

# Intuition behind Vector DB

# Example of Vector Data usecase - Semantic Search



how many employees does apple have?

## Company

The company generated \$394,328 million in revenue and employed 164,000 full-time employees in FY2022 and **154,000 employees in FY2021**.



Home - GlobalData

<https://www.globaldata.com> › Data & Insights

## Apple's Number of Employees (FY2017 – FY2022) - GlobalData



Apple

<https://www.apple.com> › job-creation

## Job Creation

Austin, Texas. Austin is home to **over 6,000 employees**, and in the last year we've opened two new campuses as we plan for additional growth.



Apple

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## Fruit

where can i pick apples near me

All

Maps

Shopping

Images

Videos

Forums

Web

More

Open now

Top rated

Georgetown, tx

Results for **Sun City, TX 78628**

[Use precise location](#)

## Places

Cherrywood Green

4.7 ★★★★★ (3) · Orchard

Austin, TX



Directions

Walburg Family Farms

5.0 ★★★★★ (3) · Farm

Georgetown, TX · (512) 456-8597

**Closed** · Opens 10:15AM Sat



Website



Directions

Driftwood Orchards

No reviews · Orchard

Austin, TX · (512) 275-1800

**Closed** · Opens 8AM Thu



Directions

# Why is it getting popular now?

Reason #1: Over 80% of the data produced is unstructured!

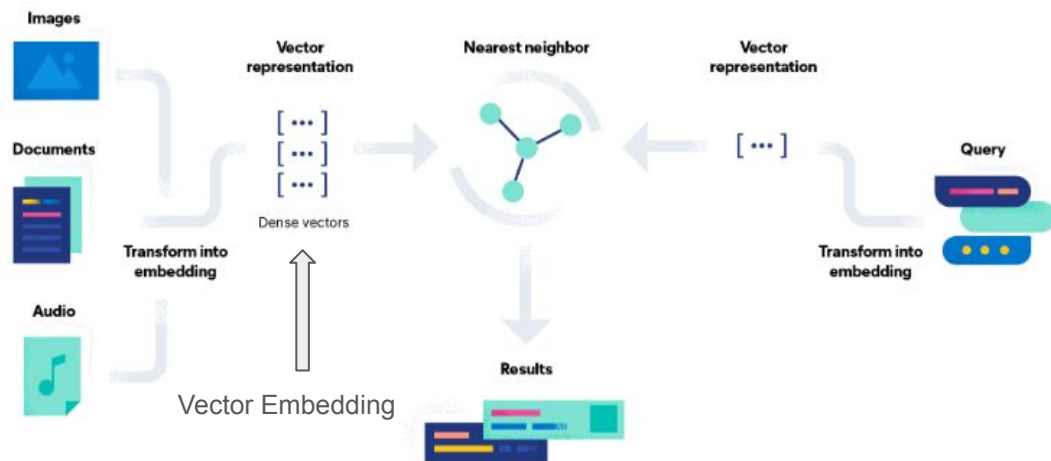
Example: Social Media, Image, Video, Audio

Reason#2: LLM lacks Long-Term Memory

Vector DBs provide the ability to store & retrieve data for LLMs

# Vector Embeddings

- Used to transform words, sentences, and other data into numerical representations (vectors)
- They map different data types to points in a multidimensional space, with similar data points positioned near each other
- These numerical representations assist machines understand and process this data more effectively.



# Types of Vector Embeddings

## Word Embeddings:

- Techniques: Word2Vec, GloVe, FastText
- Purpose: Capture semantic relationships and contextual information.

## Sentence Embeddings:

- Models: Universal Sentence Encoder (USE), SkipThought
- Purpose: Represent overall meaning and context of sentences.

