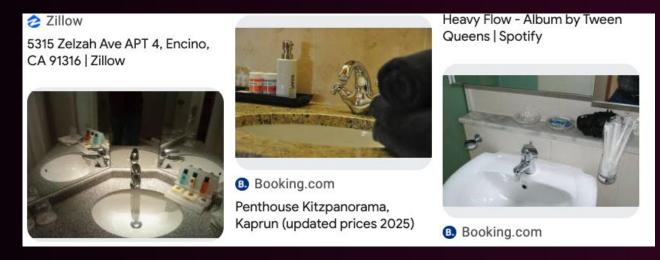# AI Doesn't "Get It"

Google search gave us a bunch of **sink** photos

Claude thought it was a **joke about T-Rex** having short arms

Both missed the toothbrush

LLMs & GraphRAG
We're Supposed to Give Us the Answers!

Today's GraphRAG is good at adding guardrails but **misses:**

Latent image data and Interwoven data types (1+1 =3)

Associative detail

Lacks Interpretability

Multimodal GraphRAG provides
Associative Intelligence

Better Match!

Better Match!

mmGraphRAG breaks down components that can be explored (texture, spatial placement, etc) individually or together
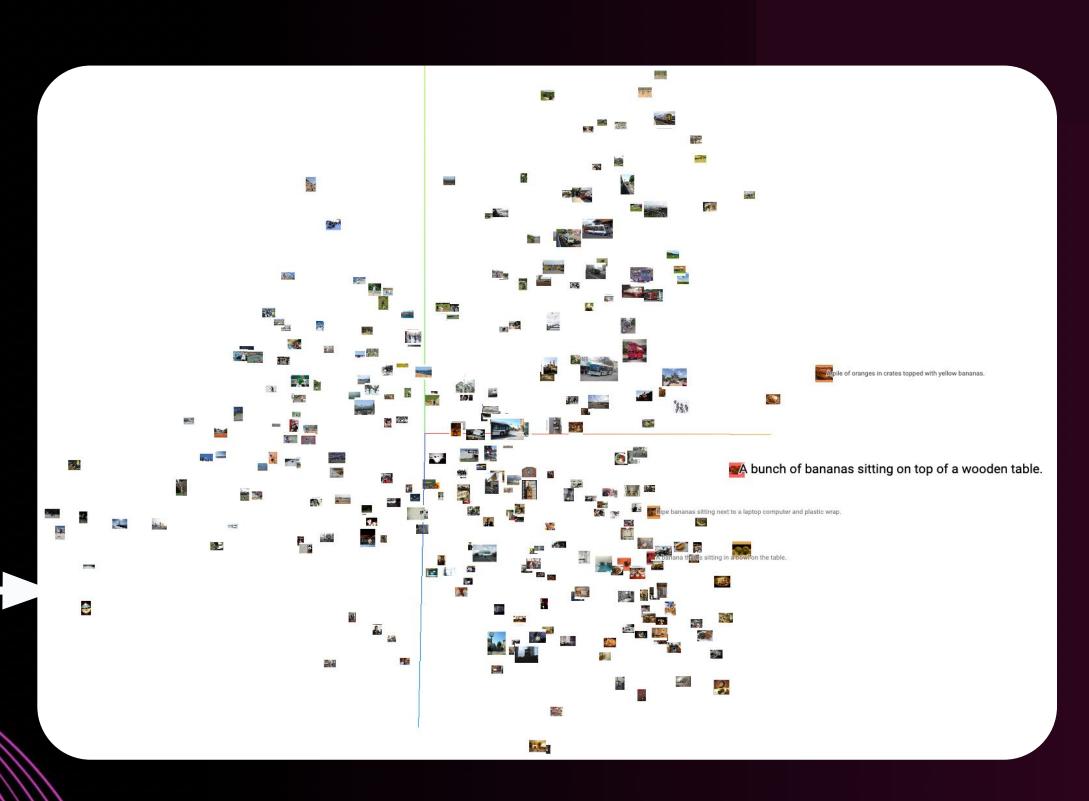
Blending of semantic context and data (text, visual, etc) enables reasoning across multiple levels of abstraction and associations
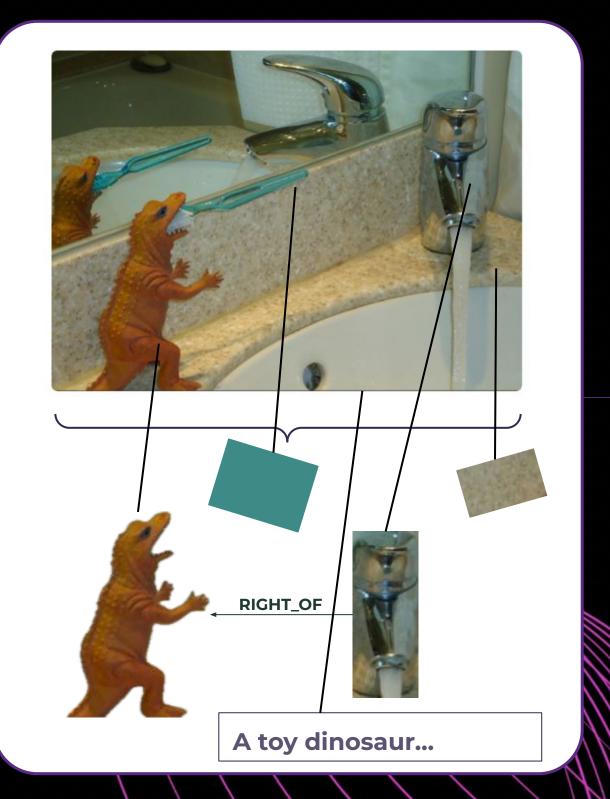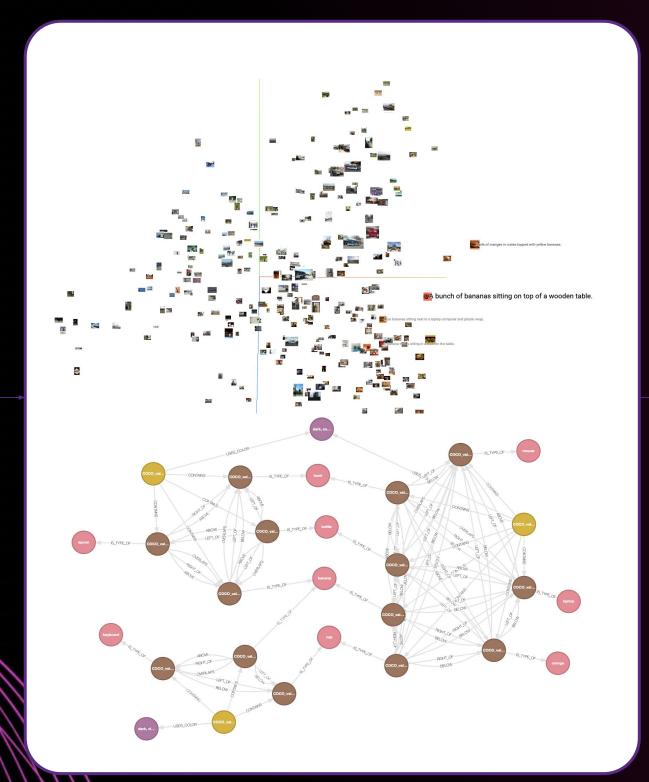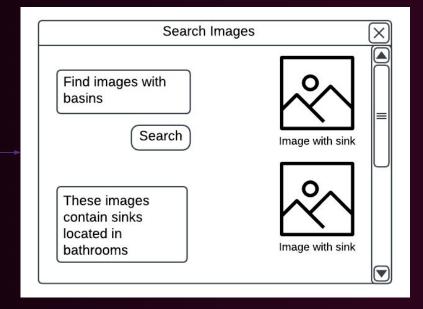
The Role of Images in RAG

Multimodal Search:
Semantics + Reasoning!?

Next Several Mins...

