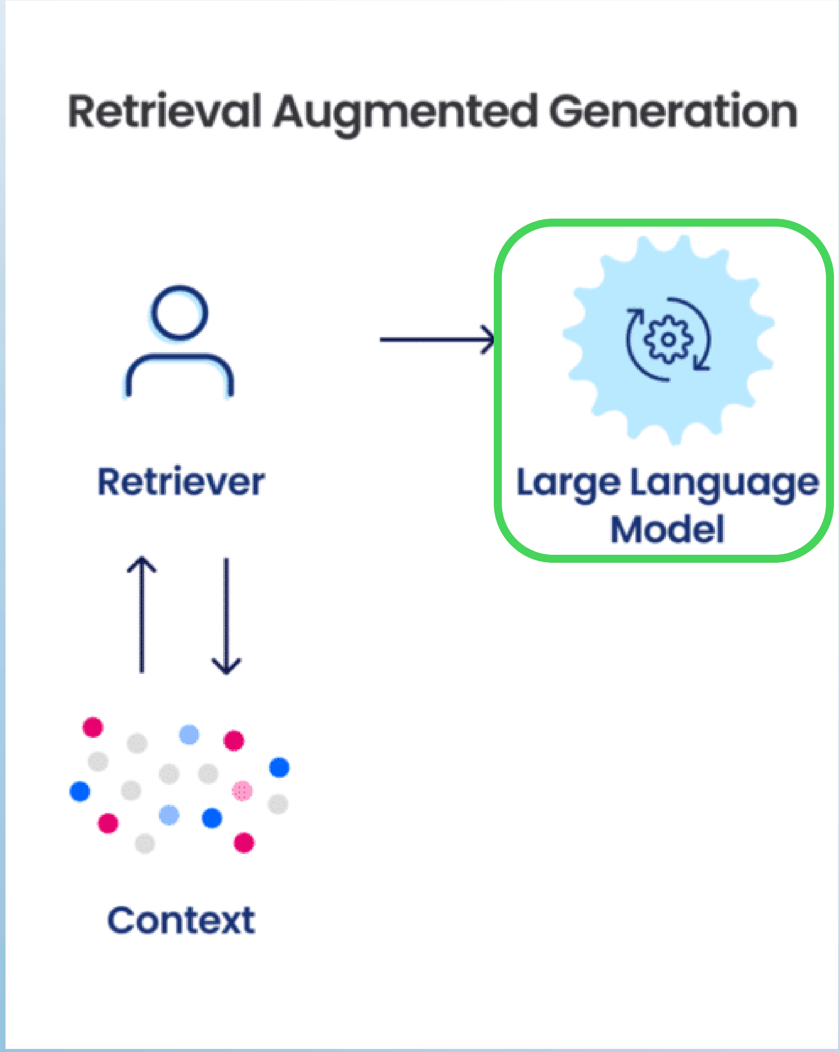
We retrieve here the chunks of information via search (similarity, semantic, etc...) by generated embedding from user request in DB

Augmentation:

Now, we join user request and with collected data (context)



Generation:



Now, with user request and some retrieved context we generate some content with LLM

Search

<Let’s explore how search is working>

Search:

Search can be performed in different ways

The most common are Similarity and Semantic searches

We will practice with Similarity search

Search:

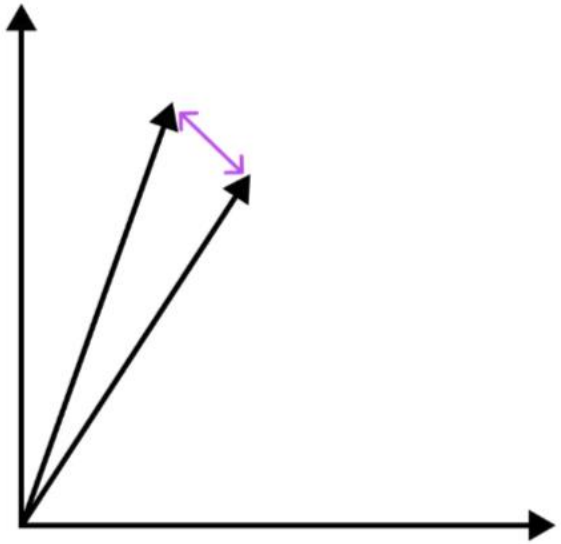
Measures the straight-line (geometric) distance between two points in vector space.