## Document Embeddings:

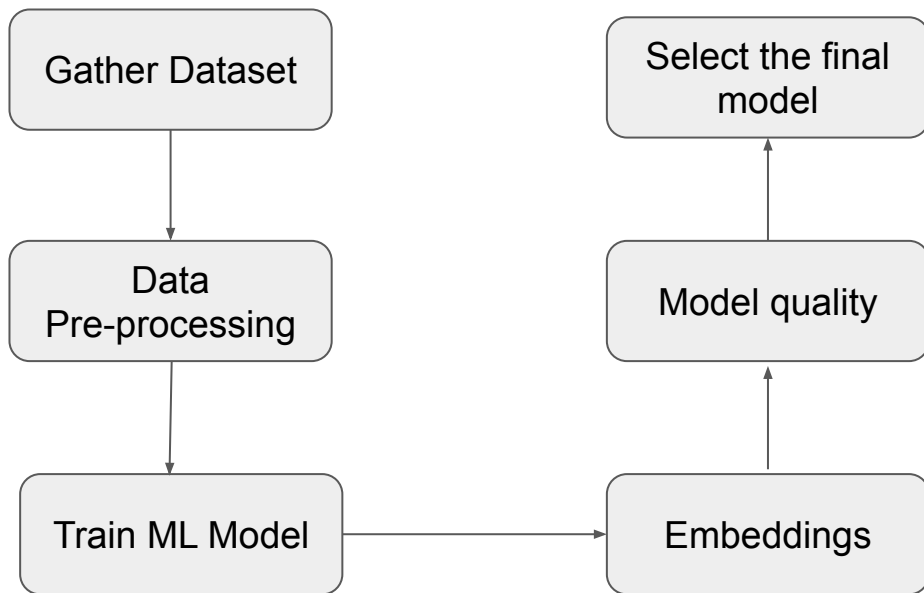
- Techniques: Doc2Vec, Paragraph Vectors
- Purpose: Capture semantic information and context of entire documents.

## Image Embeddings:

- Techniques: CNNs, ResNet, VGG
- Purpose: Capture visual features for tasks like classification and object detection.

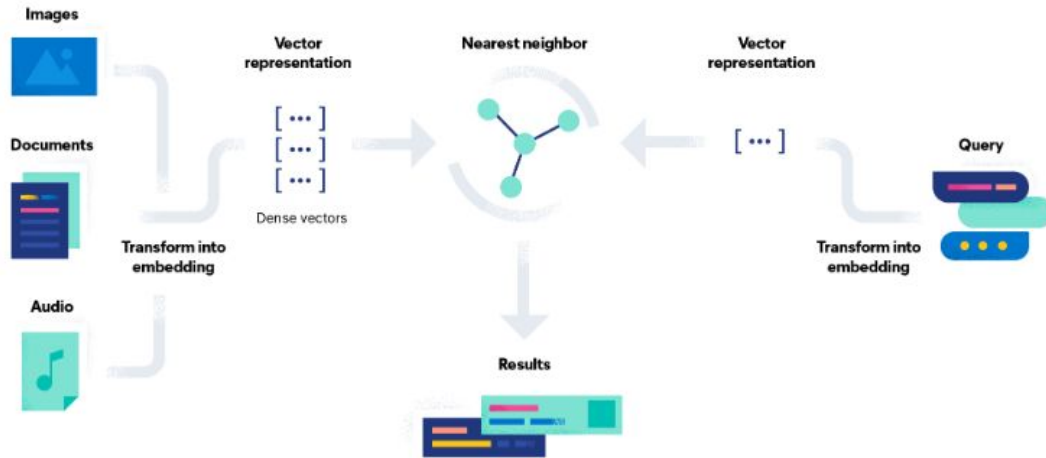
# How are Vector Embeddings created?

Vector embeddings are generated through a machine learning process that trains a model to transform various types of data into numerical vectors



# What is a vector database and how do they work?

- A vector database **indexes** and **stores** vector embeddings, for fast search and optimized storage
- Provides the ability to compare multiple things (semantically) at the same time
- Helps machine learning models remember past data better, making them more useful for search, recommendations, and text generation



# References:

1. <https://medium.com/kx-systems/vector-indexing-a-roadmap-for-vector-databases-65866f07daf5>
2. <https://www.elastic.co/what-is/vector-embedding>