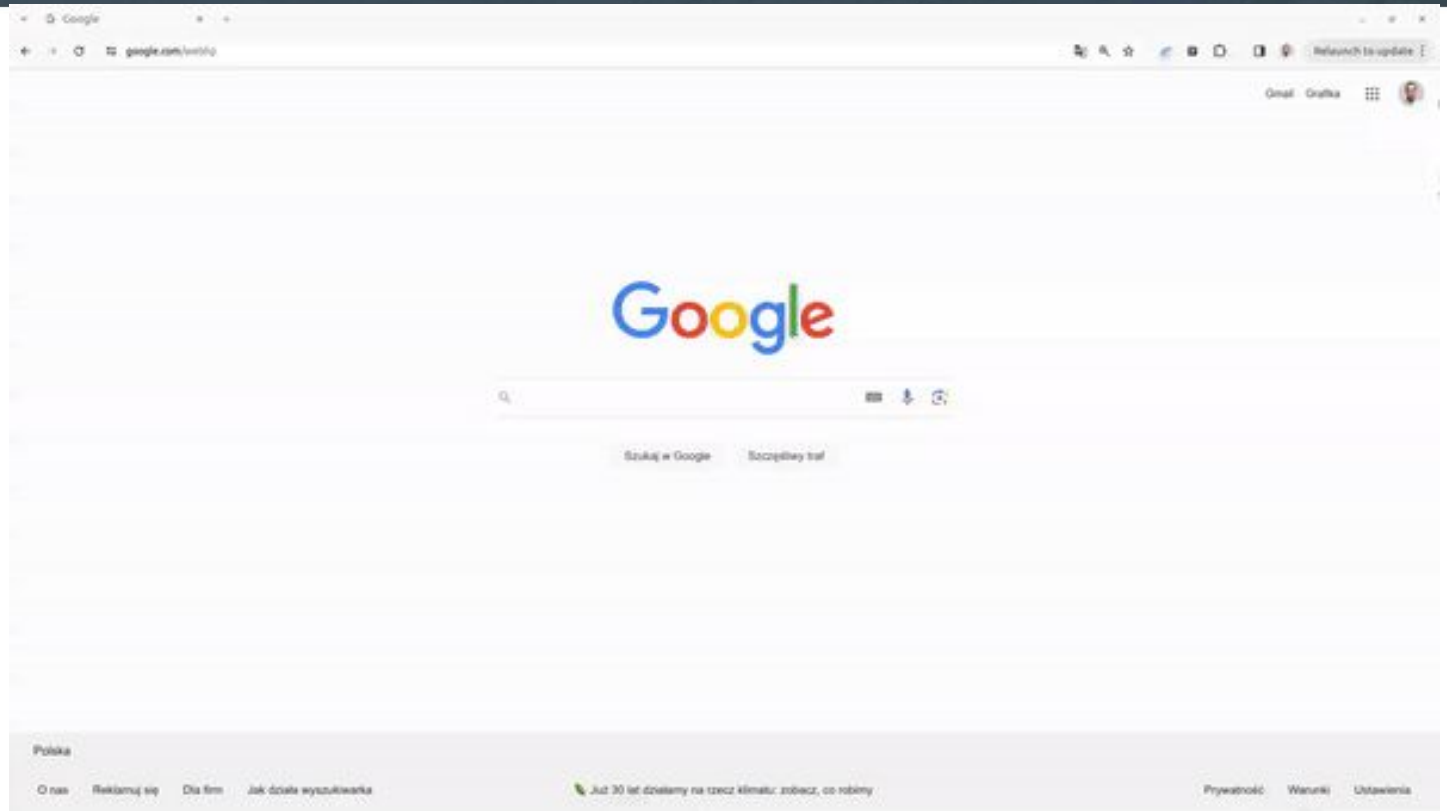
Generatywna sztuczna inteligencja z dużymi modelami tekstowymi

Wykorzystanie LLM i RAG - case study

Michał Żarnecki


Google
Gmail
Grafika
Google
Szukaj w Google
Szczęśliwy traf
Polska
O nas
Reklamuj się
Dla firm
Jak działa wyszukiwarka
Prywatność
Warunki
Ustawienia

29.01.2024

Michał Żarnecki

Audio engineer

Michał Żarnecki (ur. 12 listopada 1946 w Warszawie, zm. 21 listopada 2016, tamże) – **polski operator i reżyser dźwięku**.

Wikipedia
https://pl.wikipedia.org › wiki › Michał_Żarnecki

Michał Żarnecki – Wikipedia, wolna encyklopedia

Born: November 12, 1946, Warsaw

Died: November 21, 2016, Warsaw

Nominations: Polish Academy Award for Best Sound

Siblings: Andrzej Zarnecki

29.01.2024

case study - błędne wyniki wyszukiwania w Google

Problem:

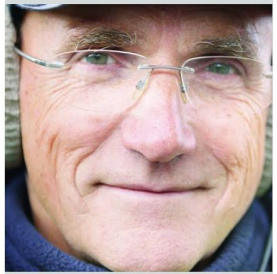
W wynikach wyszukiwania Google pod moim zdjęciem i nazwiskiem widnieje błędnie dopasowana data śmierci :O

W jaki sposób doszło do pomyłki algorytmu?

…może zdjęcia osób o tym samym imieniu i nazwisku są podobne?

Reference face

Comparison faces




```
"FaceMatches": [
    {
        "Similarity": 0.06796722859144211,
```


Amazon Rekognition Face comparison

aws

Results

 ≠ 

Request


```
{
   "TargetImage": {
       "Bytes": ()
   },
   "SourceImage": {
       "Bytes": ()
   },
   "SimilarityThreshold": 0
}
```


Response


```
{
   "SourceImageFace": {
       "BoundingBox": {
           "Width": 0.39943283796310425,
           "Height": 0.5625719428062439,
           "Left": 0.294373095035553,
           "Top": 0.15183748304843903
       },
       "Confidence": 99.9990463256836
```

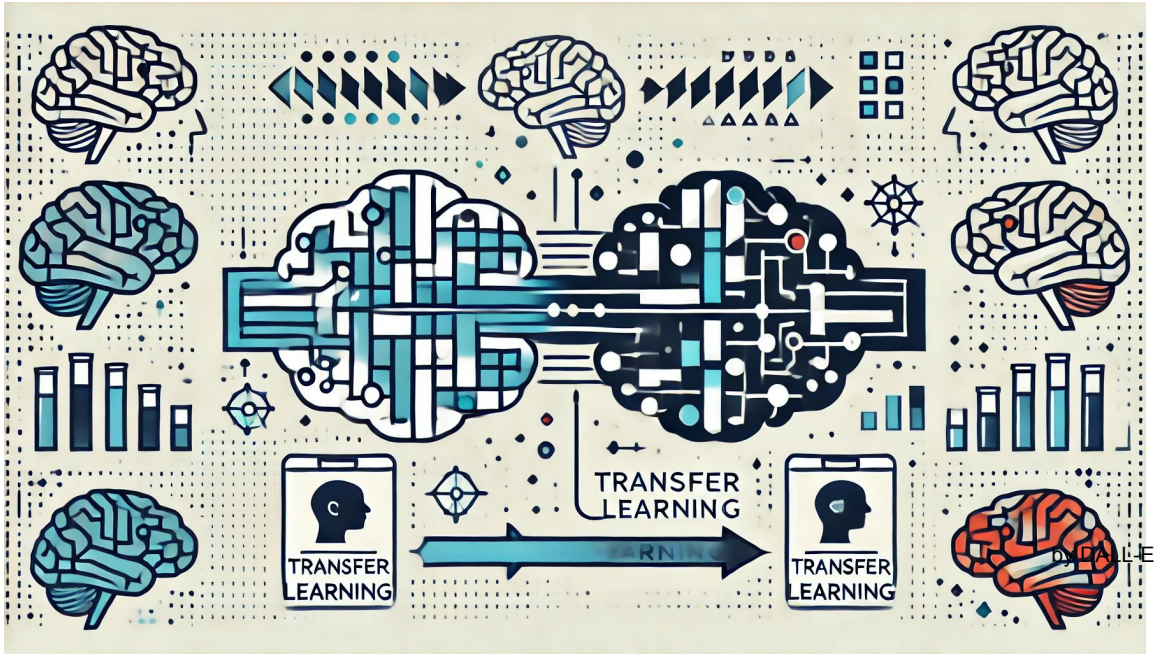
…może zdjęcia osób o tym samym imieniu i nazwisku są podobne?

Algorytm dopasował teksty zawierające moje imię i nazwisko?

W jaki sposób przetwarzać teksty,
aby uniknąć pomyłek?

RAG

Retrieval Augmented Generation



Transfer learning

Kto wie jak wygląda Moloch straszliwy?

Czym jest uczenie maszynowe?