The smaller the distance, the more similar the vectors

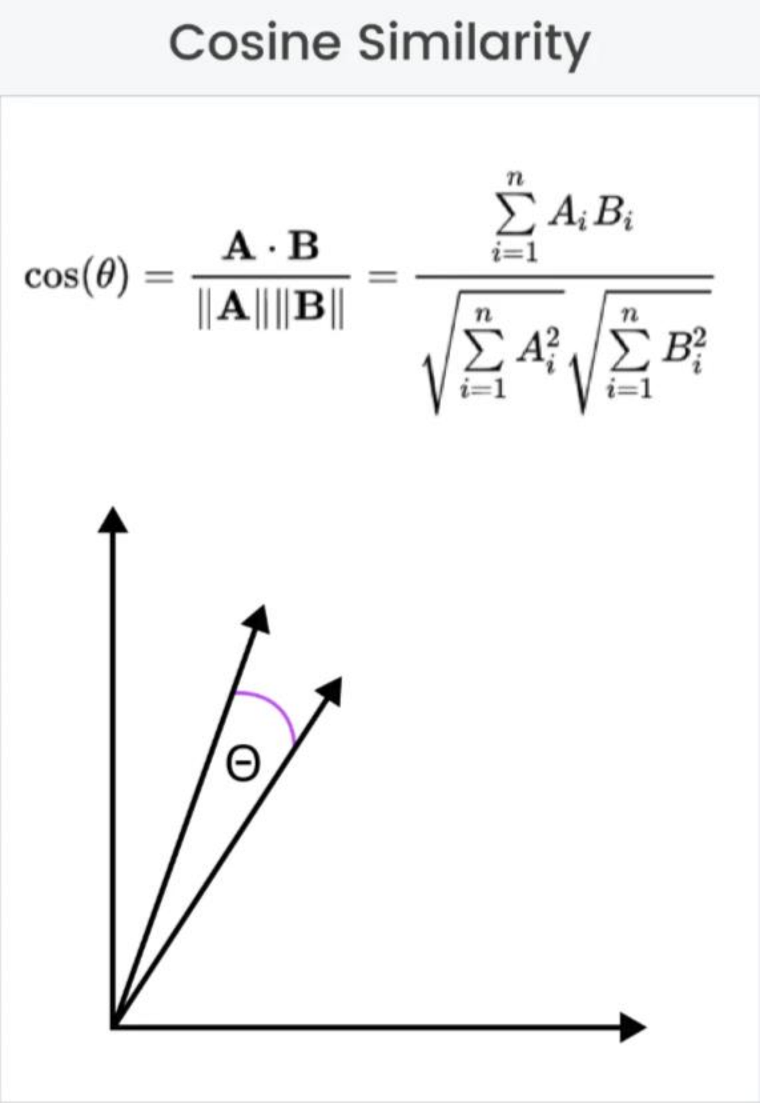
In Postgres use <-> operator for similarity search with Euclidean distance

Euclidean Distance

$$d(\mathbf{p}, \mathbf{q}) = \sqrt{\sum_{i=1}^{n} (q_i - p_i)^2}$$



Search:



Cosine Similarity

$$\cos(\theta) = \frac{\mathbf{A} \cdot \mathbf{B}}{\|\mathbf{A}\|\|\mathbf{B}\|} = \frac{\sum\limits_{i=1}^{n} A_i B_i}{\sqrt{\sum\limits_{i=1}^{n} A_i^2} \sqrt{\sum\limits_{i=1}^{n} B_i^2}}$$

Measures the cosine of the angle between two vectors

It ranges from -1 (opposite), 0 (no similarity), to 1 (similar)

