



**DEFENSE
INNOVATION UNIT**

Using AI to Understand Relationships Between
People, Places, and Things
March 2021

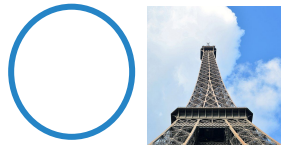
PANELISTS

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WHAT IS A KNOWLEDGE GRAPH?

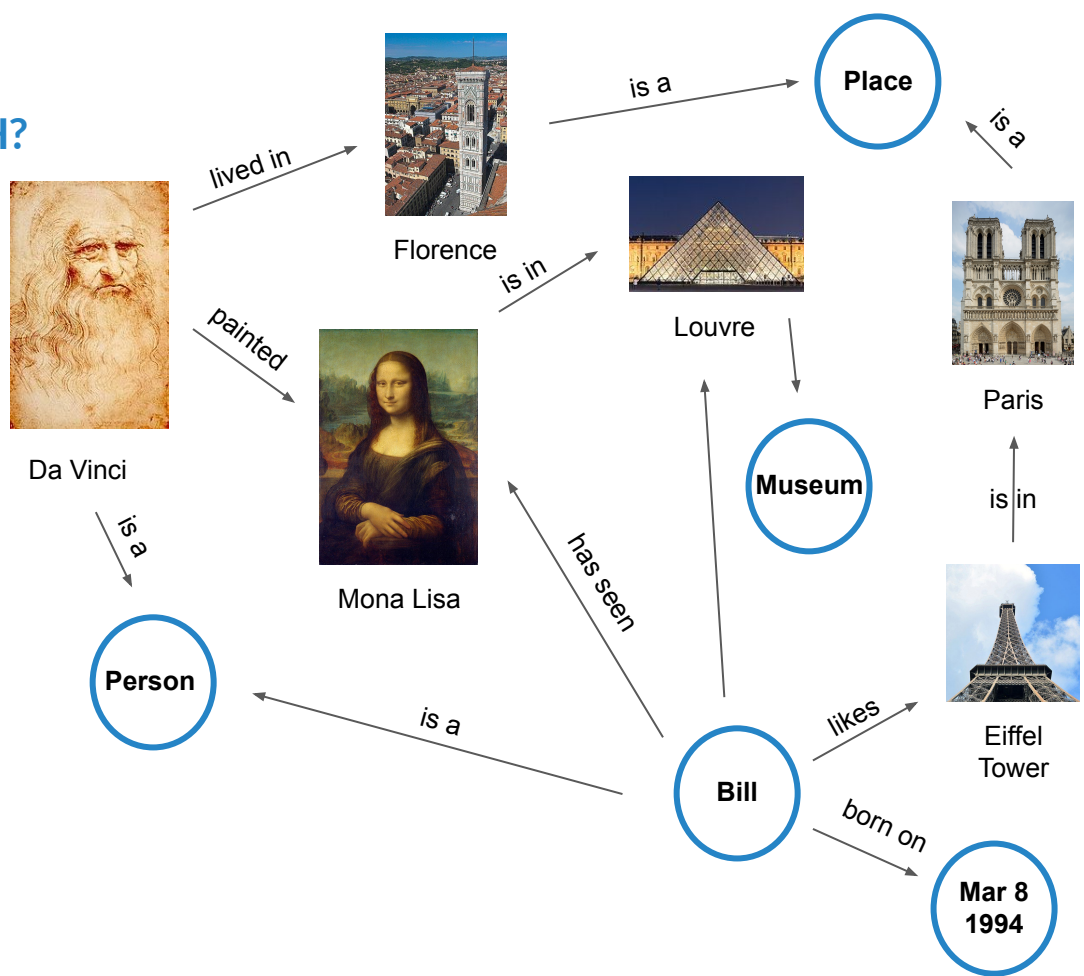
A collection of *nodes* -- usually people, places, or things -- connected by a set of *edges* defining the relationships between them



Nodes








Edges



WHAT ARE KNOWLEDGE GRAPHS USED FOR?



See results about

-  **Leonardo da Vinci**
Polymath >
-  **Leonardo DiCaprio**
American actor >
-  **Leonardo**
Aerospace company >
-  **The Leonardo**
Museum in Salt Lake City, Utah >
-  **Leonardo**
Peer-reviewed journal >


Disambiguation:
Leonardo

Summarization:
Leonardo da Vinci

Question Answering:
How tall was Leonardo da Vinci?

