

# Vector Databases

## Instructors

Prashant Sahu

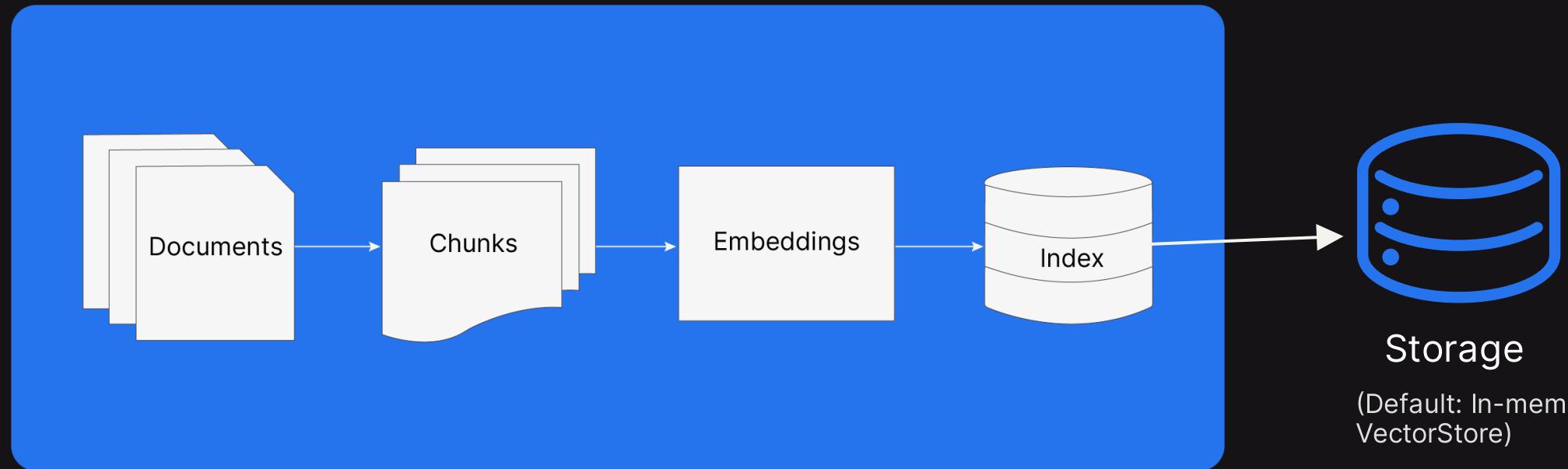
Manager - Data Science, Analytics Vidhya