Advancing GraphRAG

Demonstrate how **mmGraphRAG** works

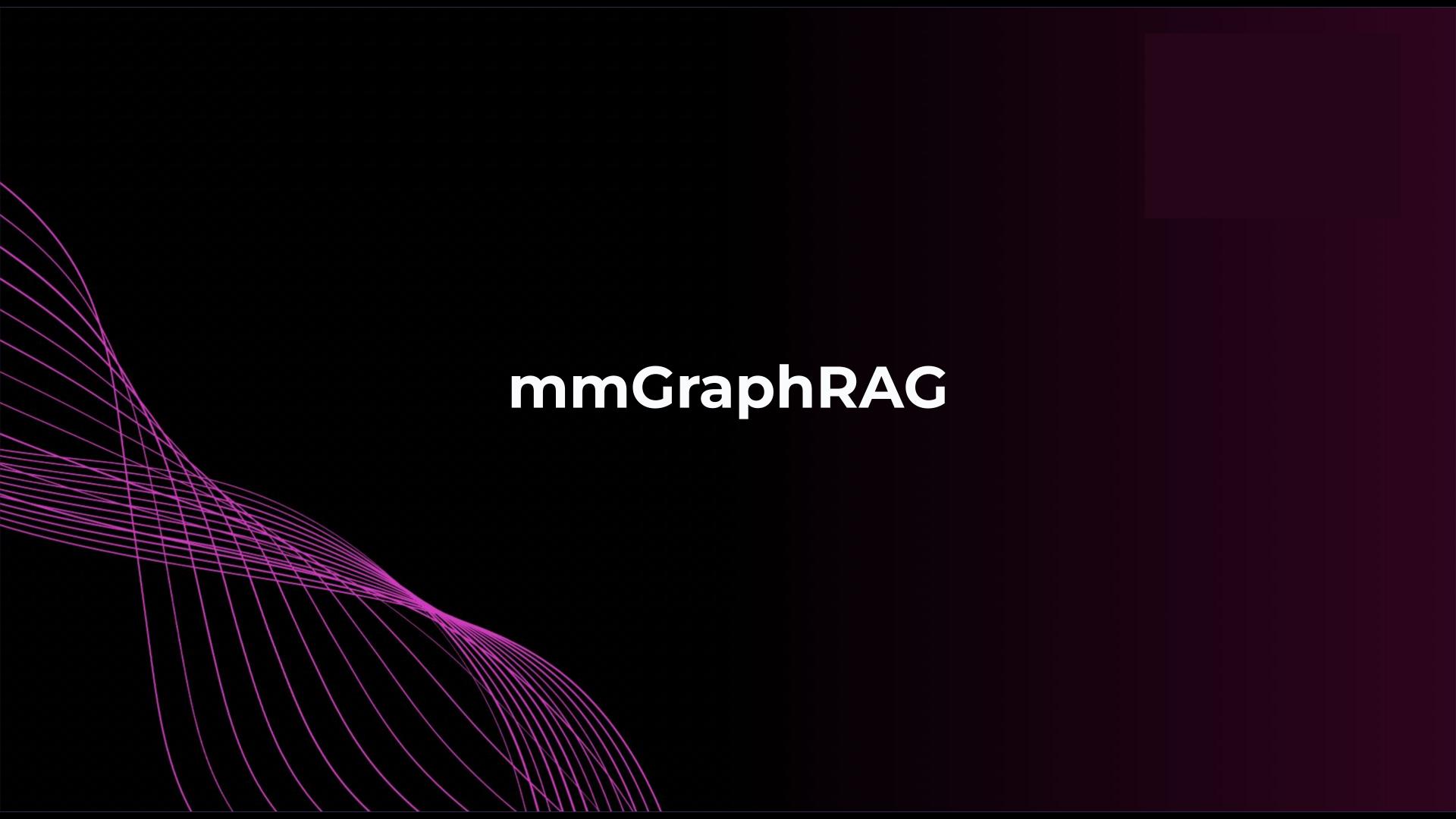Highlight the integration of **vision models** and **graphs**
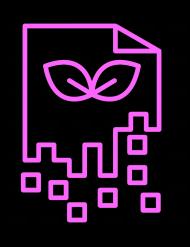
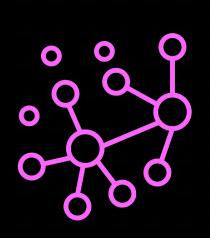Introduce **BAML for AI Development**

David Hughes
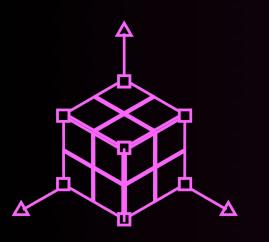
Amy Hodler

mmGraphRAG

mmGraphRAG in a Nutshell

ODSC

Associative Intelligence

Decomposition	Graph	Embedding Space	Multimodal Context
Break down images into subcomponents	Components and subs are loaded into a graph	Space with anchors created for global search in the graph	Provide blended results to LLMs for full context of text and images
Generate captions	Preserve context	Basis of semantic search	

Notable Uses

Geospatial Analysis

Search satellite or aerial images for specific features

"buildings with red roofs near water"

Surveillance & Security

Identify similar objects or scenarios based on context, spatial relationships, and object features

Medical Diagnostics

Search images for specific markers or abnormalities based on features, spatial relationships, & annotations