Discovery:
Other Artists and Leonardos








Leonardo da Vinci 

Polymath

Leonardo da Vinci was an Italian polymath of the High Renaissance who is widely considered one of the most diversely talented individuals ever to have lived. [Wikipedia](#)

Born: April 15, 1452, Anchiano, Italy
Died: May 2, 1519, Château du Clos Lucé, Amboise, France
On view: Louvre Museum, Royal Collection Trust, [MORE](#)
Periods: High Renaissance, Early renaissance, Renaissance, Italian Renaissance, Florentine painting
Height: 5' 9"
Education: Andrea del Verrocchio






Artworks [View 15+ more](#)

-  **Mona Lisa**
1503
-  **The Last Supper**
1498
-  **Vitruvian Man**
-  **Salvator Mundi**
1500
-  **Lady with an Ermin**
1489

Quotes [View 7+ more](#)

Simplicity is the ultimate sophistication.
Art is never finished, only abandoned.
Learning never exhausts the mind.

People also search for [View 15+ more](#)

-  **Michelan...**
-  **Raphael**
-  **Pablo Picasso**
-  **Leonardo DiCaprio**
-  **Vincent van Gogh**



HOW ARE KNOWLEDGE GRAPHS BUILT, STORED AND COMPUTED ON?

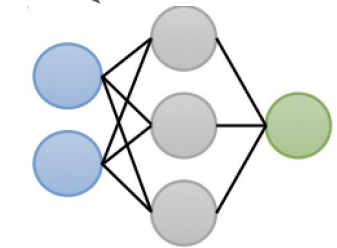
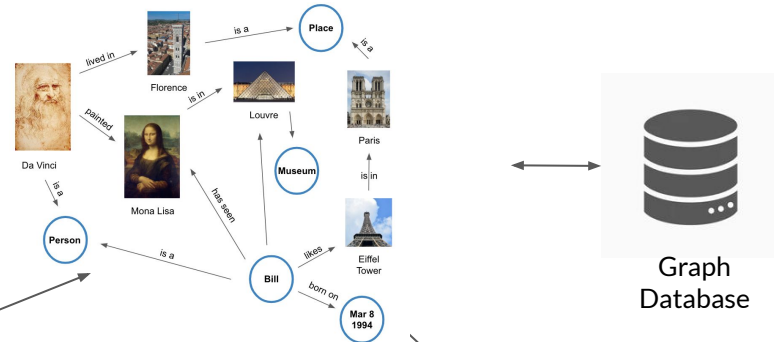
Step 1: Gather Unlabeled Data

Mona Lisa, also called **Portrait of Lisa Gherardini, wife of Francesco del Giocondo**, Italian **La Gioconda**, or French **La Joconde**, oil painting on a poplar wood panel by **Leonardo da Vinci**, probably the world's most famous painting. It was painted sometime between 1503 and 1519, when **Leonardo** was living in **Florence**, and it now hangs in the **Louvre Museum**, **Paris**, where it remained an object of pilgrimage in the 21st century. The sitter's mysterious smile and her unproven identity have made the painting a source of ongoing investigation and fascination.

Entity 1	Entity 2	Painted By?	Lives In?
Mona Lisa	Leonardo	1	0
Leonardo	Florence	0	1
Mona Lisa	Florence	0	0

Step 2: Extract Entities and Relations

Step 3: Iterate, Refine, and Scale



Step 4: Graph Analysis

Real Life Applications



HOW DIU LEVERAGES THE POWER OF KNOWLEDGE GRAPHS

ADDRESSING CAPABILITY GAPS

- Efficient Data Aggregation for Augmented Intelligence
- Entity Linking at Scale
- Extracting Risk Patterns from Noisy Signals
- Analyst Upskilling

TO SOLVE REAL WORLD MISSION CHALLENGES

- Evaluating unofficial influencers' global activity toward advancing an adversary's priorities.
- Identifying anomalous activities in an area of interest (AOR) by organizations/persons tied to adversaries.
- Assessing an adversary's strategic plans via supply chain analysis.



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