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Beyond the Database : Scaling Vector Search with Qdrant

Presented to you by Mohamed Arbi Nsibi

Mohamed Arbi Nsibi

- ML engineer
- Qdrant Star ⭐
- Former GDSC Lead 23/24

What is a ⭐ anyway?

What is a ★ anyway?

A program for developers building, sharing, and leading in the Qdrant community.

What is Qdrant?

What Qdrant is **not**?

Qdrant

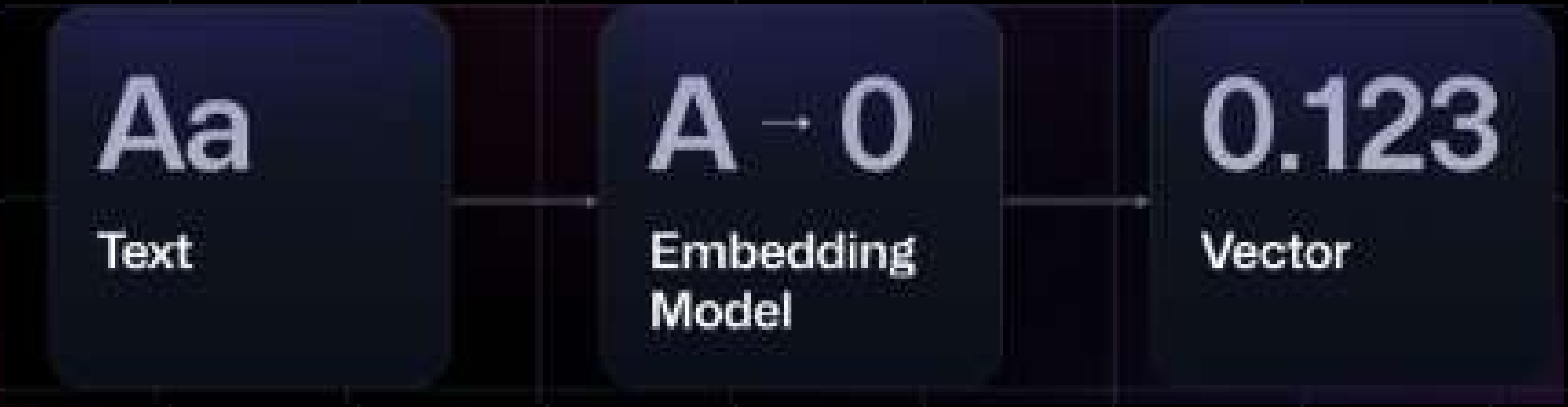
Qdrant is not a Database

Andrey Vasnetsov:
Qdrant CTO

Qdrant

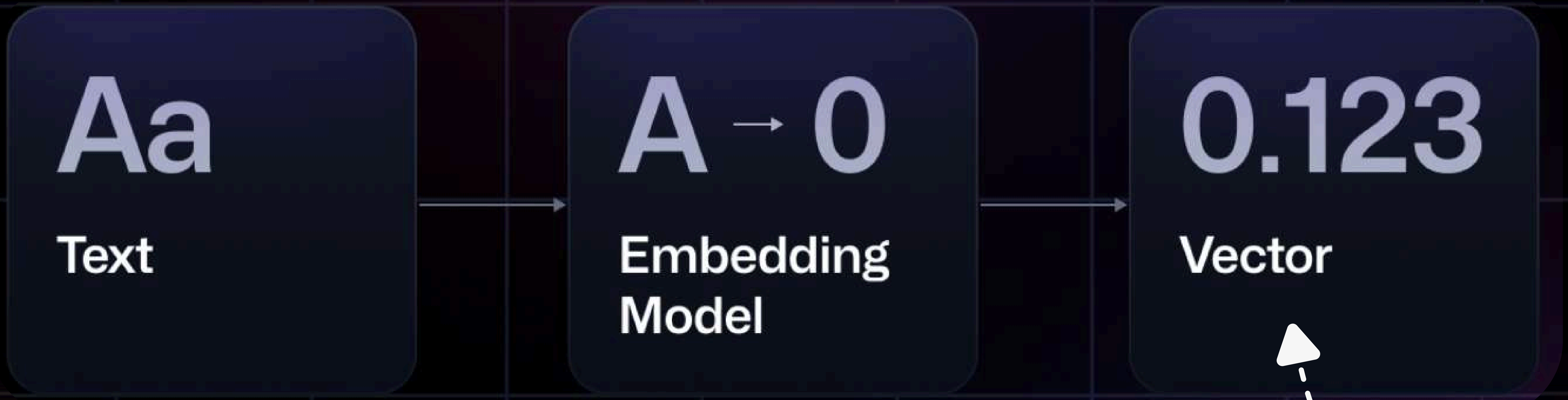
Qdrant is not a Database

Because Vectors are not data



Text → Embedding Model → Vector

Doesn’t create new information



Aa

Text

A → 0

Embedding Model

0.123

Vector

Doesn’t create new information

mathematical
representation
of meaning

There is no Universal Data Storage

There is no Universal Data Storage

Traditional DBs:
structured data

Unstructured data
(images and natural language)

Qdrant is ...

a **search engine**

Qdrant is ...

engineered **for vectors**

Qdrant

Qdrant is ...