In Postgres use <=> operator for similarity search with Cosine similarity

Real live sample

<Let’s overview RAG over some real live example>

CODEUS_

User request

Wash all the red clothes

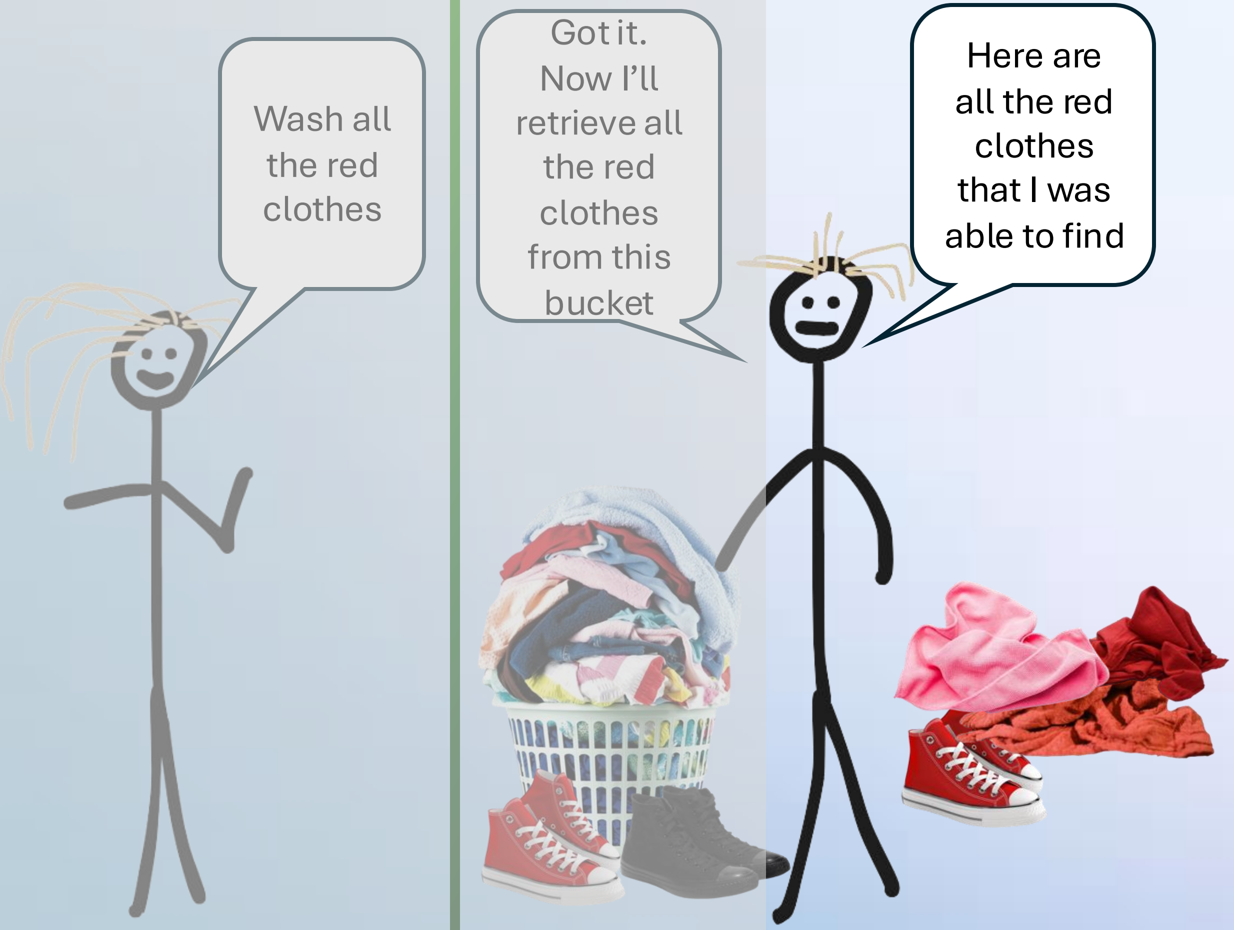
User request

Retrieval

Got it. Now I’ll retrieve all the red clothes from this bucket

User request

Retrieval


Wash all the red clothes
Got it. Now I’ll retrieve all the red clothes from this bucket
Here are all the red clothes that I was able to find

User request

Wash all the red clothes

Retrieval

Got it. Now I’ll retrieve all the red clothes from this bucket
Here are all the red clothes that I was able to find