Ravi Theja

Developer Advocate Engineer, LlamalIndex



# Indexing and Storage



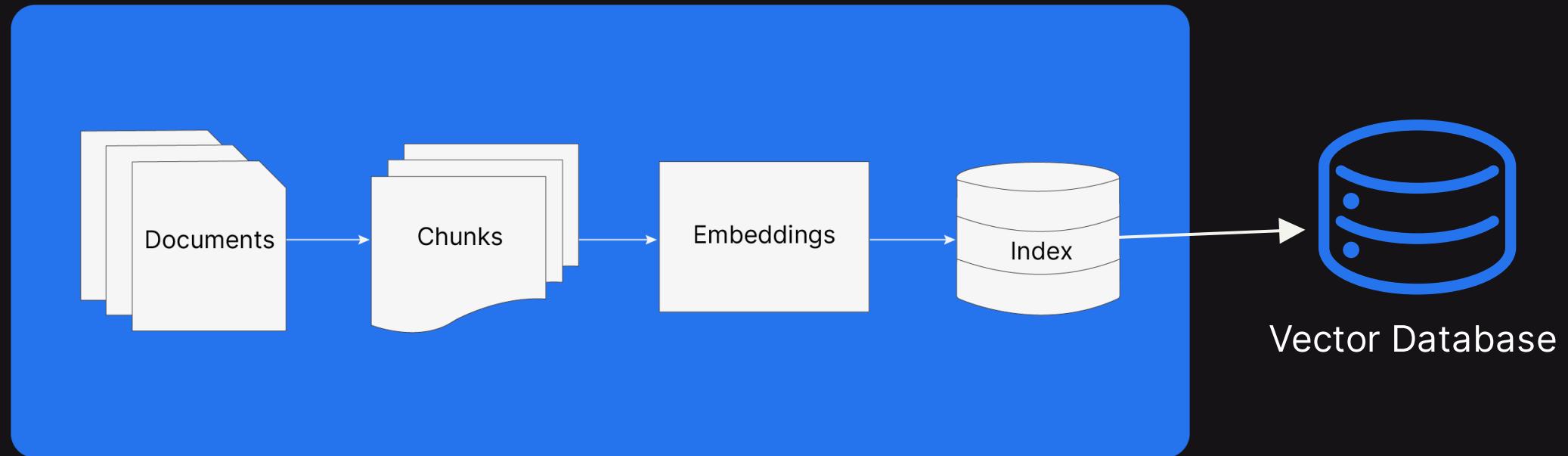
# Types of Storage

- Vector stores (Default)
- Document stores
- Index stores
- Graph stores
- Chat stores

## Challenges with In-Memory Vector Store

- Limited Data Capacity
- Data Loss Risk
- More Expensive
- High Resource Use
- Complex Management
- Weaker Data Recovery

# Indexing and Storage



# Vector Databases



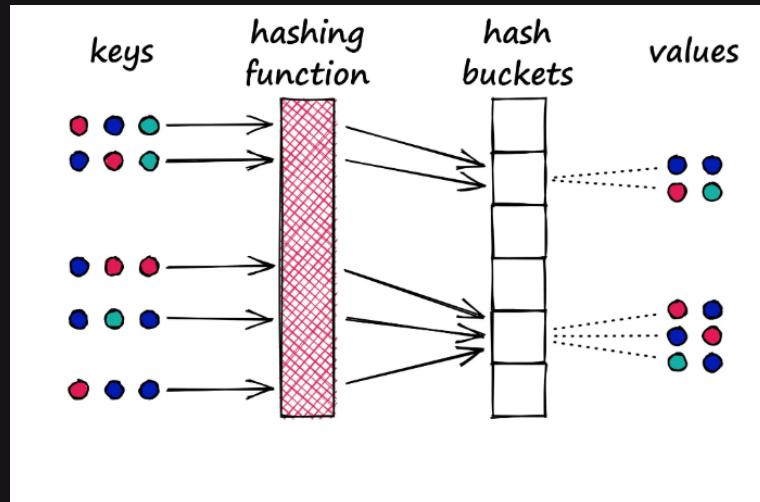
**Vector DB:** Offers specialized storage and querying capabilities

# Features of Vector DB

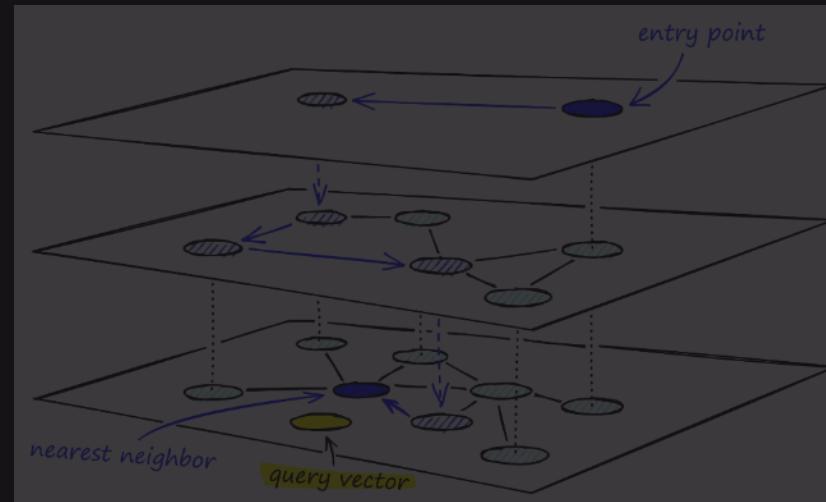
- 1 Data Management
- 2 Scalability
- 3 Real Time
- 4 Metadata Storage and Filtering
- 5 Backup and Security