ML MODEL

(logika)

moloch straszliwy

by DALL-E

ML MODEL

(logika)

nie moloch straszliwy

Czym się różni ML od "tradycyjnego" programowania?

Podejście tradycyjne

Czym się różni RAG/LLM od "tradycyjnego" programowania?

Wykorzystanie uczenia maszynowego

INSTRUKCJE TEKSTOWE

PRZYKŁADY

PROGRAM

Czym się różni RAG/LLM od "tradycyjnego" programowania?

Wykorzystanie uczenia maszynowego

1

INSTRUKCJE TEKSTOWE

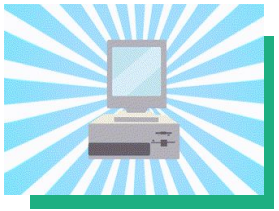
PRZYKŁADY

PROGRAM

2

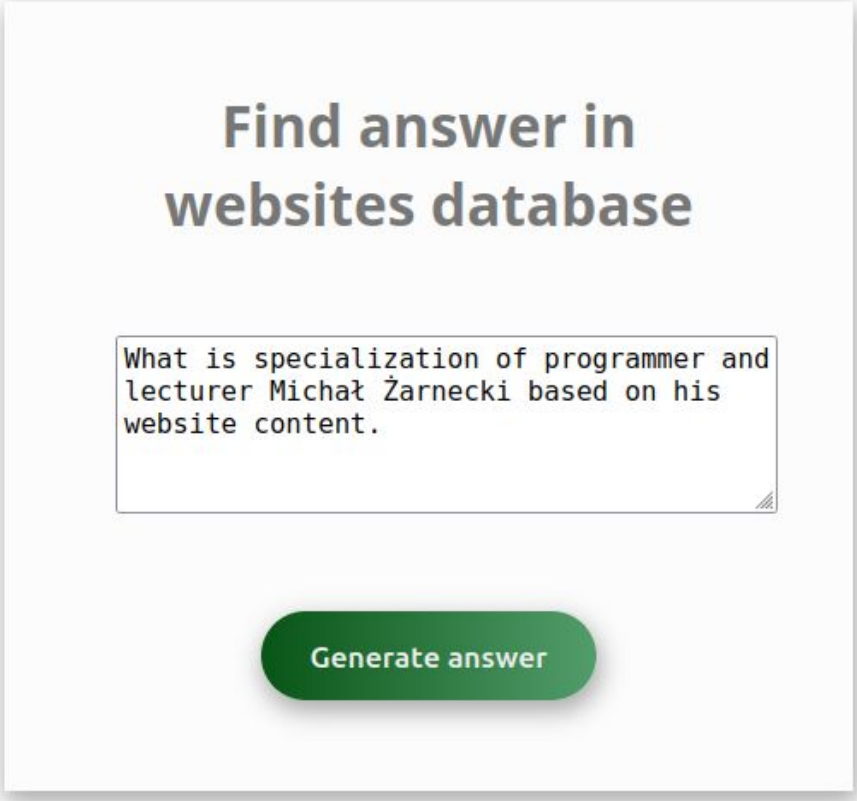
DANE

PROGRAM

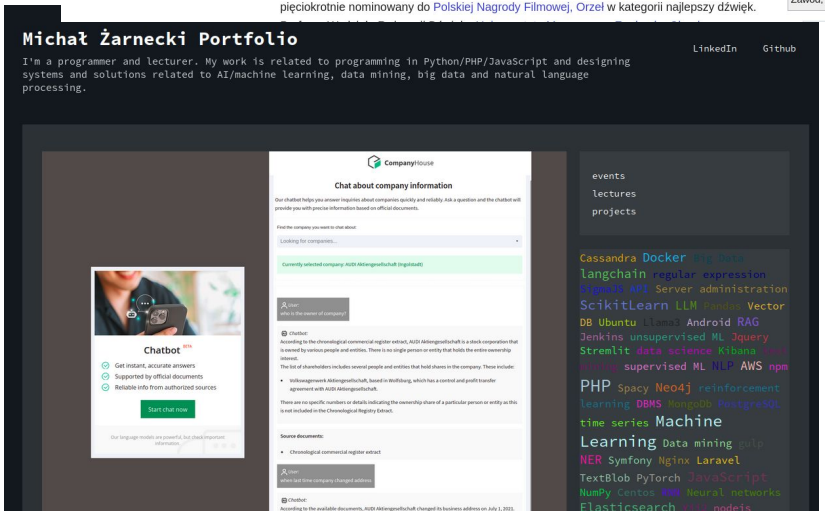


WYNIKI

Aplikacja


Find answer in websites database
What is specialization of programmer and lecturer Michał Żarnecki based on his website content.
Generate answer

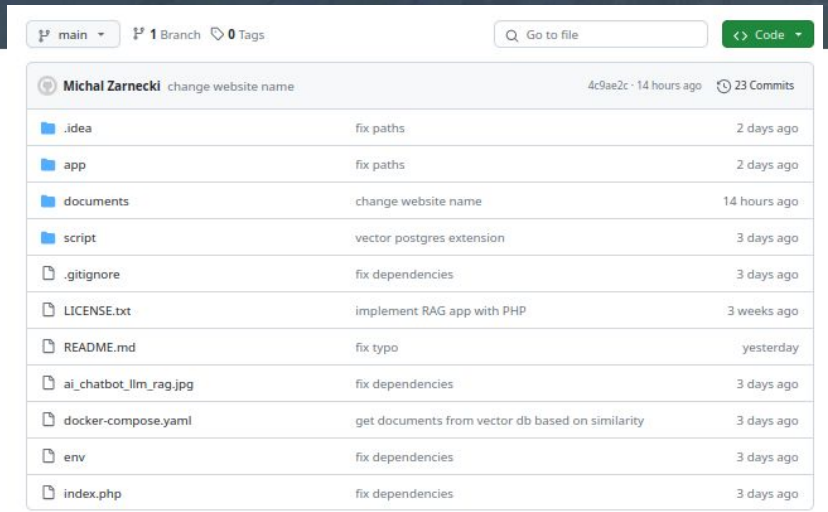

Wikipedia
Wolna encyklopedia
Przeszukaj Wikipedię
Szukaj
Michał Żarnecki [edytuj]
Spis treści ukryj
Początek
Życiorys
Filmografia
Nagrody i nominacje
Przypisy
Artykuł Dyskusja
Czytaj Edytuj Edytuj kod źródłowy Wyświetl
Michał Żarnecki (ur. 12 listopada 1946 w Warszawie, zm. 21 listopada 2016, tamże[1]) – polski operator i reżyser dźwięku.
Życiorys [edytuj | edytuj kod]
Laureat Nagrody za dźwięk na Festiwalu Polskich Filmów Fabularnych w Gdyni oraz pięciokrotnie nominowany do Polskiej Nagrody Filmowej, Orzeł w kategorii najlepszy dźwięk.
Data i miejsce urodzenia
Data i miejsce śmierci
Zawód, zajęcie


Michał Żarnecki Portfolio
I'm a programmer and lecturer. My work is related to programming in Python/PHP/JavaScript and designing systems and solutions related to AI/machine learning, data mining, big data and natural language processing.
LinkedIn
Github
Chatbot
Get instant, accurate answers
Supported by official documents
Reliable info from authorized sources
Start chat now
CompanyHouse
Chat about company information
events
lectures
projects
Cassandra Docker langchain regular expression SciKitLearn LLM Vector DB Ubuntu Android RAG Jenkins unsupervised ML Jquery Stremlit data science Kibana supervised ML NLP AWS npm PHP Spacy Neo4j reinforcement learning DBMS MongoDb Postgre SQL time series Machine Learning Data mining gulp NER Symfony Nginx Laravel TextBlob PyTorch JavaScript NumPy Centos RNN Neural networks