Fully Open-source
Self-hosting : run on your own infra
Super fast: Latency ~0.024s (~24ms)
Hybrid Search
UI support
Free Tier ~1M(vectors) 768-dim

60K

Community Members

250M+

OSS Downloads

26K+

Github Stars

>140

Contributors

The Shift to AI Native Search

Qdrant

Unstructured Data Is Exploding

(Data isn't in a spreadsheet)

AI Agents Are the New Users

Legacy Search Falls Short

Vector Search Is the Missing Layer

Wave 1

RAG 1.0 - Static Assistants

(2023 - 2024)

Wave 2

Agentic AI - Multi-Step Reasoning

(2024 - Now)

Wave 3

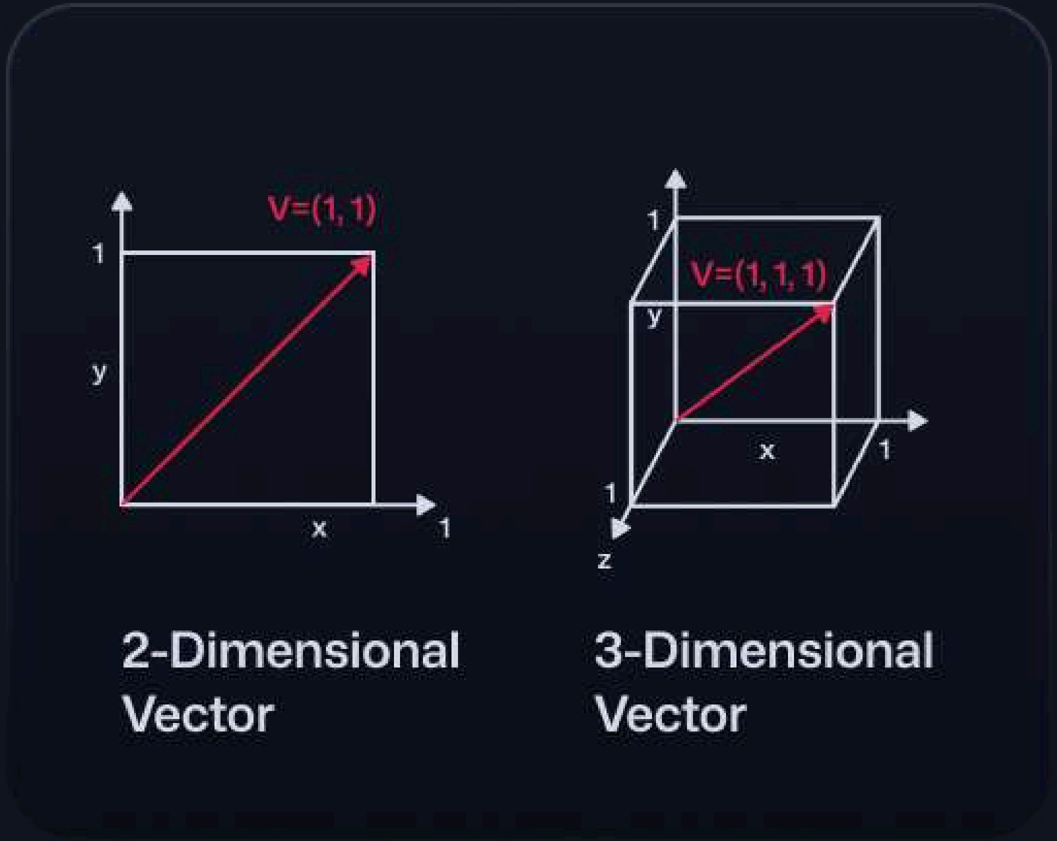
Embedded AI – Physical & On-Edge Agents

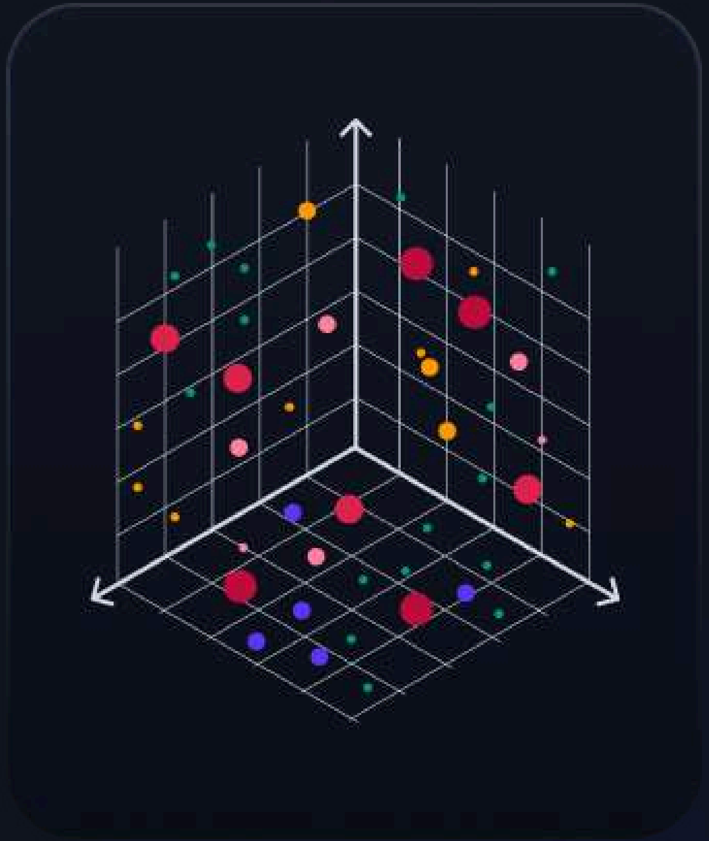
(2025 +)

