

# LLM App Development

LangChain and Embeddings

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# Text Embedding

- Transforms natural language into numerical representations
- Capture the meaning, structure and context of the text
- Helps to perform various natural language processing tasks such as semantic search, text analysis, text generation and more
- LangChain provides a simple and consistent interface for building and deploying application using text embedding from different providers

# Text Embeddings Models

- There are a variety of text embedding models available in LangChain
- Each embedder has its own advantages and disadvantages


AlephAlphaSymmetricSemanticEmbedding Any AwaEmbeddings AzureOpenAIEmbeddings BedrockEmbeddings  
 CacheBackedEmbeddings ClarifaiEmbeddings CohereEmbeddings DashScopeEmbeddings DeepInfraEmbeddings  
 DeterministicFakeEmbedding EdenAiEmbeddings ElasticsearchEmbeddings EmbaasEmbeddings ErnieEmbeddings  
 FakeEmbeddings FastEmbedEmbeddings GPT4AllEmbeddings GooglePalmEmbeddings GradientEmbeddings  
 HuggingFaceBgeEmbeddings HuggingFaceEmbeddings HuggingFaceHubEmbeddings  
 HuggingFaceInferenceAPIEmbeddings HuggingFaceInstructEmbeddings HypotheticalDocumentEmbedder  
 InfinityEmbeddings JavelinAIGatewayEmbeddings JinaEmbeddings JohnSnowLabsEmbeddings LlamaCppEmbeddings  
 LocalAIEmbeddings MiniMaxEmbeddings MlflowAIGatewayEmbeddings ModelScopeEmbeddings  
 MosaicMLInstructorEmbeddings NLPCloudEmbeddings OctoAIEmbeddings OllamaEmbeddings OpenAIEmbeddings  
 QianfanEmbeddingsEndpoint SagemakerEndpointEmbeddings SelfHostedEmbeddings SelfHostedHuggingFaceEmbeddings  
 SelfHostedHuggingFaceInstructEmbeddings SentenceTransformerEmbeddings SpacyEmbeddings  
 TensorflowHubEmbeddings VertexAIEmbeddings VoyageEmbeddings XinferenceEmbeddings

Text Embedding models available for use in LangChain (01 Jan 2024)

# LangChain Embeddings

- The base Embeddings class in LangChain provides two methods:
- Embedding documents
  - Multiple text inputs
- Embedding a query
  - Single text

[0.0053587136790156364,  
-0.0004999046213924885,  
0.038883671164512634,  
-0.003001077566295862,  
-0.00900818221271038]





```
from langchain.embeddings import OpenAIEmbeddings

embeddings_model = OpenAIEmbeddings()

# embed_documents
embeddings = embeddings_model.embed_documents(
    [
        "Hi there!",
        "Oh, hello!",
        "What's your name?",
        "My friends call me World",
        "Hello World!"
    ]
)
len(embeddings), len(embeddings[0])

#embed_query
embedded_query = embeddings_model.embed_query("What is your name?")
embedded_query[:5]
```



(5, 1536)

# Embedding Methods

- `embed_query()`
  - Embed a single piece of text
  - Useful for tasks such as semantic search i.e. to find the most similar documents to a given query
- `embed_documents()`
  - Embed a batch of documents
  - Useful for tasks such as clustering i.e. want to group documents together based on their similarity

# Text Embeddings Model

- Model uses a statistical method to represent text as a vector of real numbers.
- End goal is to capture the semantic meaning of words and phrases that is computationally efficient and easy to use
- As you can see, there are many different text embedding models, but they all work in a similar way
- Best embedding size depends on a number of factors, including the size of the dataset, the complexity of the task and the computational resources available
- Generally, a dataset with less than 100,000 sentences may benefit from a lower-dimensional embedding (e.g., 50-100 dimensions), while a larger dataset may benefit from a higher-dimensional embedding (e.g., 200-300 dimensions).

# Thank you!