Vector Databases Training

Duration: **2 Day**

BILGINC IT Academy
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Overview

This training focuses on generating embeddings from text and image data, storing vector representations in databases such as FAISS, Chroma, PgVector, Milvus, and Weaviate, and implementing efficient similarity search operations. The program also explores how vector-based retrieval systems can be integrated into Retrieval-Augmented Generation (RAG) architectures in production environments.

Throughout the training, participants will gain practical experience with data chunking strategies, metadata schema design, selecting appropriate indexing methods and distance metrics, implementing hybrid search techniques, and evaluating retrieval performance.

The program covers the essential principles of vector databases, advanced information retrieval techniques, and the development of end-to-end RAG workflows. Participants will learn how to build vector-based solutions optimized for retrieval accuracy, system performance, and operational cost.

Prerequisites

Participants should have basic programming knowledge and a general understanding of data structures.

Who Should Attend

- Backend developers and data engineers
- Teams developing search systems and RAG applications
- Professionals working on semantic search and information retrieval solutions

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What You Will Learn

By the end of this training, participants will be able to:

- Understand the fundamental principles of vector databases.
- Generate embeddings from text and image data.
- Explore vector databases such as FAISS, Chroma, PgVector, Milvus, and Weaviate.
- Apply chunking, indexing, and distance metrics.
- Implement metadata management and hybrid search techniques.
- Perform similarity searches using PgVector.
- Understand RAG architectures and re-ranking techniques.
- Develop RAG workflows optimized for performance and cost.

Outline

1. Fundamentals of Vector Databases and Information Retrieval

- Embedding models and vector normalization techniques
- Data chunking strategies
- Distance metrics and indexing approaches
- Types of vector databases and their core characteristics
- Designing metadata schemas
- Hybrid search methods and retrieval evaluation
- **Hands-on:** Performing similarity searches with PgVector

2. RAG Integration and Best Practices

- Understanding Retrieval-Augmented Generation (RAG) architecture
- Advanced data chunking approaches
- Re-ranking techniques for improving retrieval results
- Optimizing performance and operational costs
- Observability and governance practices
- **Hands-on:** Developing an end-to-end RAG pipeline

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