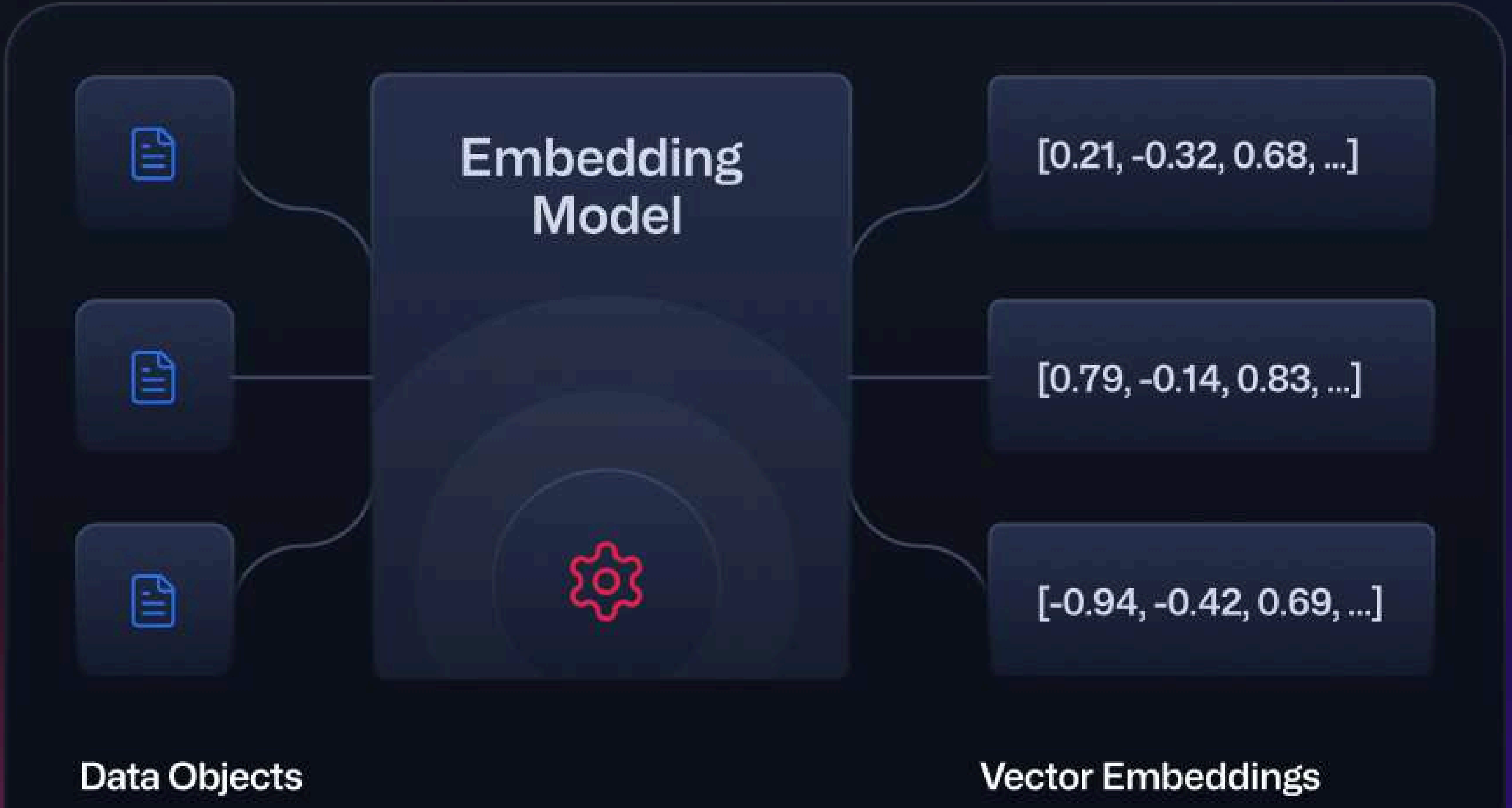
Vector Search Basics

Two different vector embeddings should be close to each other if they represent a similar input object.

Embeddings are generated by neural networks and can represent thousands of dimensions.