Aplikacja na Github

PHP / Docker

https://github.com/rzarno/php-rag



README GPL-3.0 license

Creating RAG (Retrieval Augmented Generation) application in PHP

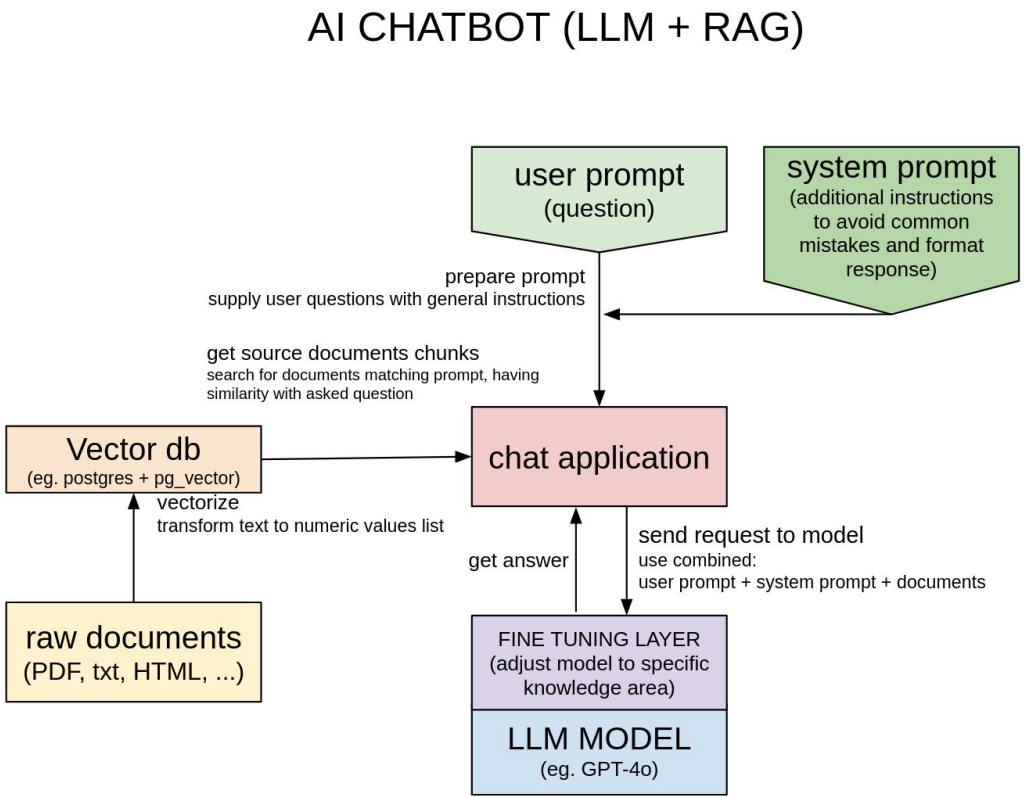
based on https://github.com/Krisseck/php-rag

This application uses LLM (Large Language Model) GPT-4o accessed via OpenAI API in order to generate text based on the user input. The user input is used to retrieve relevant information from the database and then the retrieved information is used to generate the text. This approach combines power of transformers and access to source documents.

Setup:

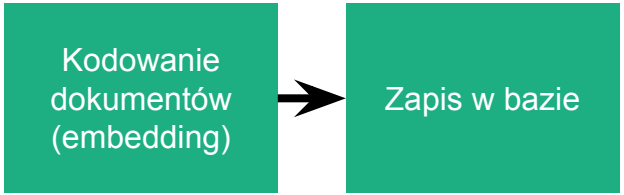
1. Run in CLI: `cd app/src && composer install`
2. Create api_key.txt file inside app/src and put there your OpenAI API key
3. Run in CLI: `cd ../../ && composer install`

Schemat aplikacji

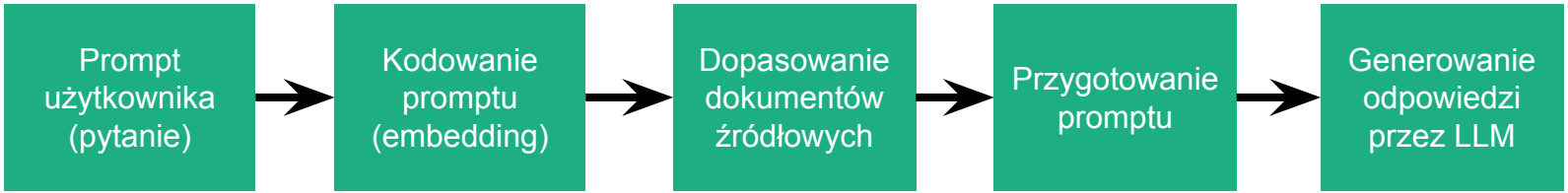


Proces przetwarzania zapytania

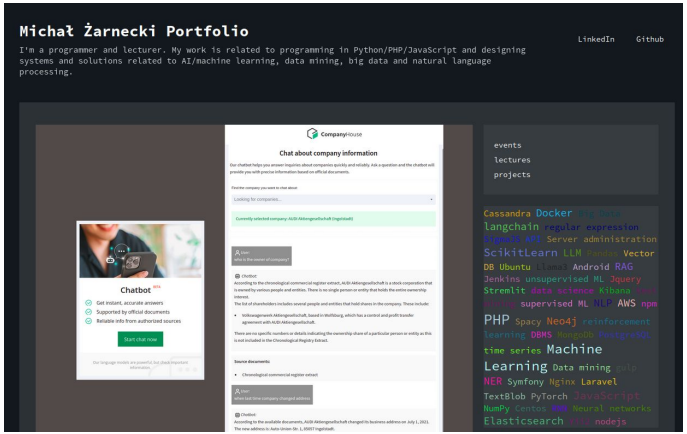
1. Import dokumentów do bazy wektorowej

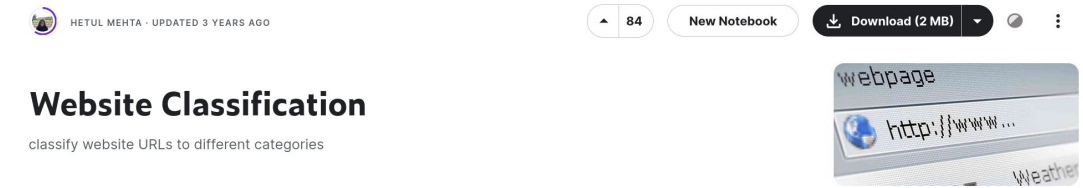


2. Proces generowania odpowiedzi

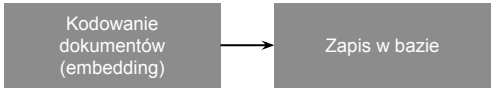


Baza stron internetowych

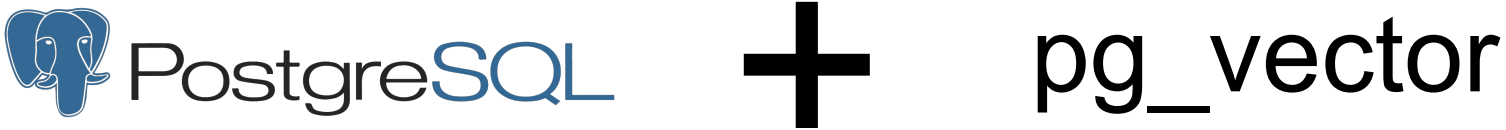




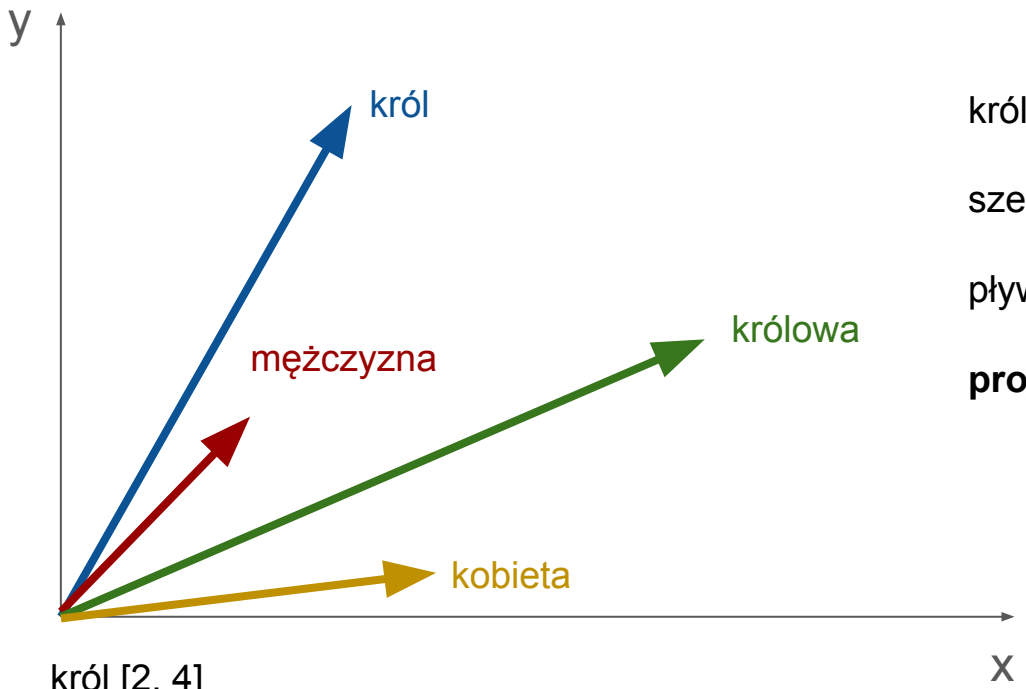
https://www.kaggle.com/datasets/hetulmehta/website-classification