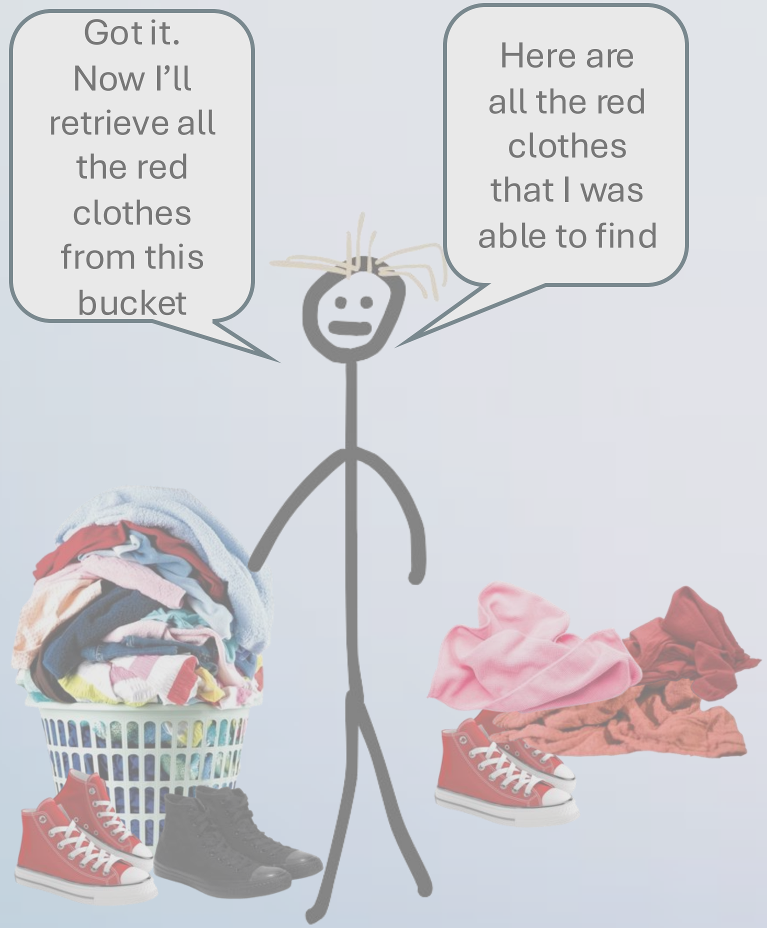
Augmentation

‘Wash all the red clothes’ + the clothes

User request

Wash all the red clothes

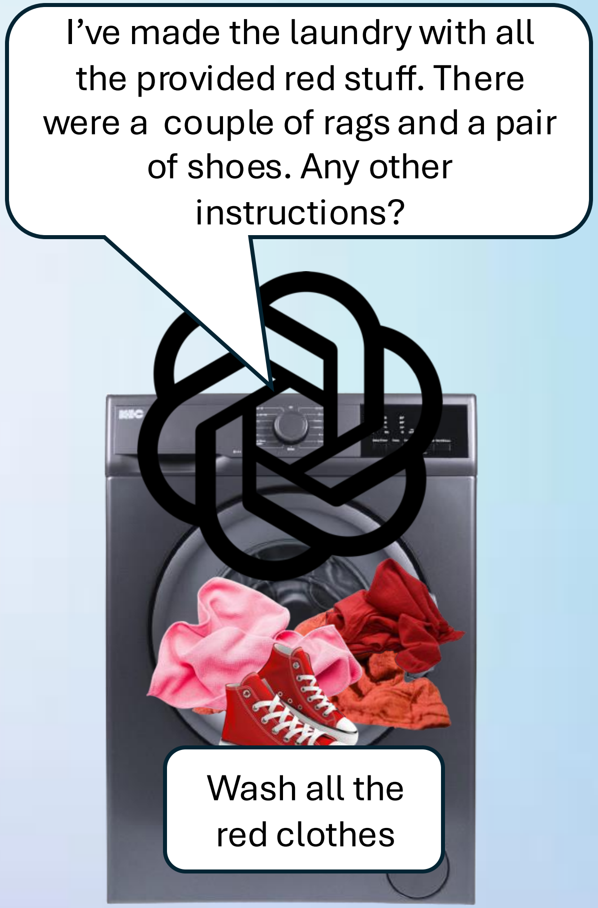
Retrieval


Got it. Now I’ll retrieve all the red clothes from this bucket
Here are all the red clothes that I was able to find