Vector Search Basics

Although word counting produces embeddings, dense embeddings are needed to capture semantics

Sparse embedding:

e.g. One Hot Encoding

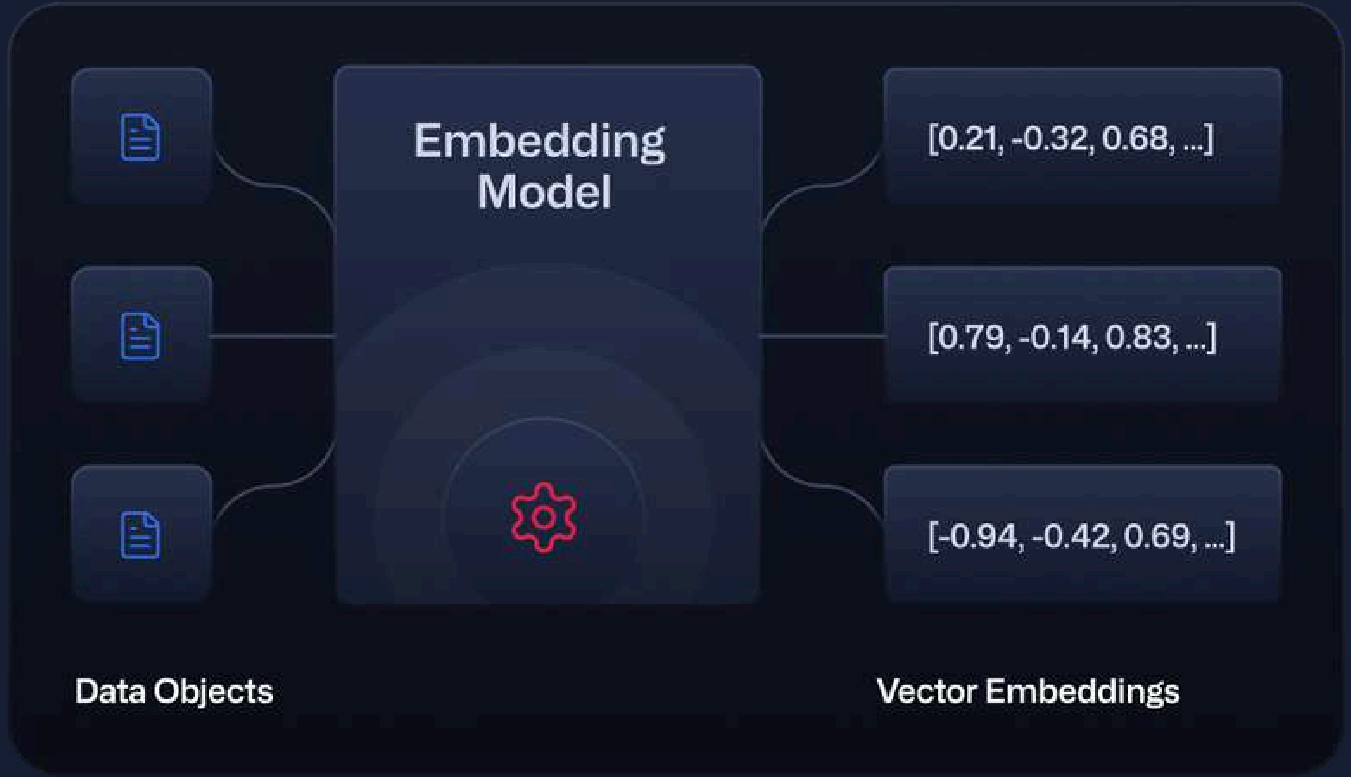
	an	another	embedding	is	this	Query Sim.
“this is an embedding”	[1,	0,	1,	1,	1]	3
“this is another embedding”	[0,	1,	1,	1,	1]	2

Query:

“What is an embedding?”

Dense embedding:

e.g. from BERT



Qdrant-at-a-Glance

Vector Search Engine. Not Database. optimized for scalability and high availability

Built-Out for Search-First Workflows

Qdrant is built from the ground up with **search as the core functionality**. Conventional databases focus on ACID transactions and strong consistency.
In contrast, search engines are optimized for scalability, low-latency search, and high availability.

Engineered for Vector Search at Scale

Qdrant is purposed to handle extremely high-dimensional embeddings. It’s designed with a **vector index as a central component of the system**, allowing a custom, finely tuned approach to data and index management that secures high performance even as data grows and changes dynamically

Specialized for Advanced Vector Operations

Qdrant is designed from the ground up to handle high-dimensional vector math and (dis-)similarity-based retrieval. This allows for leveraging the full potential of vector search **beyond simple similarity ranking** from multi-stage filtering to dynamic exploration of high-dimensional spaces**.**

Quick and Easy to Start

Performance Centric

Fully Open Source Project

All Embeddings Types Supported

Scalability Oriented

Resource Optimized

How Qdrant Achieves Search

Core Capabilities

Vector Search
Scalable similarity and discovery search (billions of vectors)