Baza wektorowa



Kodowanie tekstu w bazie do postaci wektorowej



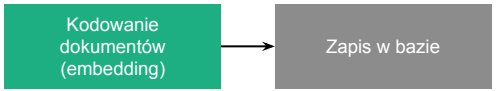
król [2, 4]
królowa [5, 3]
...

król - mężczyzna + kobieta ≈ królowa

szedłem - idę ≈ biegłem - biegnę

pływamy - my ≈ pływam - ja

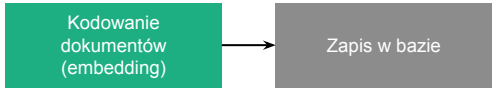
projekt + deadline ≈ stackoverflow + copy/paste



Kodowanie tekstu w bazie do postaci wektorowej

```
1 model['go']
```

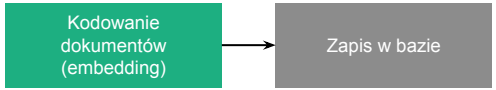
```
array([-0.078894,  0.4616  ,  0.57779 , -0.71637 , -0.13121 ,  0.4186  ,
       -0.29156 ,  0.52006 ,  0.089986, -0.35062 ,  0.51755 ,  0.51998 ,
        0.15218 ,  0.41485 , -0.12377 , -0.37222 ,  0.0273  ,  0.75673 ,
       -0.8739  ,  0.58935 ,  0.46662 ,  0.62918 ,  0.092603, -0.012868,
       -0.015169,  0.25567 , -0.43025 , -0.77668 ,  0.71449 , -0.3834  ,
       -0.69638 ,  0.23522 ,  0.11396 ,  0.02778 ,  0.071357,  0.87409 ,
       -0.1281  ,  0.063576,  0.067867, -0.50181 , -0.28523 , -0.072536,
       -0.50738 , -0.6914  , -0.53579 , -0.11361 , -0.38234 , -0.12414 ,
        0.011214, -1.1622  ,  0.037057, -0.18495 ,  0.01416 ,  0.87193 ,
       -0.097309, -2.3565  , -0.14554 ,  0.28275 ,  2.0053  ,  0.23439 ,
       -0.38298 ,  0.69539 , -0.44916 , -0.094157,  0.90527 ,  0.65764 ,
        0.27628 ,  0.30688 , -0.57781 , -0.22987 , -0.083043, -0.57236 ,
       -0.299   , -0.81112 ,  0.039752, -0.05681 , -0.48879 , -0.18091 ,
       -0.28152 , -0.20559 ,  0.4932  , -0.033999, -0.53139 , -0.28297 ,
       -1.4475  , -0.18685 ,  0.091177,  0.11454 , -0.28168 , -0.33565 ,
       -0.31663 , -0.1089  ,  0.10111 , -0.23737 , -0.64955 , -0.268   ,
        0.35096 ,  0.26352 ,  0.59397 ,  0.26741 ], dtype=float32)
```



Kodowanie tekstu w bazie do postaci wektorowej

```
1 model['away']
```

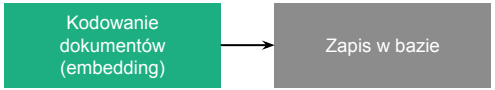
```
array([-0.10379 , -0.014792,  0.59933 , -0.51316 , -0.036463,  0.6588  ,
       -0.57906 ,  0.17819 ,  0.23663 , -0.21384 ,  0.55339 ,  0.53597 ,
        0.041444,  0.16095 ,  0.017093, -0.37242 ,  0.017974,  0.39268 ,
       -0.23265 ,  0.1818  ,  0.66405 ,  0.98163 ,  0.42339 ,  0.030581,
        0.35015 ,  0.25519 , -0.71182 , -0.42184 ,  0.13068 , -0.47452 ,
       -0.08175 ,  0.1574  , -0.13262 ,  0.22679 , -0.16885 , -0.11122 ,
       -0.32272 , -0.020978, -0.43345 ,  0.172   , -0.67366 , -0.79052 ,
        0.10556 , -0.4219  , -0.12385 , -0.063486, -0.17843 ,  0.56359 ,
        0.16986 , -0.17804 ,  0.13956 , -0.20169 ,  0.078985,  1.4497  ,
        0.23556 , -2.6014  , -0.5286  , -0.11636 ,  1.7184  ,  0.33254 ,
        0.12136 ,  1.1602  , -0.2914  ,  0.47125 ,  0.41869 ,  0.35271 ,
        0.47869 , -0.042281, -0.18294 ,  0.1796  , -0.24431 , -0.34042 ,
        0.20337 , -0.93676 ,  0.013077,  0.080339, -0.36604 , -0.44005 ,
       -0.35393 ,  0.15907 ,  0.55807 ,  0.1492  , -0.86433 ,  0.040305,
       -1.0939  , -0.26386 , -0.29494 ,  0.25696 , -0.33718 , -0.086468,
       -0.24246 , -0.21114 ,  0.099632,  0.12815 , -0.78714 , -0.51785 ,
       -0.10944 ,  0.9763  ,  0.57032 ,  0.13581 ], dtype=float32)
```



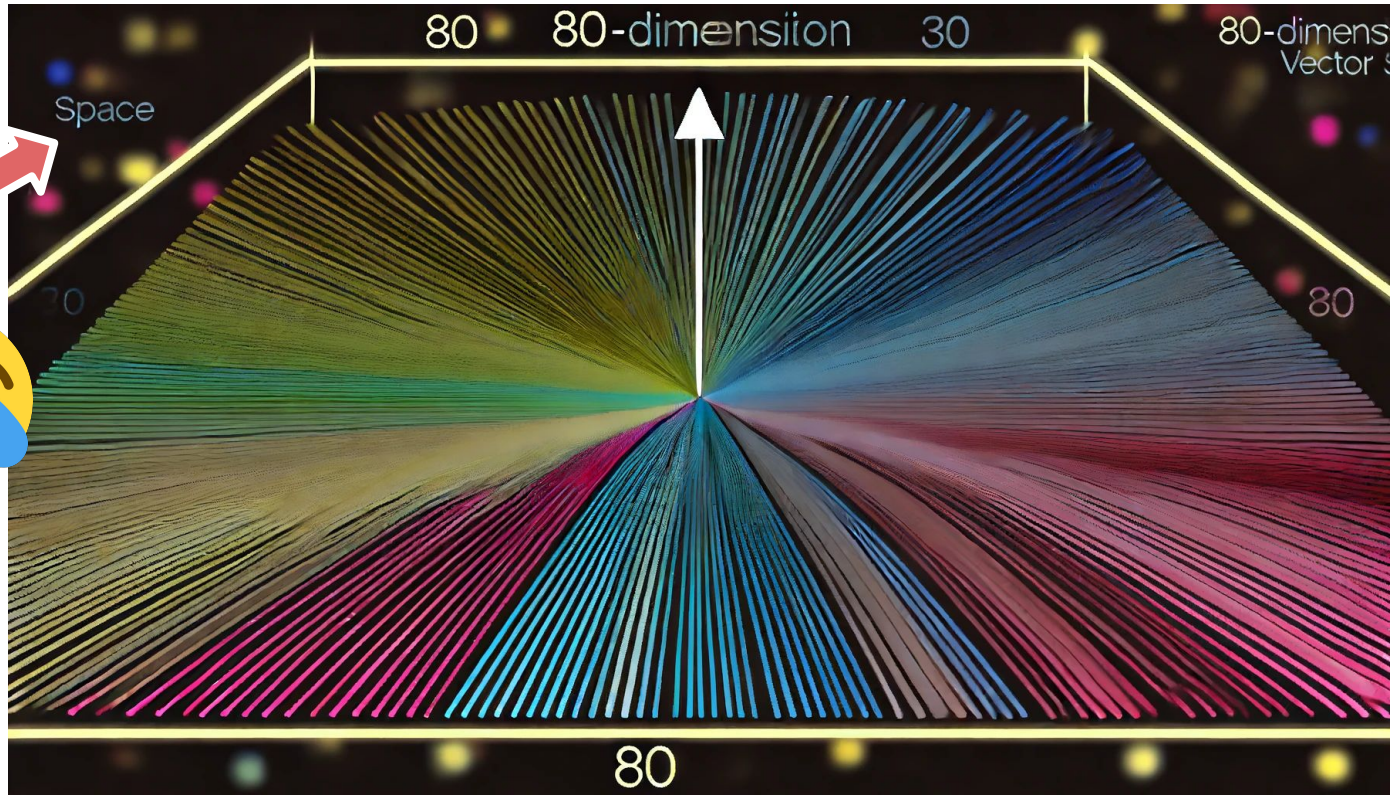
Kodowanie tekstu w bazie do postaci wektorowej

```
1 (model['go'] + model['away'])/2
```

```
array([-0.091342  ,  0.223404  ,  0.58856   , -0.614765  , -0.0838365 ,
        0.5387    , -0.43531   ,  0.349125  ,  0.163308  , -0.28223   ,
        0.53547   ,  0.52797496,  0.096812  ,  0.2879    , -0.0533385 ,
       -0.37232   ,  0.022637  ,  0.574705  , -0.553275  ,  0.385575  ,
        0.565335  ,  0.805405  ,  0.2579965 ,  0.0088565 ,  0.1674905 ,
        0.25543   , -0.571035  , -0.59926   ,  0.422585  , -0.42896   ,
       -0.389065  ,  0.19631   , -0.00933   ,  0.127285  , -0.0487465 ,
        0.381435  , -0.22540998,  0.021299  , -0.1827915 , -0.16490501,
       -0.47944498, -0.431528  , -0.20091   , -0.55665   , -0.32982   ,
       -0.088548  , -0.28038502,  0.219725  ,  0.090537  , -0.67012   ,
        0.0883085 , -0.19332   ,  0.0465725 ,  1.160815  ,  0.0691255 ,
       -2.47895   , -0.33707   ,  0.083195  ,  1.86185   ,  0.283465  ,
       -0.13081   ,  0.927795  , -0.37028   ,  0.1885465 ,  0.66198   ,
        0.505175  ,  0.37748498,  0.1322995 , -0.380375  , -0.025135  ,
       -0.1636765 , -0.45639   , -0.047815  , -0.87394   ,  0.0264145 ,
        0.0117645 , -0.427415  , -0.31048   , -0.317725  , -0.02326   ,
        0.525635  ,  0.05760051, -0.69786   , -0.1213325 , -1.2707    ,
       -0.225355  , -0.1018815 ,  0.18575001, -0.30943   , -0.211059  ,
       -0.279545  , -0.16002001,  0.100371  , -0.05461   , -0.71834505,
       -0.392925  ,  0.12075999,  0.61991   ,  0.582145  ,  0.20161   ],
      dtype=float32)
```