Augmentation

‘Wash all the red clothes’ + the clothes

Generation

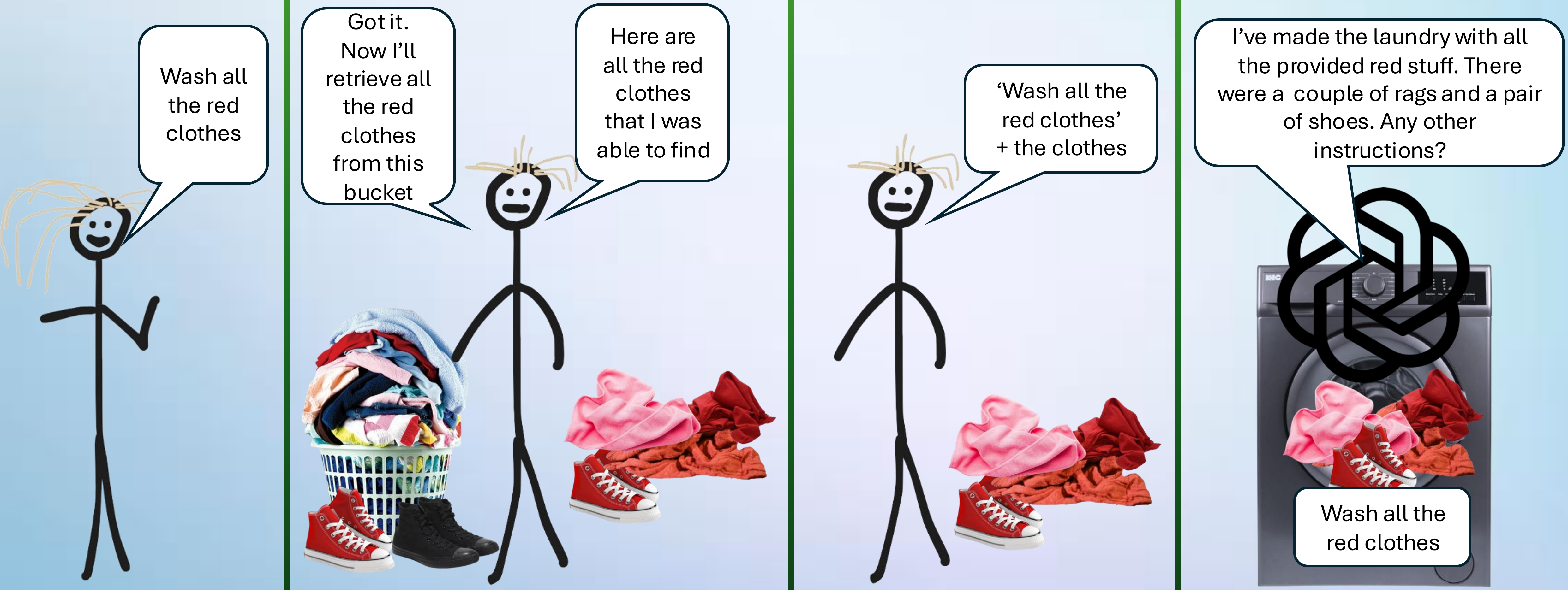

I’ve made the laundry with all the provided red stuff. There were a couple of rags and a pair of shoes. Any other instructions?
Wash all the red clothes

User request

Retrieval

Augmentation

Generation


Wash all the red clothes
Got it. Now I’ll retrieve all the red clothes from this bucket
Here are all the red clothes that I was able to find
‘Wash all the red clothes’ + the clothes
I’ve made the laundry with all the provided red stuff. There were a couple of rags and a pair of shoes. Any other instructions?
Wash all the red clothes