Hybrid Search
Combine dense + sparse embeddings, filters, and metadata

Filtering
Numeric, categorical, geo, temporal filters out-of-the-box

Distributed & Resilient
Replication, sharding, multi-tenancy

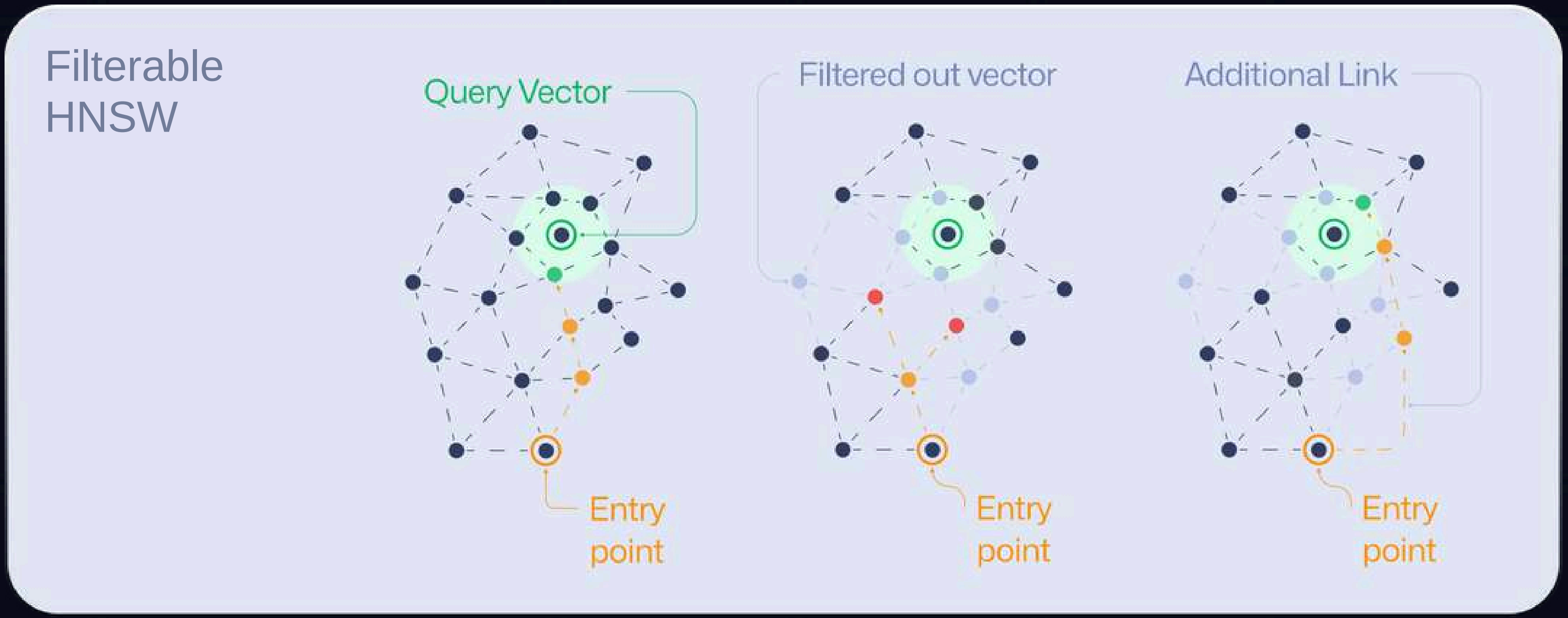
Advanced Features

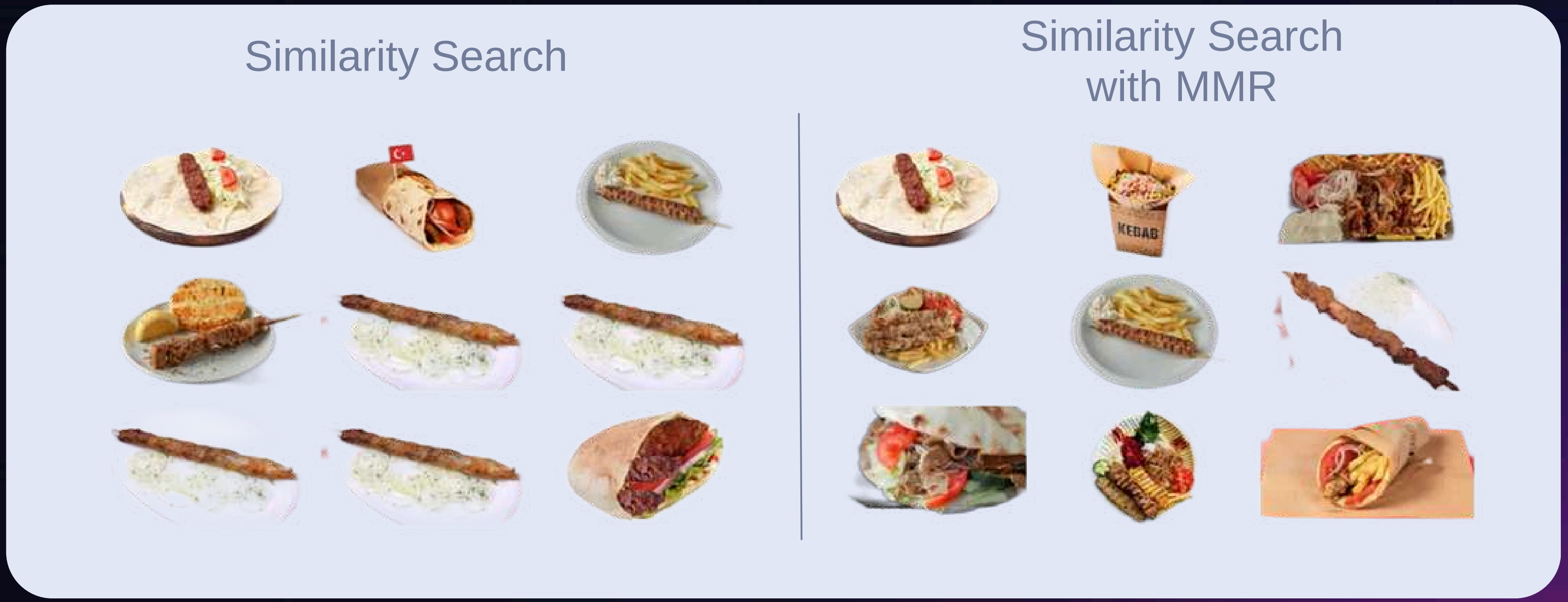
Re-ranking
Maximum Marginal Relevance (MMR), score boosting