# Common Vector Database Search Techniques

Locality-Sensitive Hashing  
(LSH)



Hierarchical Navigable Small World (HNSW)

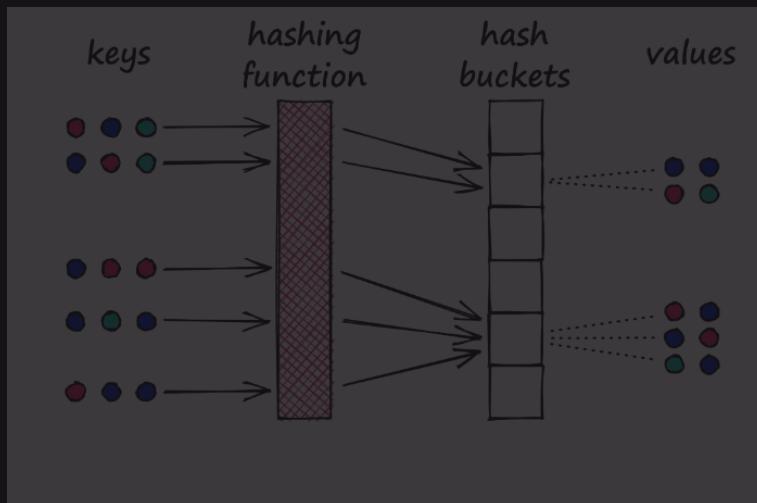


Annoy (Approximate Nearest Neighbors Oh Yeah)

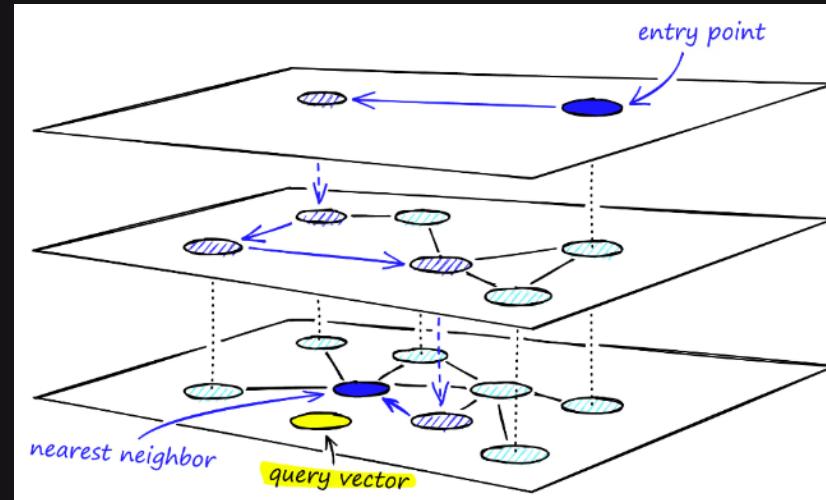


# Common Vector Database Indexing Techniques

Locality-Sensitive Hashing  
(LSH)



Hierarchical Navigable Small World (HNSW)

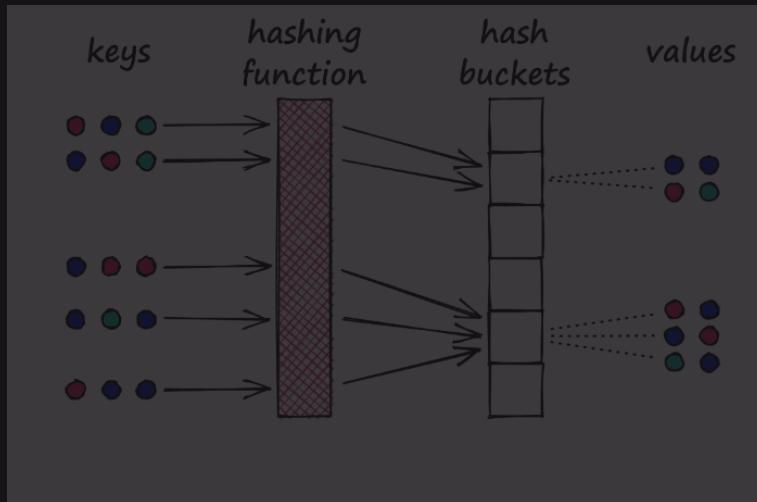


Annoy (Approximate Nearest Neighbors Oh Yeah)