IP Search

Compare new designs against existing patents by identifying visual & textual similarities while preserving privacy

Recommendations

Enhance product search results by integrating embeddings & relational data
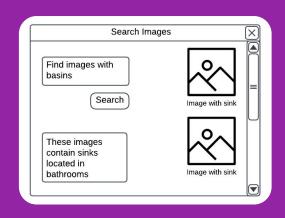
"Cheap shovels with a yellow handle"

Archival Data Management

Find & catalog images from archives based on complex visual features and captions
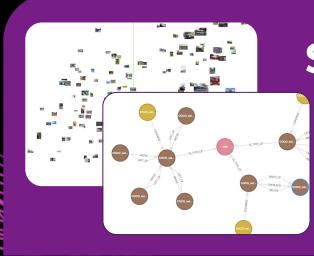
Architectural Layers

Presentation Apps

Query and Explain

- Vector similarity searches on images
- Graph queries retrieve contextual details on similar images
- LLMs generate explanations linking results to user queries

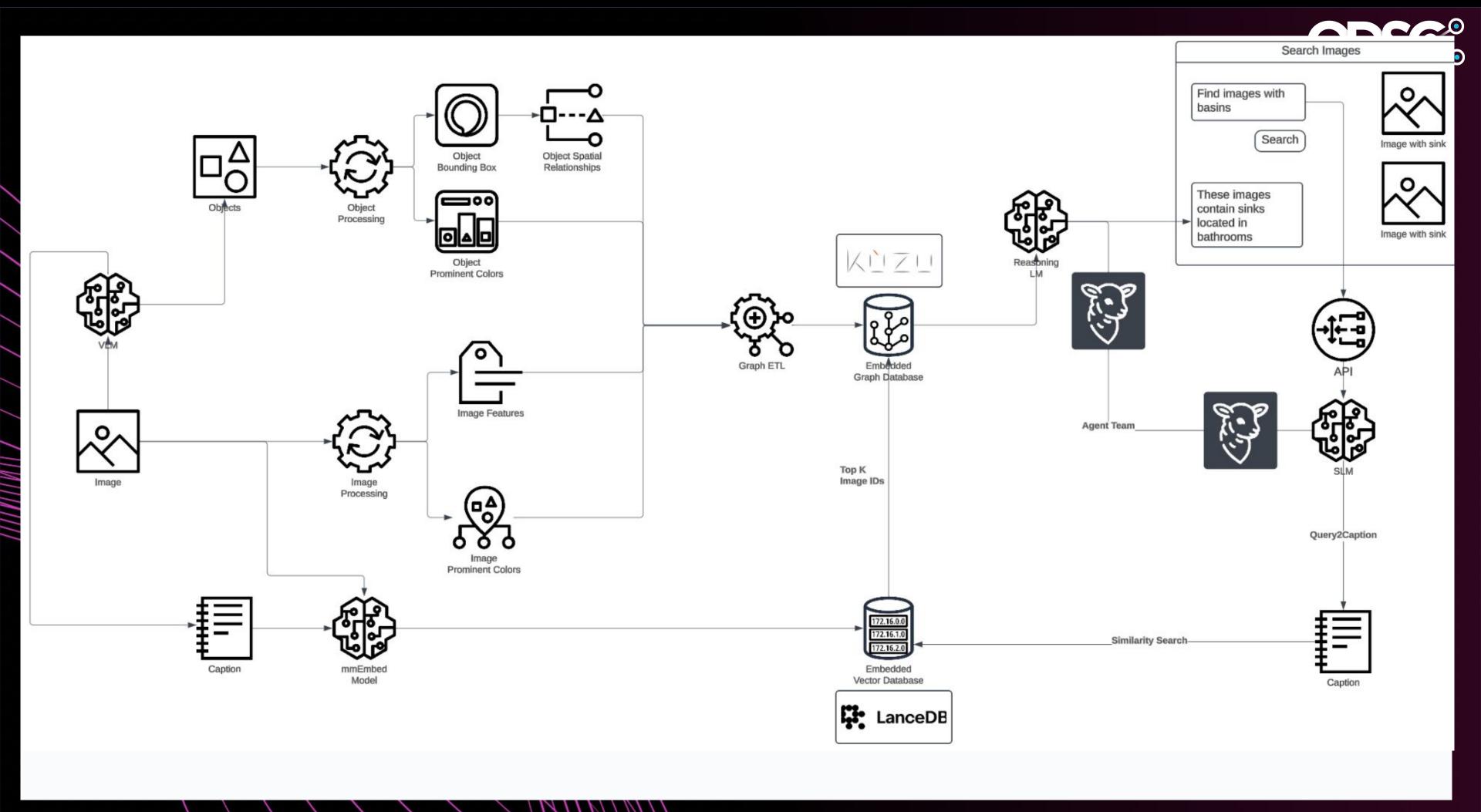**Semantics**

Semantic and Graph Construction

- Load hypervectors & relationships into vector & graph DB
- Connect nodes representing image features, metadata, & text-based context
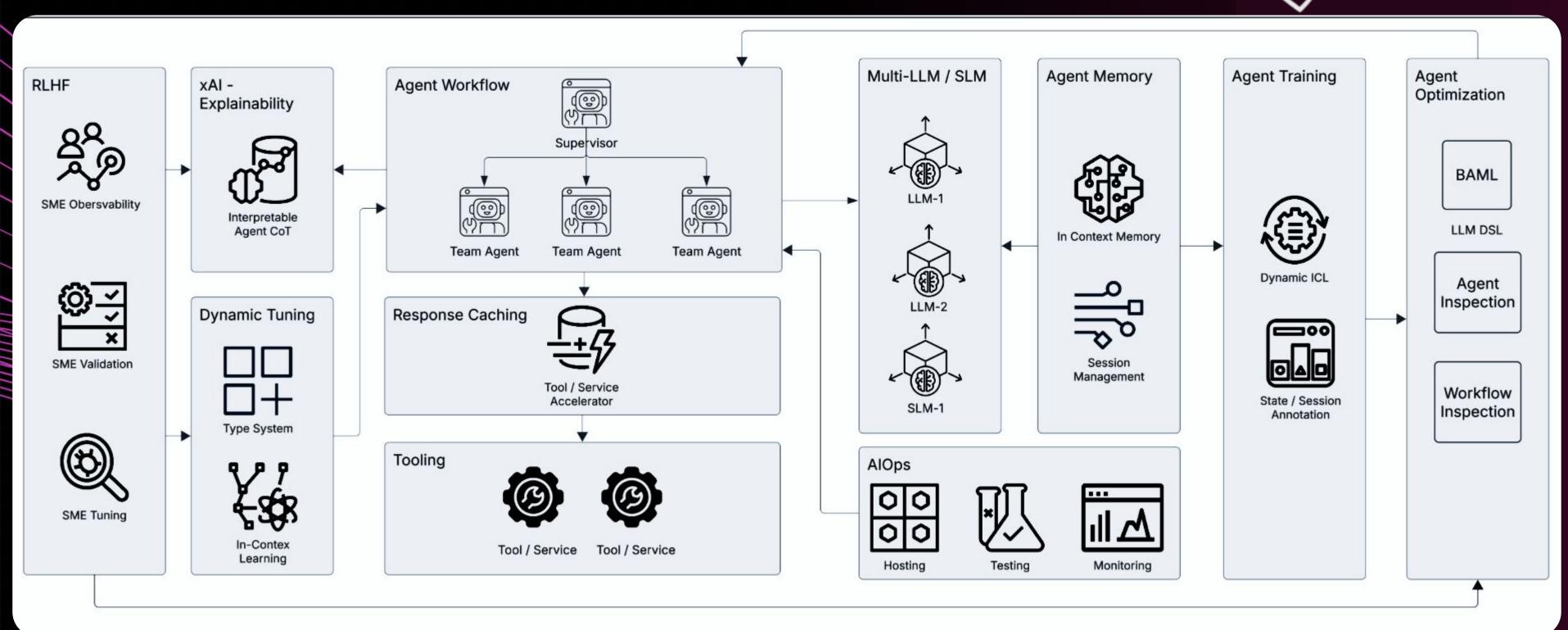
Data Sources