Quantization
Binary, scalar & product; lower cost without major recall loss

Multi-vectors: Late interaction for retrieval models (e.g. ColBERT)

Performance Optimizations
HNSW tuning, payload indexing, prefetching





Qdrant Innovations to make development easier

FastEmbed

Generate high-quality embeddings fast. A small Python library for embedding generation, built in and integrated with Qdrant.

- Works out of the box in Qdrant.
- Few dependencies: runs on CPU; skips multi-GB PyTorch downloads.
- Made for speed: uses ONNX Runtime and data parallelism.

Key features

- Use Qdrant models (miniCOIL, BM42).
- Support for late-interaction (ColPali, ColBERT) and sparse-neural methods (SPLADE, BM42, miniCOIL), MUVERA embeddings and more.
- Run inference and upsert/search in one call.

Import:

```
from qdrant_client.models import
Document, Image
```

MCP Servers

Build custom retrieval-based AI apps fast. Start from these servers and add tools/commands for your data and workflows.

- mcp-server-qdrant: official MCP server for storing and retrieving data in Qdrant.
- mcp-for-docs: open-source API reference for AI coding assistants using semantic code retrieval.

Key features

- Automate codebase documentation.
- Personalize your coding assistant to your project’s conventions and rules.
- Do `inline RAG`.
- Speaks stdio, sse, and streamable-http protocols.

Run:

```
docker run  mcp-server-qdrant
```

Qdrant Edge

Bring vector search to the edge: an embeddable, high-performance engine that runs directly on mobile and other edge devices.

- Run on low-CPU devices.
- Use one API to manage and synchronize data on-device and in your cloud cluster.
- Fit common on-device cases: phones and laptops, smart-home/IoT, robotics.

Key features

- Use local storage to avoid network latency.
- Support multi-tenant setups; treat each device as its own tenant.
- Embed as a library; runs in-process with no background daemons.

Use:

```
client =
QdrantClient(path="qdrant_edge.db")
```

Vector Search in Production

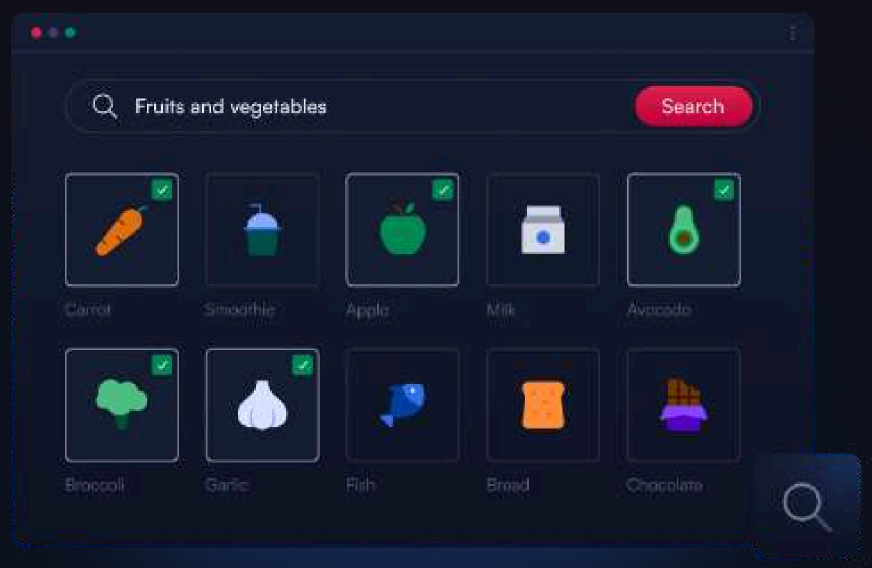
- Written in **Rust** and offers **great performance**
- Allows to interact by **HTTP** or **gRPC protocols**.
- Runs both in **single and multiple node** setup.
- Incorporates **category, geo-coordinates** and **full-text filters**
- Supports **hybrid**, **multimodal**, **multivector** and **multi-staged** search
- Official **Python**, **Javascript**/**Typescript**, **Rust** and **Go SDKs**.
- Makes vector search **affordable**.

For Managed Cloud solutions, check out Cloud Embeddings Inference.