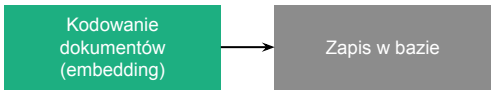
Create an image with a vector in 80 dimensional space



by DALL-E

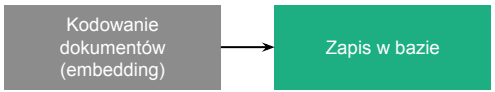
Kodowanie tekstu w bazie do postaci wektorowej

```php
class TextEncoder extends AbstractGPTAPIClient implements StageInterface
{
    private string $embeddingModel = 'text-embedding-ada-002';

    public function getEmbeddings(string $document): string
    {
        $response = $this->client->embeddings()->create([
            'input' => $document,
            'model' => $this->embeddingModel
        ]);
        return json_encode($response->embeddings[0]->embedding);
    }
```



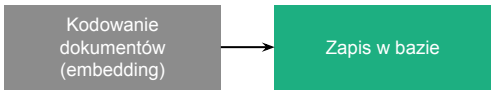
Wczytanie dokumentów

```php
class DocumentLoader extends AbstractDocumentRepository
{
    public function loadDocuments(): void
    {
        $path    = __DIR__ . '/../documents';
        $files = array_diff(scandir($path), array('.', '..'));
        foreach($files as $file) {
            $document = file_get_contents($path . '/' . $file);

            #load documents to postgres database
            $responseDocument = $this->textEncoder->getEmbeddings($document);

            $this->insertDocument($document, $responseDocument);
        }
    }
```



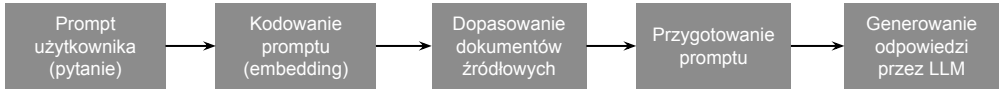
Wczytanie dokumentów

```
CREATE EXTENSION IF NOT EXISTS vector;

CREATE TABLE IF NOT EXISTS document (
    id serial PRIMARY KEY,
    embedding vector,
    text text,
    created_at timestamptz DEFAULT now()
);
```

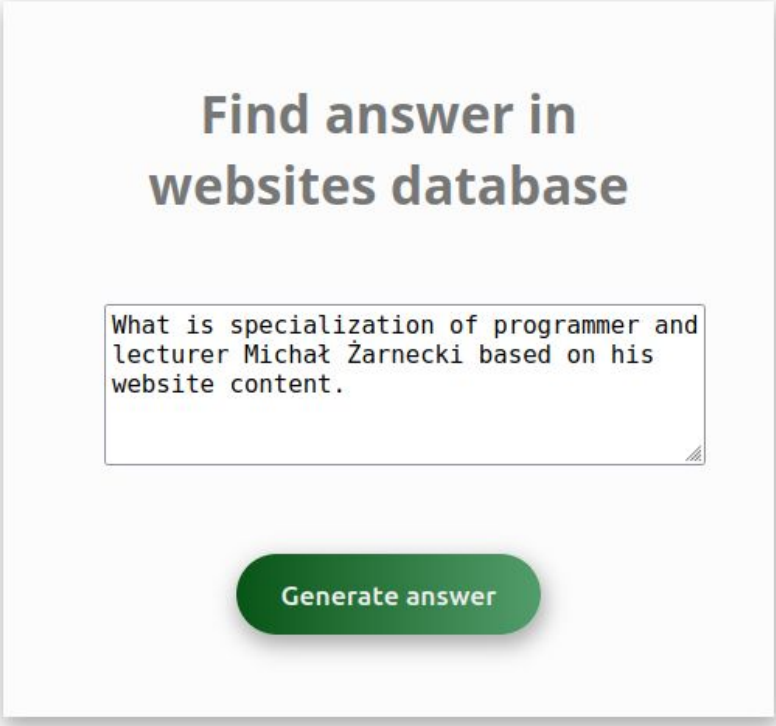


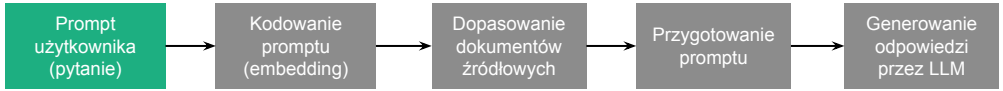
Proces przetwarzania zapytania

```php
$promptResolver = new PromptResolver();
$textEncoder = new TextEncoder();
$documentProvider = new DocumentProvider();
$ragPromptProvider = new RAGPromptProvider();
$generatedTextProvider = new GeneratedTextProvider();
$payload = new Payload();

$pipeline = (new Pipeline(new FingersCrossedProcessor()))
    ->pipe($promptResolver) //get prompt from POST or CLI
    ->pipe($textEncoder) //get embeddings for prompt
    ->pipe($documentProvider) //find documents with similarity to prompt
    ->pipe($ragPromptProvider) //combine prompt with matched source documents
    ->pipe($generatedTextProvider); //get API response

$response = $pipeline->process($payload);
```

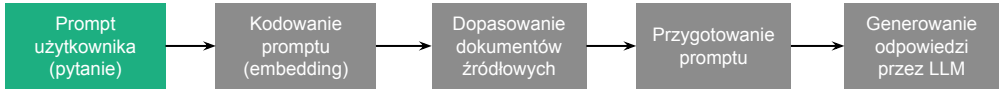


Zapytanie użytkownika



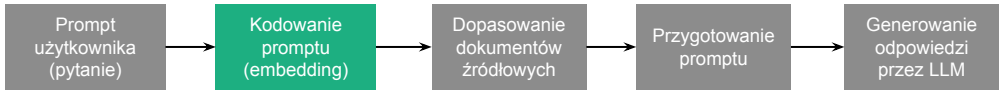


Zapytanie użytkownika



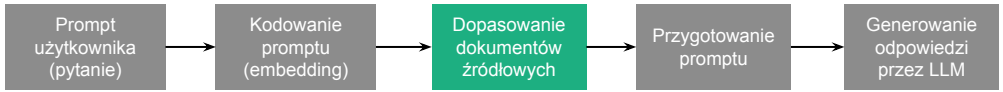
Kodowanie tekstu w bazie do postaci wektorowej

```php
class TextEncoder extends AbstractGPTAPIClient implements StageInterface
{
    private string $embeddingModel = 'text-embedding-ada-002';

    public function getEmbeddings(string $document): string
    {
        $response = $this->client->embeddings()->create([
            'input' => $document,
            'model' => $this->embeddingModel
        ]);
        return json_encode($response->embeddings[0]->embedding);
    }

    /**
     * @param Payload $payload
     * @return Payload
     */
    public function __invoke($payload)
    {
        return $payload->setEmbeddingPrompt($this->getEmbeddings($payload->getPrompt()));
    }
```