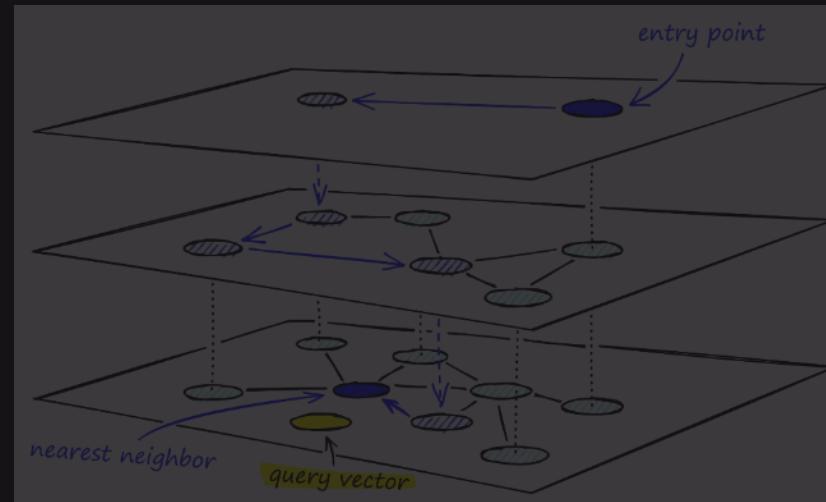


# Common Vector Database Search Techniques

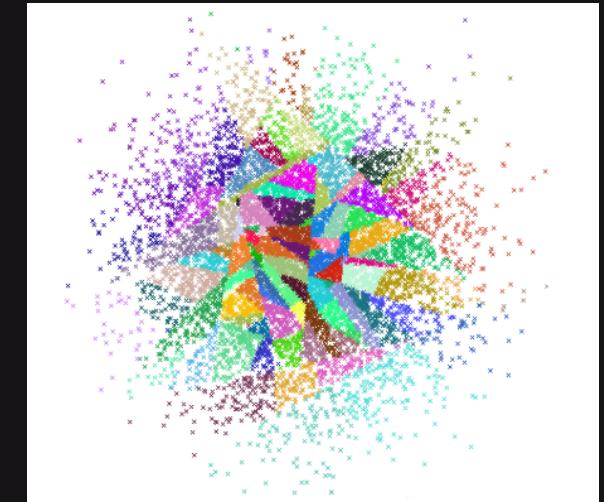
Locality-Sensitive Hashing  
(LSH)



Hierarchical Navigable Small World (HNSW)



Annoy (Approximate Nearest Neighbors Oh Yeah)



# Search Techniques for Vector Databases



Proprietary composite index



Customized HNSW



HNSW



Flat (brute force), HNSW



HNSW + BM25 hybrid

# Search Techniques for Vector Databases



**Weaviate**

Customized HNSW, HNSW (PQ), DiskANN (in progress...)



**Vald**

NGT



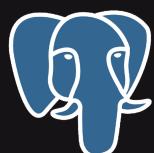
**LanceDB**

IVF (PQ), DiskANN (in progress...)



**redis**

Flat (brute force), HNSW



**pgvector**

IVF (Flat), IVF PQ in progress...

# Search Techniques for Vector Databases



Flat, Annoy, IVF, HNSW/RHNSW  
(Flat/PQ), DiskANN

# Popular Vector Databases

Closed-Source



Open Source/ Source Available



# Thank You