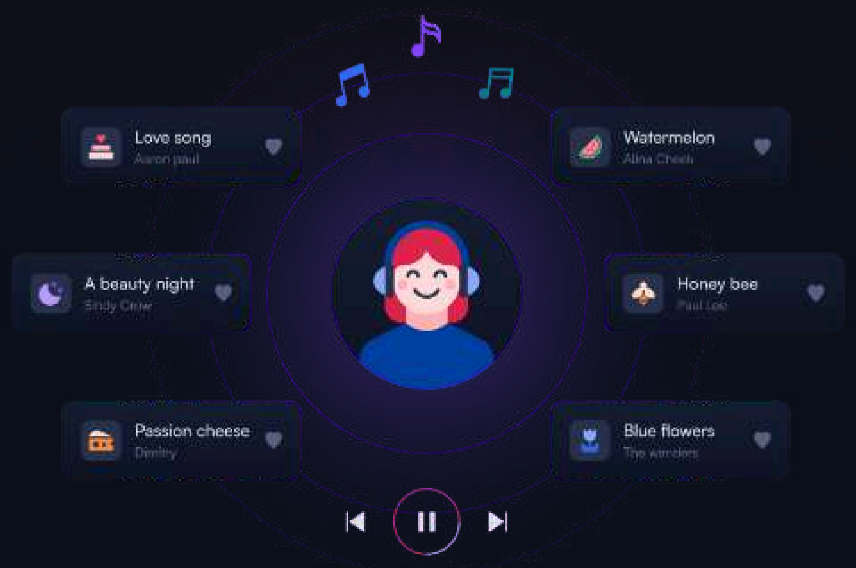
Vector Search

An essential part of the AI Transformation

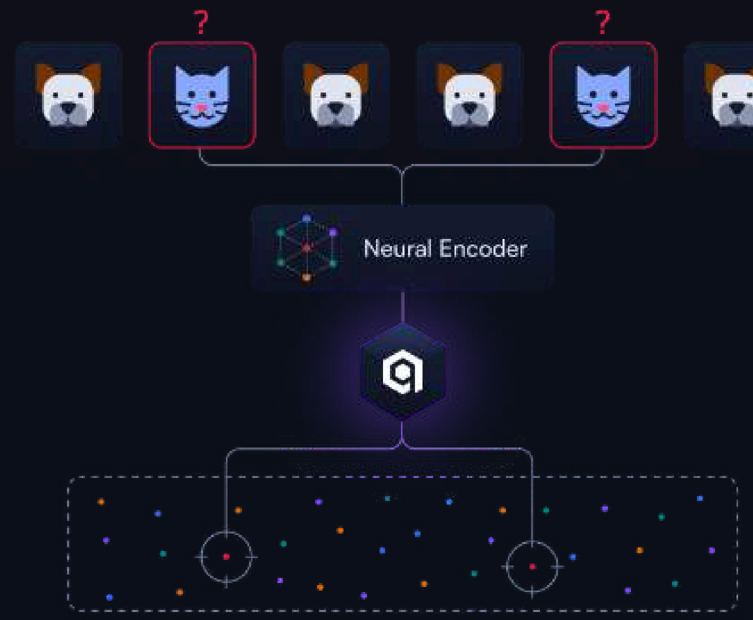
- HR-Tech
- Ad-Tech
- Online Dating
- Gig Economy
- E-Commerce
- Legal-Tech
- Fashion
- Med-Tech
- Ed-Tech
- Media & News
- Agriculture
- Manufacturing
- Streaming Services
- Marketplaces
- Anti-fraud
- Biometrics



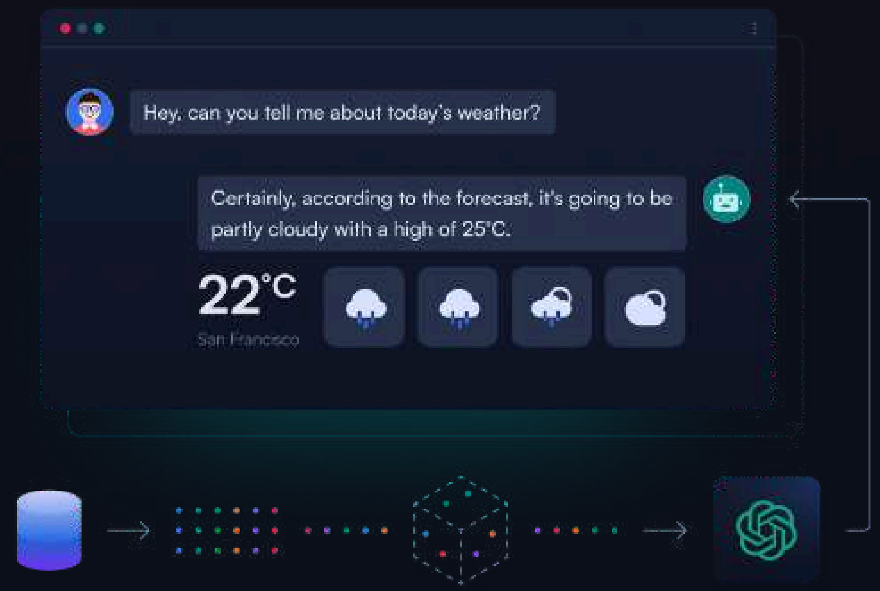
Search Systems



Recommendations



Anomaly Detection



Hey, can you tell me about today's weather?