Data Extraction and Embedding

- Visual features extracted using pretrained models
- Features converted into hypervectors for high-dimensional encoding
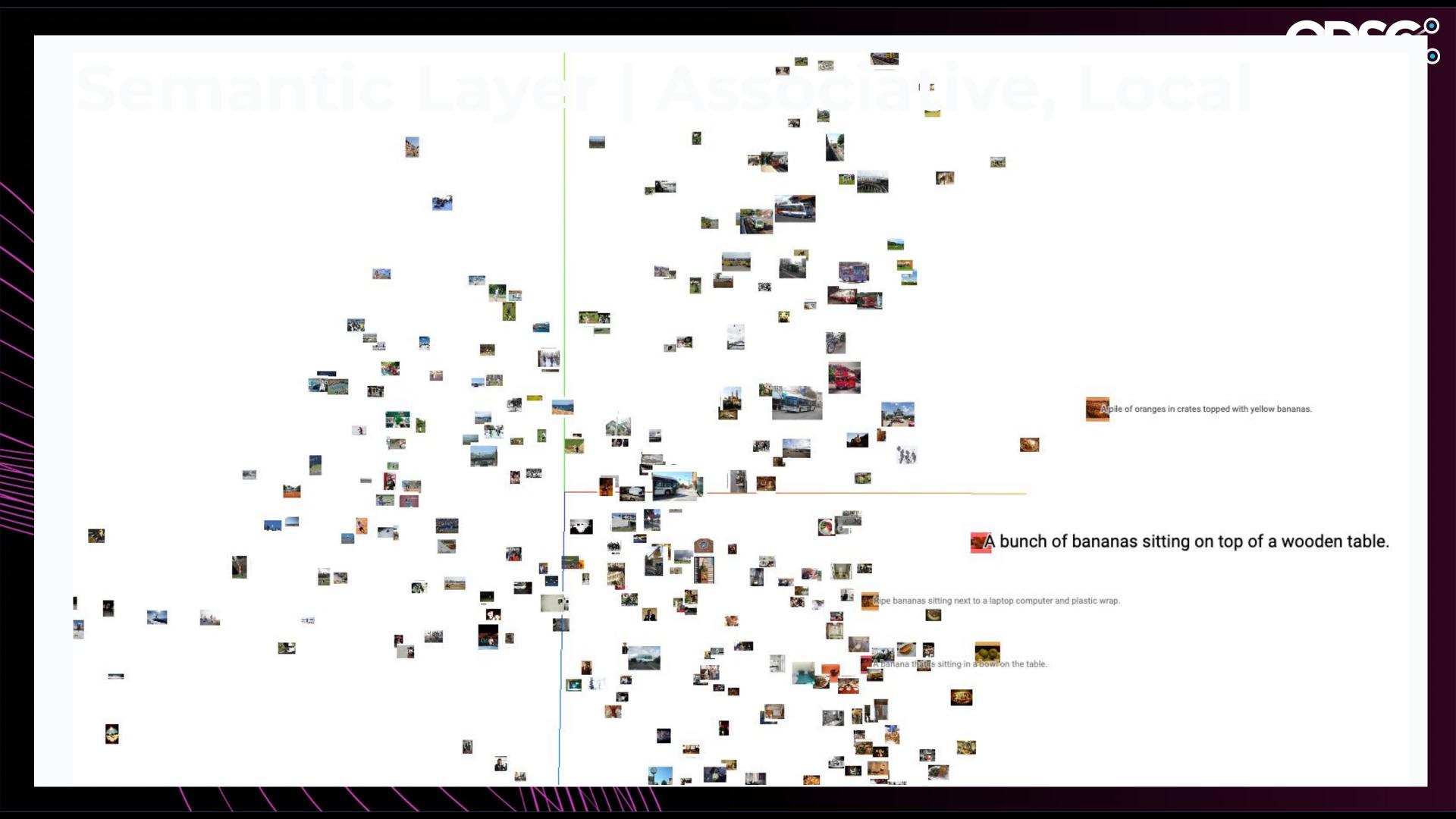
(:Agents)-[:ORCHESTRATED_IN]->(🐑)

The Semantic & Graph Layer

A pile of oranges in crates topped with yellow bananas.

A bunch of bananas sitting on top of a wooden table.

Ripe bananas sitting next to a laptop computer and plastic wrap.

A banana that is sitting in a bowl on the table.