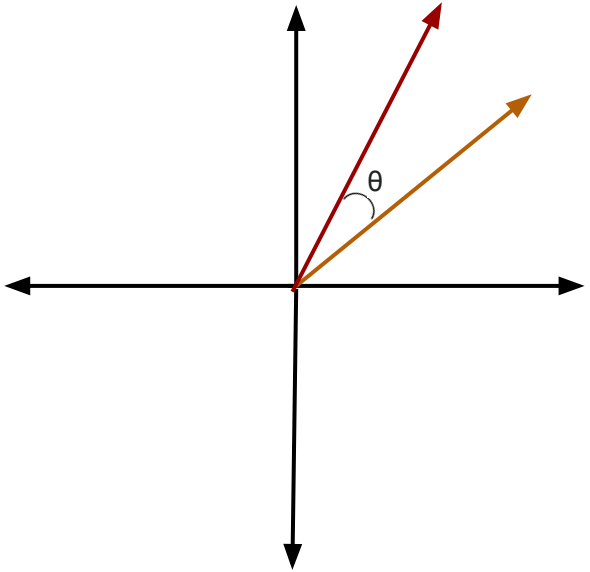


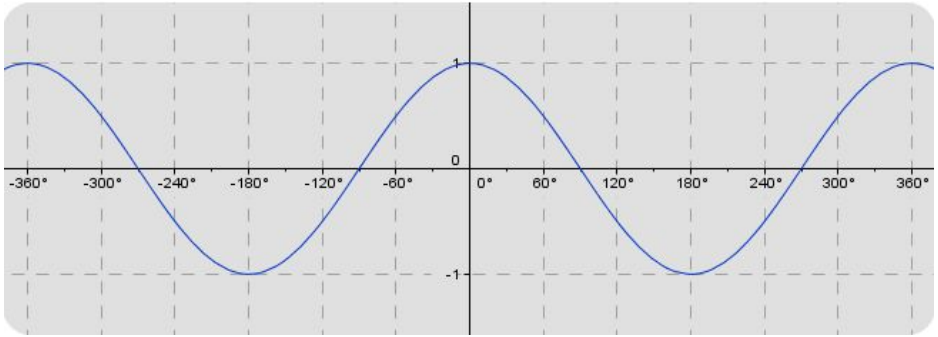
Dopasowanie "pasujących" dokumentów

```
SELECT text FROM document order by embedding <=>
    '[-0.0014472235,-0.0001540061,0.0052023693,...]' DESC limit 3;
```

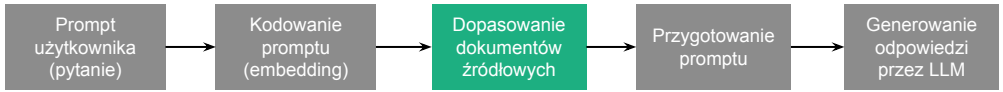


Podobieństwo cosinusowe

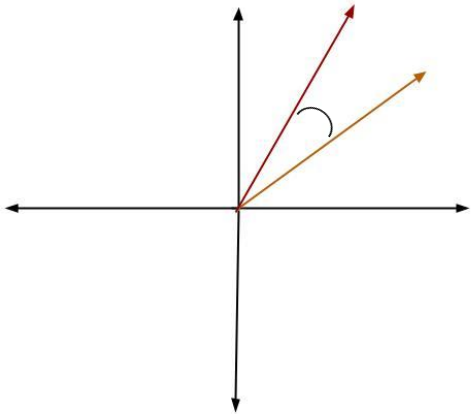




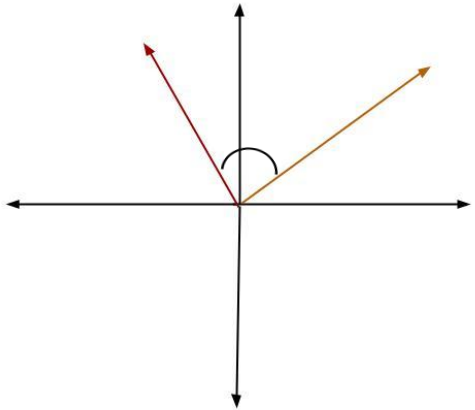
$$\cos\theta = \frac{\vec{a} \cdot \vec{b}}{\|\vec{a}\| \cdot \|\vec{b}\|}$$



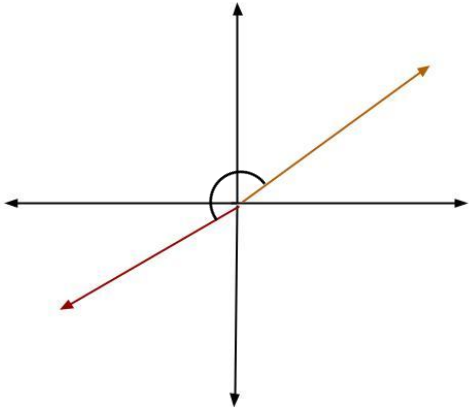
Dopasowanie "pasujących" dokumentów



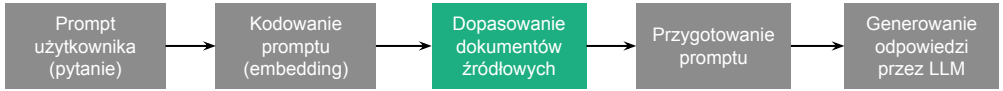
kąt bliski 0°
cosinus kąta bliski 1



kąt bliski 90°
cosinus kąta bliski 0

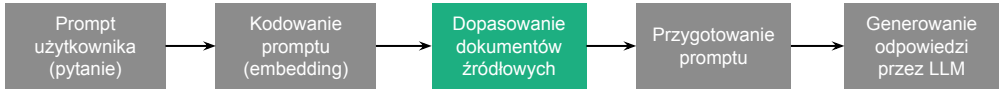


kąt bliski 180°
cosinus kąta bliski -1

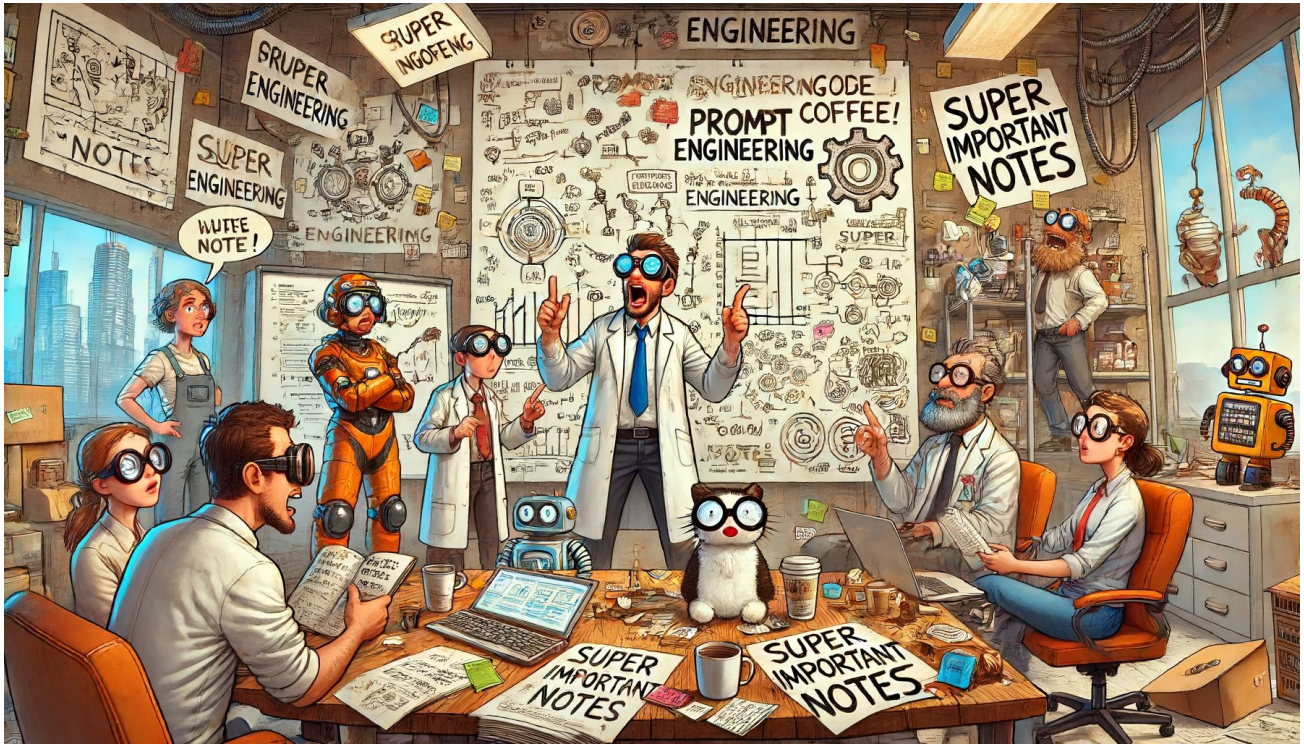


Dopasowanie "pasujących" dokumentów

```
class DocumentProvider extends AbstractDocumentRepository implements StageInterface
{
    public function getSimilarDocuments(string $embeddingPrompt): array
    {
        $stmt = $this->connection->prepare("SELECT text from document order by
embedding <=> :embeddingPrompt DESC limit 5;");
        $stmt->execute(['embeddingPrompt' => $embeddingPrompt]);
        return $stmt->fetchAll();
    }
```