Certainly, according to the forecast, it's going to be partly cloudy with a high of 25°C.

RAG / Information Assistants

Getting Started with Qdrant

Qdrant Open Source
Usually deployed with Docker containers. Lightweight, offers all the functionalities of Qdrant.

Qdrant Managed Cloud
Run on one of the three major cloud providers: AWS, Azure, or GCP. Provides a management UI and API. For US regions, we offer Cloud Inference that processes raw data into vectors.

Qdrant Hybrid Cloud
All the benefits of cloud deployment, but keeping the data on your premises. Requires a Kubernetes cluster and might be managed from Qdrant Cloud UI, but no data leaves your environment.

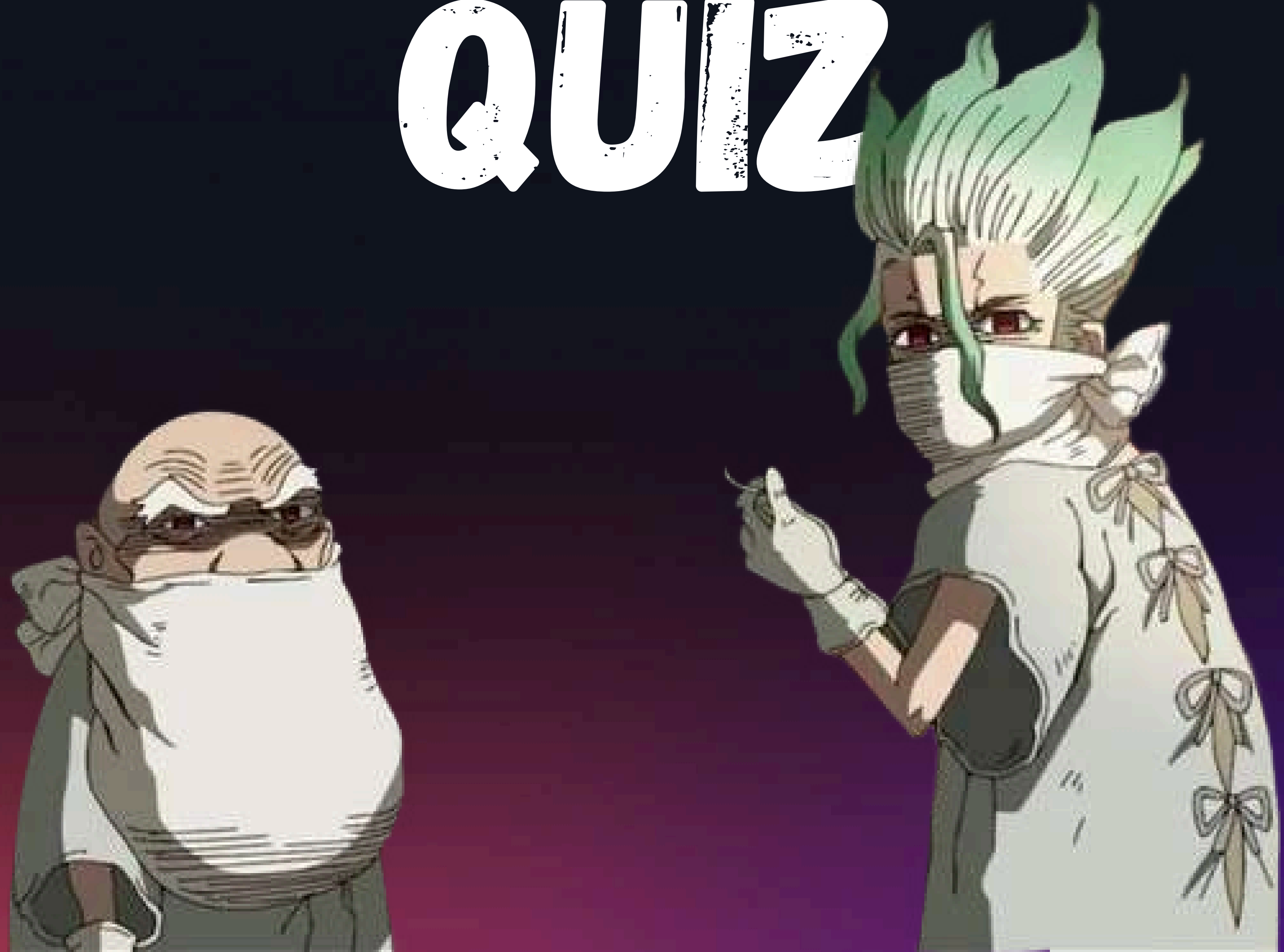
Qdrant Private Cloud
A dedicated, on-premise solution that guarantees supreme data privacy and sovereignty.

Python SDK Local Mode
Suitable mostly for quick experiments, but not intended to be running in production.

Ecosystem

Gemini	n8n	MISTRAL AI_
aws	UNSTRUCTURED	
Google Cloud Platform	OpenAI	jina
Haystack by deepset	crewai	LlamaIndex
LangChain	cohere	*and more...*

QUIZ



THANK YOU FOR YOUR ATTENTION!!

Where to find me?

Goodnight	Linkedin Profile	MedArbiNsibi