Search with topK and score

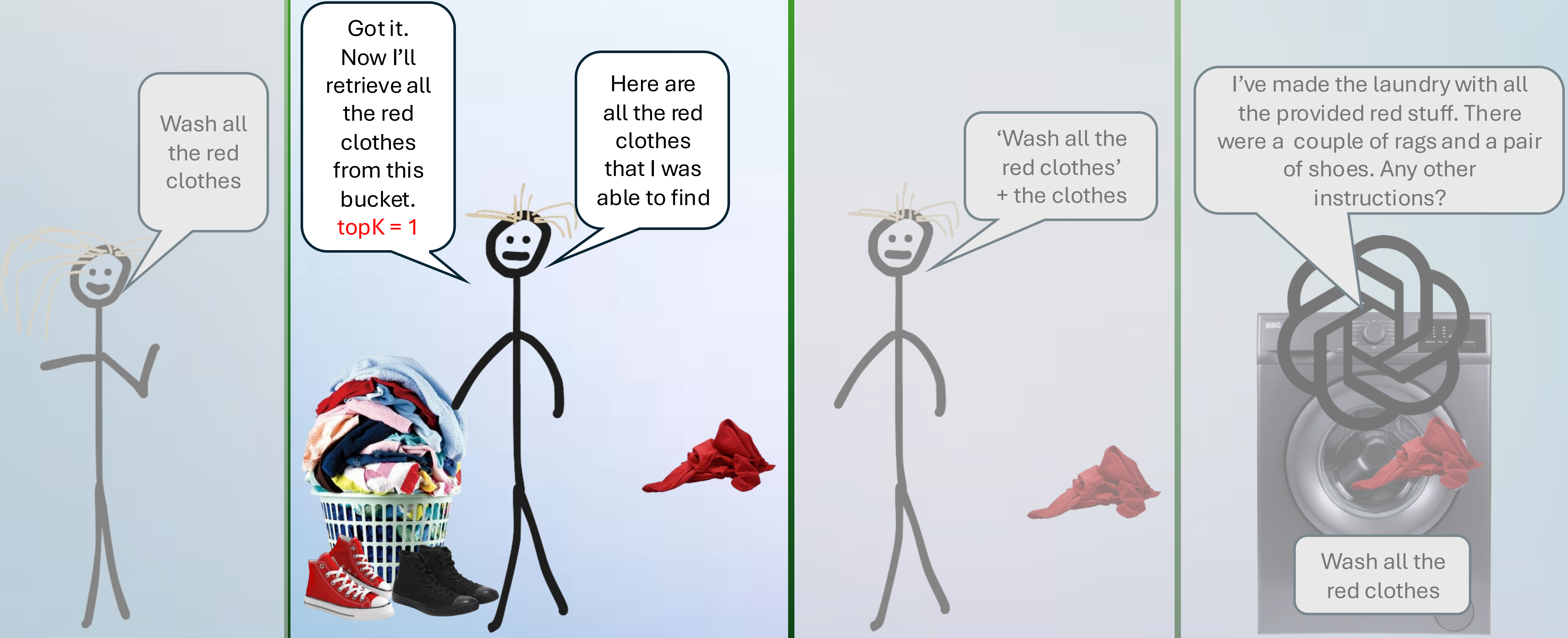
<Let’s explore how search with the topK and score filters>

