Case Study

eBay

Neo4j Powers Intelligent Commerce for eBay App on Google Assistant

INDUSTRY
Retail / Ecommerce

USE CASE
Artificial Intelligence / Knowledge Graph

GOAL
Improve shopping experience using chatbot that learns and understands shopping context

CHALLENGE
Most shopping context is lost using the standard search box experience, requiring the user to sift results manually

SOLUTION
Shopping bot that uses a Neo4j knowledge graph, artificial intelligence and natural language processing (NLP) to converse via voice

RESULTS
- eBay App stores, remembers and learns from past interactions with shoppers to provide truly customized recommendations
- Neo4j + in-house natural language understanding (NLU) algorithms comprehend spelling and grammar intention of customers for smooth shopping conversations

When shopping on eBay, the typical search box experience regularly falls short in understanding and remembering what a shopper is truly seeking to find. To remedy this issue, eBay used a Neo4j knowledge graph to power the eBay App on Google Assistant: a smart, personal shopping bot that converses with users via voice.

The Company

eBay Inc. is a multinational ecommerce leader headquartered in San Jose, California that facilitates consumer-to-consumer and business-to-consumer sales across multiple platforms. Founded in 1995, eBay enabled $86.4 billion of gross merchandise volume in the past year.

The Challenge

eBay is continually looking to improve the ways shoppers search for the items they seek. SVP & Chief Product Officer RJ Pittman explains how existing product searches and recommendation engines are currently unable to provide or infer contextual information within a shopping request. As an example, Pittman considers the information implied within the phrase: "My wife and I are going camping in Lake Tahoe next week, we need a tent."

He observes that most search engines would react to the word "tent." But the additional context regarding location, temperature, tent size, scenery, etc. is typically lost. Yet, this type of specific information is actually what informs many buying decisions. Relaying or maintaining this context is often a burden left to the user and a new solution was needed to remove the hard work associated with shopping.

The Strategy

From a technical standpoint, eBay's goal was to build a real-time recommendation engine that understands and learns from the contextual language supplied by the shopper and quickly zeroes in on specific product recommendations.

eBay calls this exercise of tapping into human intent as the "holy grail" of conversational commerce. To accomplish this requires a combination of natural language processing, machine learning, predictive modeling and a distributed, real-time storage and processing engine that operates across the Internet while scaling to contain their entire product catalog.

The Solution

To build the eBay App for Google Assistant, the knowledge graph they needed would be coupled with natural language understanding and artificial intelligence to store, remember and learn from past interactions with shoppers.

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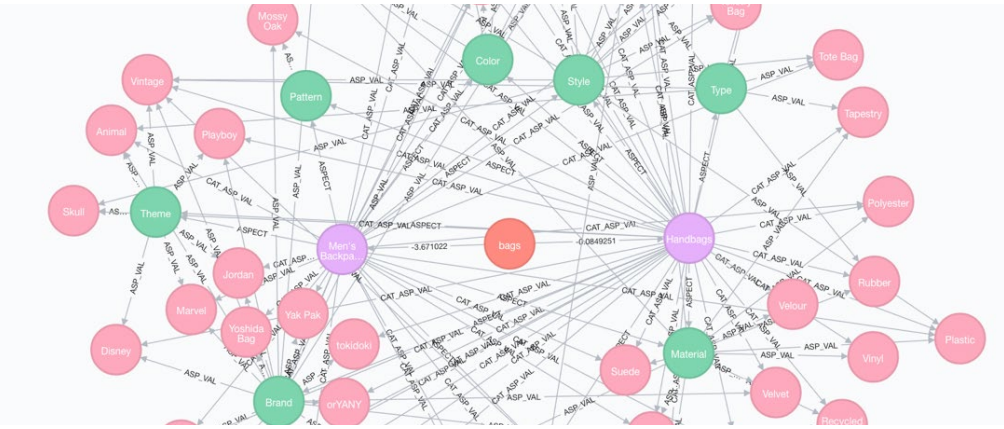
"Our goal is to bring the best of eBay to your fingertips, highlighting the best of our inventory, with a focus on fixed-price items, fast and free shipping, and deals."

– RJ Pittman,
SVP, Chief Product Officer, eBay

eBay chose Neo4j as the native graph database that holds the probabilistic models that aid understanding in the conversational shopping scenario. The Neo4j graph contains both the product catalog and the attributes of shopper interactions while seeking products.

Below is a portion of the knowledge graph the eBay App uses to interpret the customer request to purchase a "brown, leather Coach messenger bag costing less than $100."



When a shopper searches for "brown bags" for example, the eBay App knows what details to ask about next, such as type, style, brand, budget or size. As it accumulates this information by traversing through the graph, the application is continuously checking inventory for the best match. This is a great example of real-time decision making.

The Results

The knowledge graph development was not only a successful project, but a fun one – especially with a graph database behind it.

eBay engineeers knew that deploying a chatbot to their user base required internet scale with a high degree of resiliency and availability, predictable responses in milliseconds and support from graph experts with experience in these types of deployments. This led them to Neo4j, which includes highly available clustering and exceptional write and read performance. Even with millions of nodes, the application is highly responsive to user requests.

The application includes the Neo4j graph database and natural language understanding (NLU) algorithms that not only understand text, pictures and speech, but also include spelling and grammar intention while parsing these conversations for meaning and context.

The application is running in Docker containers in the cloud, and the eBay team expects to deploy the chatbot across multiple platforms via plugins including Slack and Microsoft. To try out the eBay App today say, "Hey Google, Let me talk to eBay" on any Google Assistant device.

Questions about Neo4j?

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