Prompt engineering + one shot learning

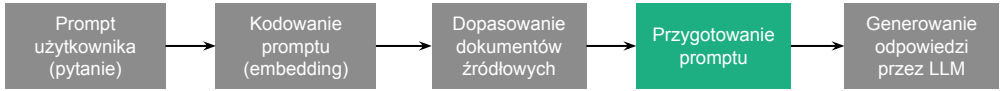


by DALL-E

Prompt użytkownika (pytanie) → Kodowanie promptu (embedding) → Dopasowanie dokumentów źródłowych → **Przygotowanie promptu** → Generowanie odpowiedzi przez LLM

Prompt engineering + one shot learning

```
##### INPUT:
You are a helpful AI assistant with access to a set of websites content. Your role is to provide
information and answer questions based solely on these documents.
You should respond directly and concisely, using the information contained within the documents without
quoting or revealing actual document content. Do not infer or guess information that is not explicitly
stated in the documents.

If a question relates to information not present in the documents, state that the information is not
available.
Your goal is to be helpful by providing factual and document-backed answers.

Here is question:
<QUESTION>

Source documents:
<DOCUMENTS>

Example:
when receive question and content like below:
<WEBSITE CONTENT>

you should answer like below:
<EXPECTED ANSWER>
```



Model

by DALL-E

Prompt użytkownika (pytanie) → Kodowanie promptu (embedding) → Dopasowanie dokumentów źródłowych → Przygotowanie promptu → Generowanie odpowiedzi przez LLM

Model

OpenAI

GPT4o

API OPENAI
175 mld parametrów

MISTRAL AI_

MIXTRAL

API / STANDALONE
45 mld parametrów

Meta

LLAMA3

API / STANDALONE
70 mld parametrów
kontekst ~15 str. po 400 słów

ANTHROP\C

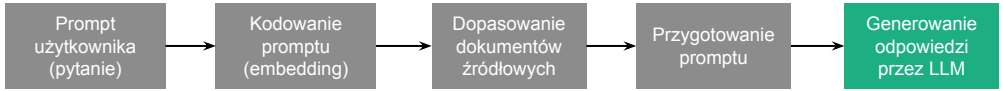
CLAUDE 3

API AWS BEDROCK
2 tryliony parametrów

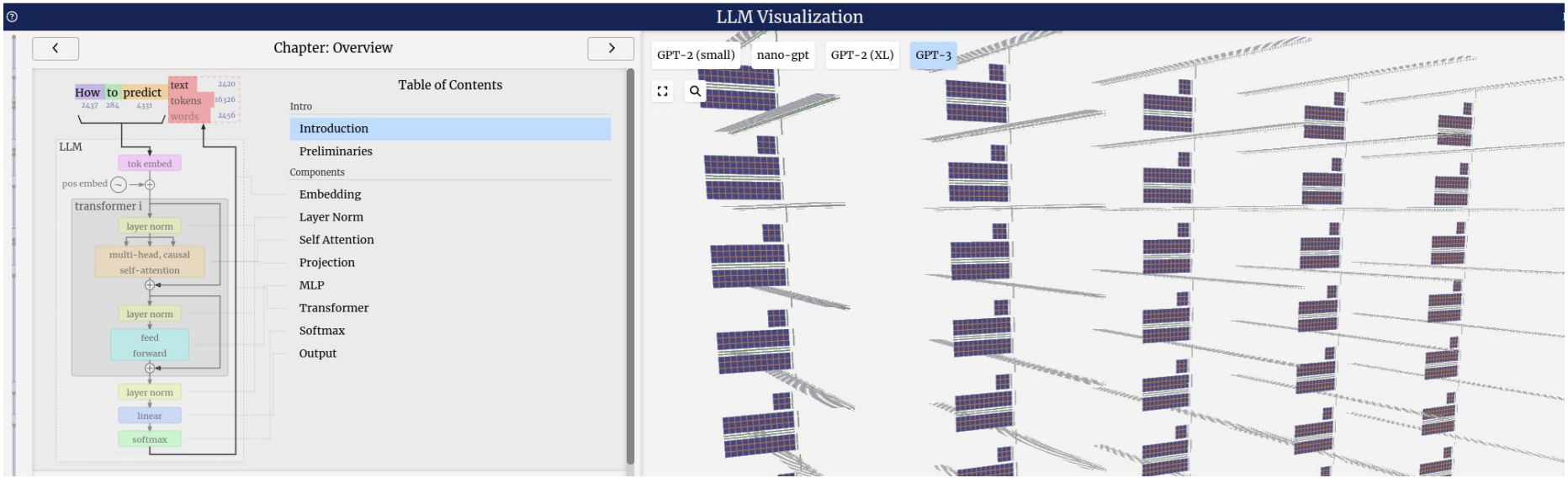
aws

open source models available on:

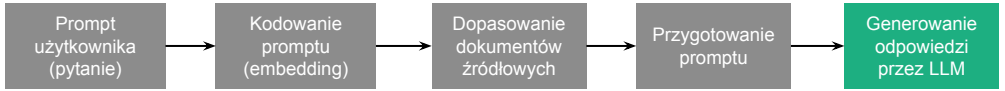
Hugging Face



Model

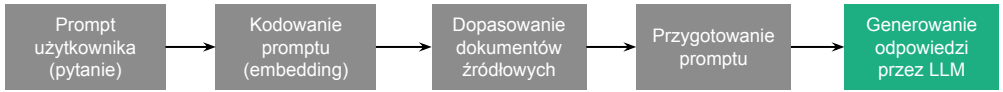


https://bbycroft.net/llm



Komunikacja z API

```php
class GeneratedTextProvider extends AbstractGPTAPIClient implements StageInterface
{
    private string $model = 'gpt-4o';

    public function generateText(string $prompt, string $sourceDocuments): string
    {
        # prepare API input
        $input = $sourceDocuments . "\n\n##### INPUT: \n"  . $prompt . "\n##### RESPONSE:\n";

        # get API response
        $response = $this->client->chat()->create([
            'model' => $this->model,
            'messages' => [
                [
                    'content' => $input,
                    'role' => 'user'
                ]
            ]
        ]);

        return $response->choices[0]->message->content;
    }
```



Przeszukiwanie treści stron internetowych

```
##### INPUT:
what is specialization of Michał Żarnecki based on website content?
```

Przeszukiwanie treści stron internetowych

INPUT:
what is specialization of Michał Żarnecki based on website content?

RESPONSE:
Michał Żarnecki is a programmer and lecturer specializing in several key areas related to modern software development and data-driven technologies.

His expertise includes:
1. **Programming Languages**: Python, PHP, JavaScript.
2. **AI and Machine Learning**: Designing systems and solutions related to artificial intelligence and machine learning.
3. **Data Mining and Big Data**: Extracting valuable insights from large datasets.
4. **Natural Language Processing (NLP)**: Working on systems that understand and generate human language.
5. **Software Development Frameworks**: Utilizing various tools and frameworks such as Streamlit, TensorFlow, PyTorch, and langchain.
6. **Database Systems**: Implementing and working with databases like PostgreSQL, Elasticsearch, Neo4j, and others.

His portfolio highlights projects such as an AI chatbot for analyzing company documents and a self-driving vehicle based on TensorFlow and Raspberry Pi.
Additionally, he has contributed to conferences and created e-learning courses focused on machine learning, underscoring his dual role as a developer and educator.

Fine tuning (opcjonalnie)

by DALL-E

Prompt użytkownika (pytanie) → Kodowanie promptu (embedding) → Dopasowanie dokumentów źródłowych → Przygotowanie promptu → Generowanie odpowiedzi przez LLM

Michał Żarnecki

Audio engineer

Michał Żarnecki (ur. 12 listopada 1946 w Warszawie, zm. 21 listopada 2016, tamże) – **polski operator i reżyser dźwięku**.

Wikipedia
https://pl.wikipedia.org › wiki › Michał_Żarnecki

Michał Żarnecki – Wikipedia, wolna encyklopedia

Born: November 12, 1946, Warsaw

Died: November 21, 2016, Warsaw

Nominations: Polish Academy Award for Best Sound

Siblings: Andrzej Zarnecki

W jaki sposób przetwarzać teksty, aby uniknąć pomyłek?

