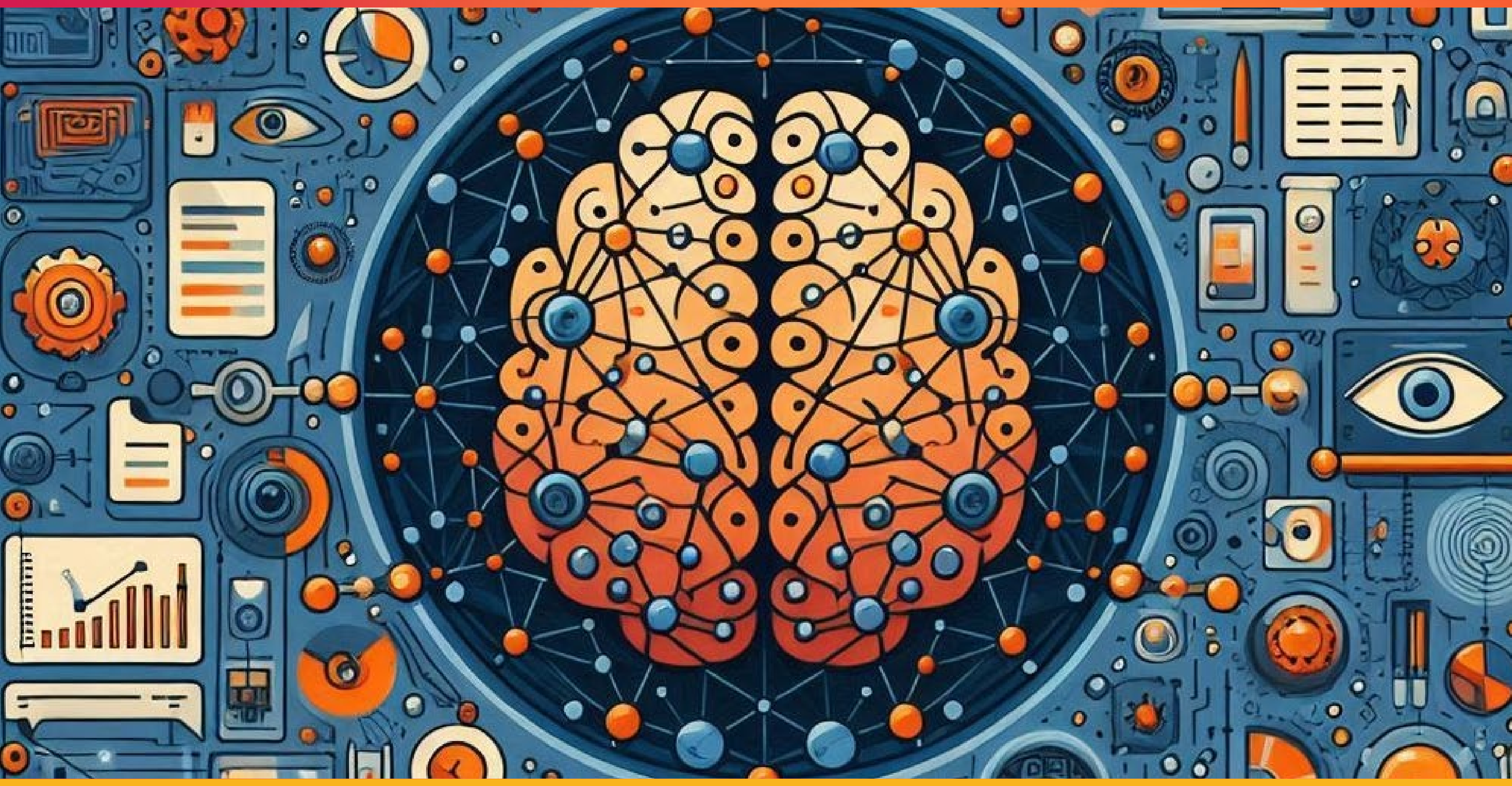
DATA & AI

Knowledge Graphs

A pivotal role in enhancing Generative AI flows



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WHAT IS A KNOWLEDGE GRAPH?

A **Knowledge Graph** is a data structure designed to represent real-world entities and their relationships in a format that machines can understand.

By organizing information into a network where nodes represent entities (such as people, places, or things) and edges represent the relationships between them, Knowledge Graphs help integrate information from diverse sources. They make data more accessible and useful for applications like search engines, recommendation systems, and question-answering services.

Nodes represent entities or concepts (like "Person," "Location," or "Company").

Edges represent the relationships between these entities (like "lives in," "works for," or "located in").

RAG AND KNOWLEDGE GRAPH

SOME KEY POINTS ON RAG

Retrieval-Augmented Generation (RAG) improves generative AI by incorporating a retrieval phase. It retrieves pertinent documents from a knowledge base or database and uses these documents as input for a generative model, allowing it to generate more precise and contextually rich responses.

HOW THE TWO APPROACHES RELATE

Knowledge Graph	Ideal for obtaining **accurate** information and drawing logical conclusions.
RAG	Ideal for providing **context** or enhancing responses with unstructured information.

Together, they harness the accuracy of Knowledge Graphs and the expansive reach of RAG.

KNOWLEDGE GRAPH VS RAG

KNOWLEDGE GRAPH		RAG
Structured (nodes and explicit relationships).	Data Structure	Unstructured or semi-structured (documents, text).
Precise queries for specific facts and relationships.	Query Method	Retrieves relevant text blocks using retrieval models.
Provides semantic depth and explicit entity connections.	Context	Offers broad context from unstructured sources.
Logical, rule-based inferences.	Inference	Relies on generative models for implicit reasoning.
Stable, well-defined domains.	Use Cases	Dynamic, broad, or rapidly changing knowledge areas.

HOW TO BUILD KNOWLEDGE GRAPHS

PLANNING AND DESIGN

The process starts with planning and design. This involves defining the scope and purpose of the knowledge graph. A crucial step in this phase is designing the **ontology**, which entails identifying key entities, their properties, and the relationships among them.

DATA COLLECTION AND PREPARATION

The data is gathered from structured, semi-structured and unstructured data. Techniques such as Named Entity Recognition (**NER**) and **Relation Extraction** are used to identify entities and their relationships, generating tuples in the form of "Node A → Relation → Node B".

GRAPH CONSTRUCTION

The final phase is the graph construction itself. Graph databases such as **Neo4j** or **GraphDB** are used to build the knowledge graph. Entities and relationships are populated into the graph. To ensure the quality of the knowledge graph, it is important to verify data consistency and optimize query performance.

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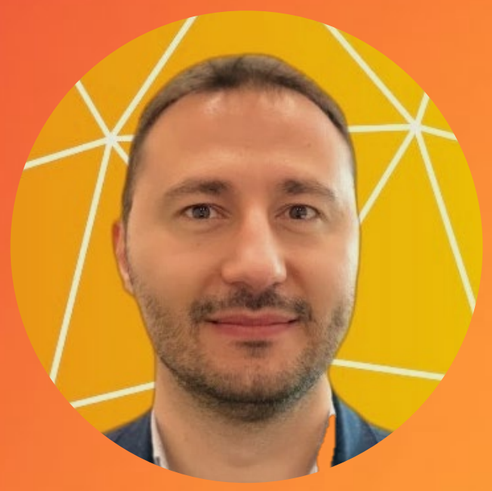

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