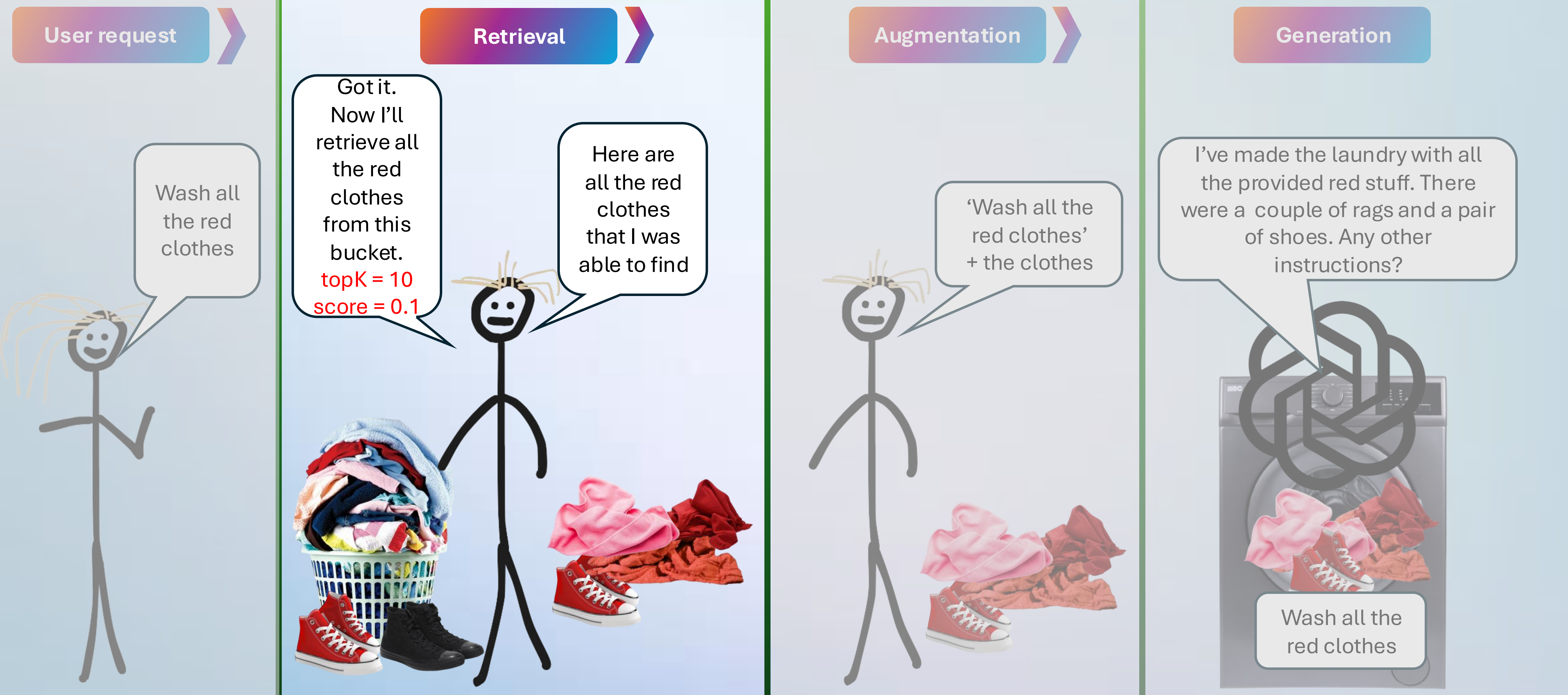
User request

Retrieval

Augmentation

Generation


Wash all the red clothes
Got it. Now I’ll retrieve all the red clothes from this bucket. topK = 1
Here are all the red clothes that I was able to find
‘Wash all the red clothes’ + the clothes
I’ve made the laundry with all the provided red stuff. There were a couple of rags and a pair of shoes. Any other instructions?
Wash all the red clothes



User request

Wash all the red clothes

Retrieval

Got it. Now I'll retrieve all the red clothes from this bucket.
topK = 10
score = 0.1

Here are all the red clothes that I was able to find

Augmentation

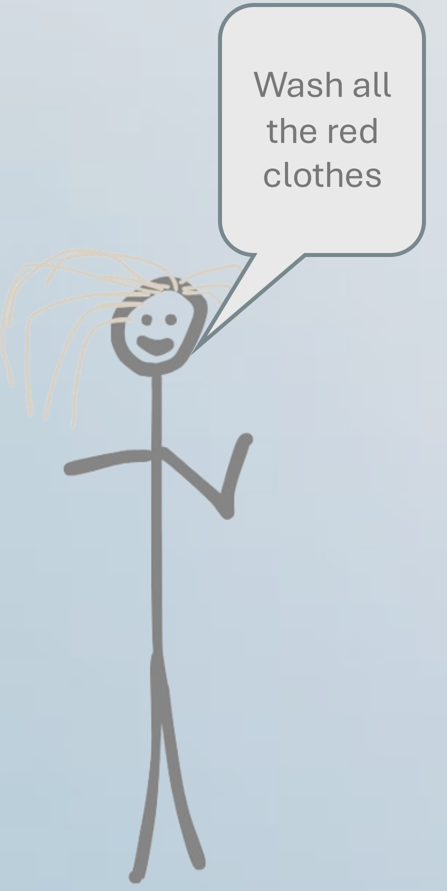
'Wash all the red clothes' + the clothes

Generation

I've made the laundry with all the provided red stuff. There were a couple of rags and a pair of shoes. Any other instructions?