Image Graph | Discrete, Global

Each node can have multiple spatial relationships

Image Graph

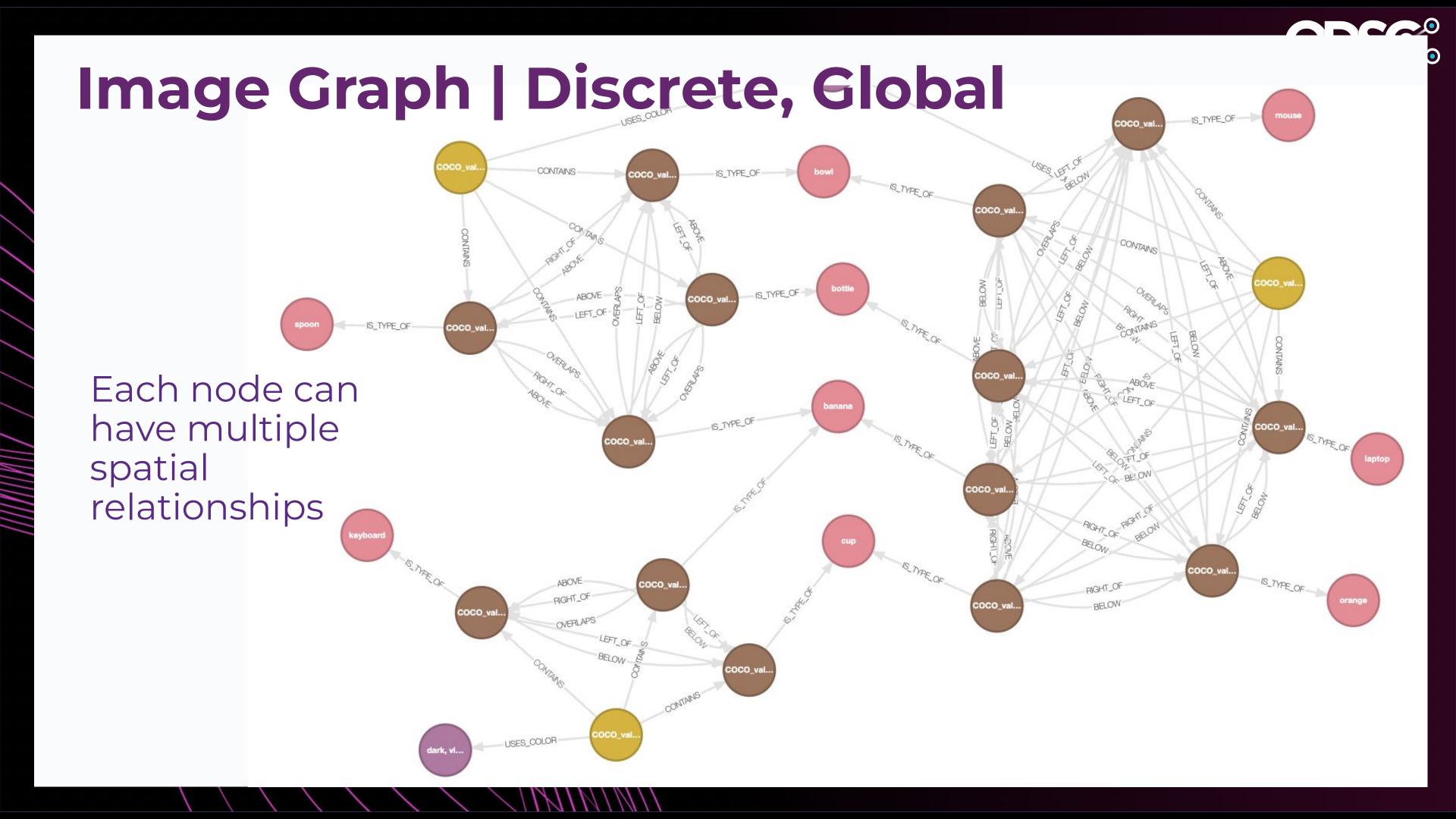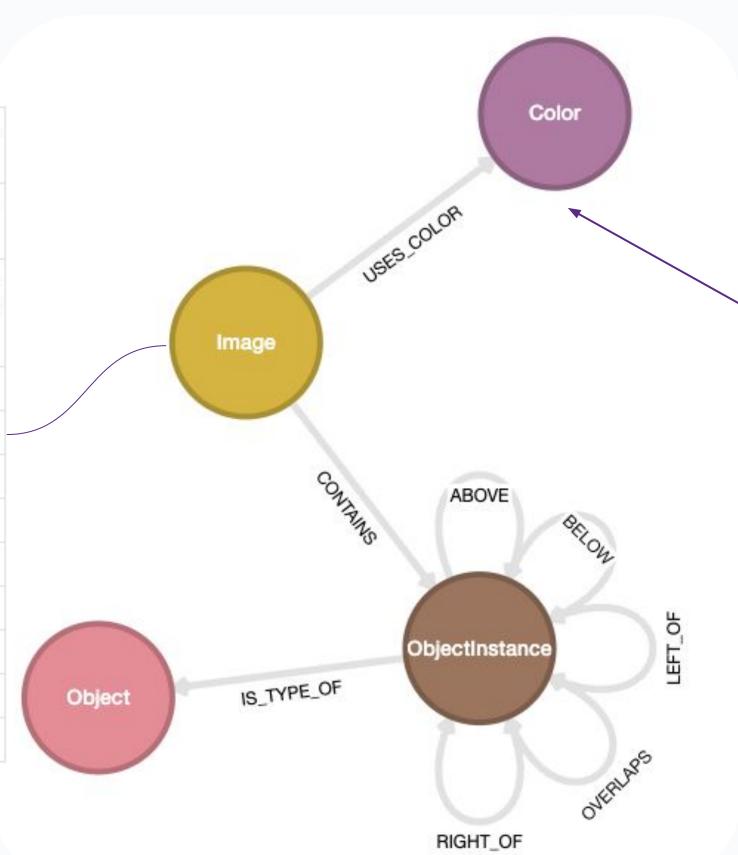|	
id PK	COCO_val2014_000000000208.jpg
name	COCO_val2014_000000000208.jpg
caption	A toy dinosaur standing on a sink next to a running faucet.
complexity_value	12759
complexity_description	highly complex
texture_value	42.90502166748047
texture_description	smooth
sharpness_value	1603.90087890625
sharpness_description	sharp
lightness_value	124.84366607666016
lightness_description	balanced
pattern	geometric patterns