Find answer in websites database

What is specialization of programmer and lecturer Michał Żarnecki based on his website content.

Generate answer

Przeszukiwanie treści stron internetowych

INPUT:
Is Michał Żarnecki programmer the same person as Michał Żarnecki audio engineer?

Przeszukiwanie treści stron internetowych

INPUT:
Is Michał Żarnecki programmer the same person as Michał Żarnecki audio engineer?

RESPONSE:
Based on the information provided, it appears that Michał Żarnecki the programmer and Michał Żarnecki the audio engineer are not the same person.
Here's why:
1. **Fields of Expertise**:
 - Michał Żarnecki, the audio engineer, was a well-known operator and reżyser dźwięku (sound director) in Poland, with notable contributions to the Polish film industry, as mentioned in the Wikipedia excerpt.
 - Michal Żarnecki, the programmer, has a portfolio focused on programming in Python, PHP, and JavaScript, with projects related to AI, machine learning, data mining, and software development.
2. **Lifespan**:
 - Michał Żarnecki the audio engineer was born on November 12, 1946, and passed away on November 21, 2016.
 - The projects listed in Michał Żarnecki the programmer's portfolio date from 2014 to 2016, which would be conflicting if he had passed away in 2016 and was actively working in those years.
3. **Occupational Focus**:
 - The audio engineer has a career documented in film sound engineering and education.
 - The programmer's career is centered around software development, mobile applications, ERP systems, and consulting in technology.

Given the distinct differences in their professional domains, timelines, and expertise, it is highly unlikely that they are the same individual

Przeszukiwanie treści stron internetowych

INPUT:
Is Michał Żarnecki programmer the same person as Michał Żarnecki audio engineer?

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Wyzwania

- **wydajność zapytania dopasowującego źródła przy milionach rekordów**

Wyzwania

- **wydajność zapytania dopasowującego źródła przy milionach rekordów**

```
CREATE INDEX ON document
   USING hnsw (embedding vector_cosine_ops);
```

Wyzwania

- wydajność zapytania dopasowującego źródła przy milionach rekordów
- **halucynowanie i ewaluacja modelu**

Wyzwania

- wydajność zapytania dopasowującego źródła przy milionach rekordów
- **halucynowanie i ewaluacja modelu**

by DALL-E

Wyzwania

- wydajność zapytania dopasowującego źródła przy milionach rekordów
- halucynowanie i ewaluacja modelu
- **wybór właściwych dokumentów źródłowych**

Wyzwania

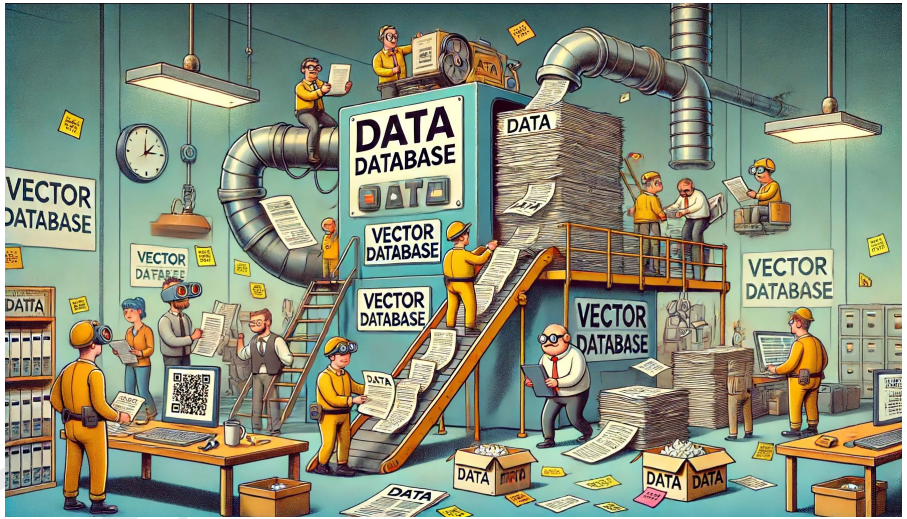
- wydajność zapytania dopasowującego źródła przy milionach rekordów
- halucynowanie
- **wybór właściwych dokumentów źródłowych**

```
metadata column:
{
    "company_id": "3b011094-df66-451e-a55c-94fd204f2f72",
    "company_name": "Cobol&Fortran Innovations inc.",
    "file_type": "excerpt",
    "file_name": "Chronologischer Handelsregisterauszug",
    "entry_id": 2,
    "date": "2022-08-31",
    "source_document_id": "b7600b45-8f89-4600-be7c-58714c11bca5"
}
```

Jak wdrożyć RAG w projekcie?

Jak wdrożyć RAG w projekcie?

1. Pozyskanie danych do bazy wektorowej



by DALL-E

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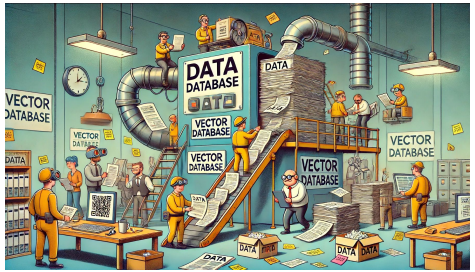
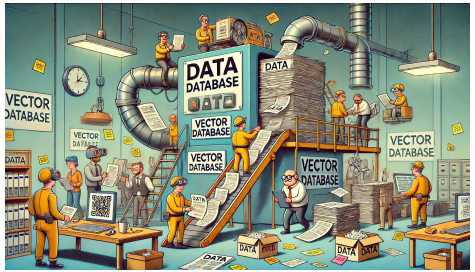


2. Import i konfiguracja modelu lub API LLM

by DALL-E

Jak wdrożyć RAG w projekcie?

1. Pozyskanie danych do bazy wektorowej



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by DALL-E

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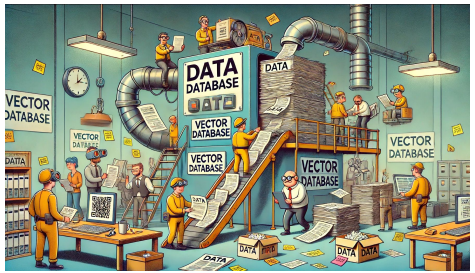

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4. Opcjonalnie: fine tuning modelu

by DALL-E

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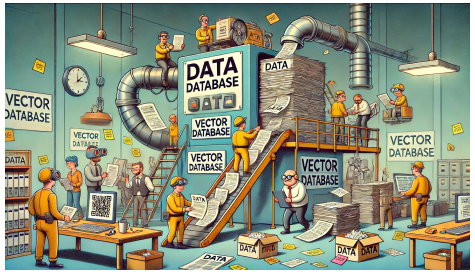

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Nie stosuj modelu uczenia maszynowego, gdy...

Nie stosuj modelu uczenia maszynowego, jeżeli w danym problemie nie ma wyraźnej przewagi nad “tradycyjnym” podejściem.

Nie stosuj modelu uczenia maszynowego, gdy...

Nie stosuj modelu uczenia maszynowego, jeżeli w danym problemie nie ma wyraźnej przewagi nad “tradycyjnym” podejściem.

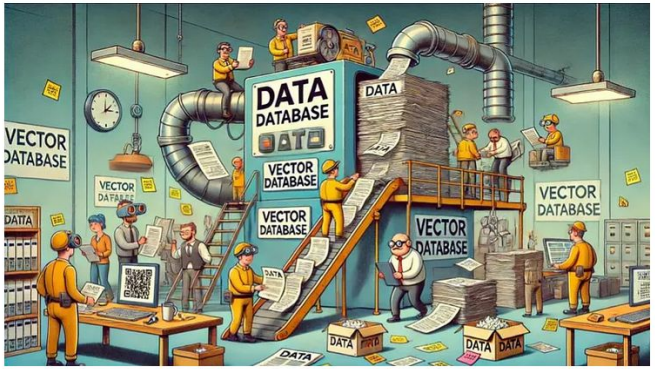
by DALL-E

Artykuł

https://medium.com/p/3bff25ce6616

A Guide to LLM Retrieval-Augmented Generation with PHP

Michalzarnecki
9 min read · Sep 8, 2024



Zadanie

Zadanie:

realizacja w 3-osobowych grupach

1. Zainstaluj docker

2. Uruchom projekt w dockerze https://github.com/rzarno/php-rag, skorzystaj z instrykcji w README.md -> Setup

3. Zadaj kilka pytań związanych ze zbiorem stron internetowych

4. Podmień zbiór dokumentów w folderze php-rag/app/src/documents. Usuń pliki tekstowe stron internetowych i wstaw 3-5 dowolne pliki tekstowe. Uruchom ponownie aplikację i sprawdź, czy potrafi odpowiedzieć na pytania dotyczące informacji zawartych w nowych tekstach.

docker-compose up

docker-compose rm
docker rmi myapp