Wash all the red clothes

User request



Wash all the red clothes

Retrieval

Got it. Now I'll retrieve all the red clothes from this bucket.
topK = 10
score = 0.6

Here are all the red clothes that I was able to find

Augmentation

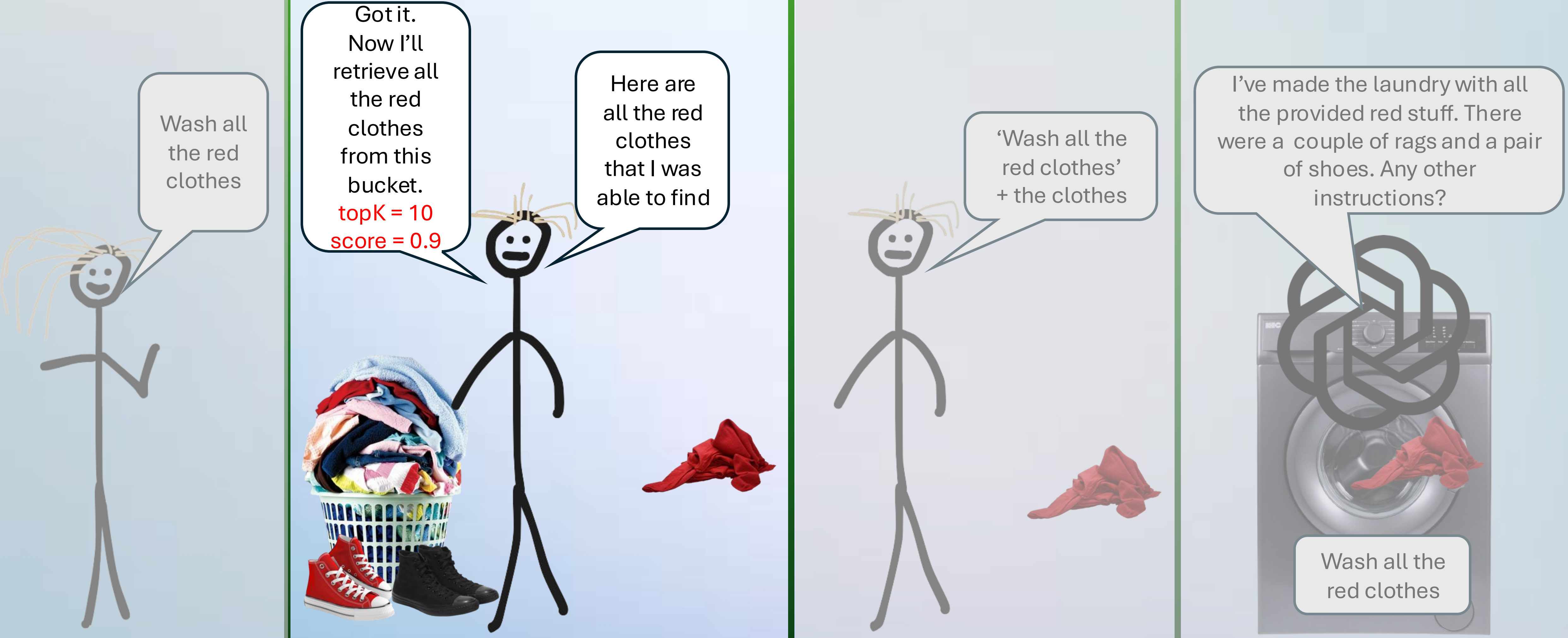
'Wash all the red clothes'
+ the clothes

Generation

I've made the laundry with all the provided red stuff. There were a couple of rags and a pair of shoes. Any other instructions?

Wash all the red clothes

User request › Retrieval › Augmentation › Generation



Wash all the red clothes

Got it. Now I'll retrieve all the red clothes from this bucket.
topK = 10
score = 0.9

Here are all the red clothes that I was able to find

'Wash all the red clothes' + the clothes

I've made the laundry with all the provided red stuff. There were a couple of rags and a pair of shoes. Any other instructions?

Wash all the red clothes

Thank you

- Author: Pavlo Khshanovskyi
- My LinkedIn: https://www.linkedin.com/in/khshanovskyi/
- Date: April 2025
- Join Codeus community in Discord
- Join Codeus community in LinkedIn