E.g.
color present,
major color,
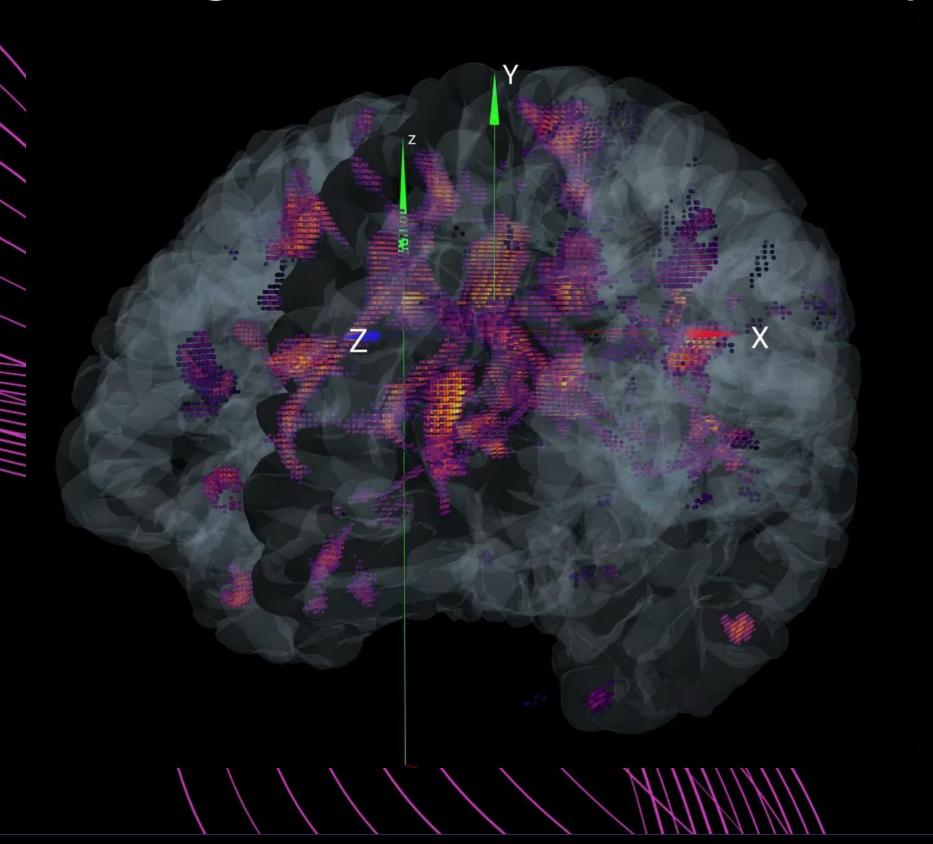minor color,
dominant color
score

git.new/ODSC-East-25

Follow Along
Notebook for Associative Search

Future Directions

BrainGraph
Using Latent Data and Graph Analytics

Medical images consist of 3D pixels called voxels. **Voxels are nodes in a graph with neighbors**.

Communities of voxels can represent anatomical structures, or abnormalities like tumors. **Evolution in the graph** can represent **disease progression** or **treatment response**.