

U.S. Health Insurer

Preventive Care and Patient Journey Visibility

A leading health insurer needed visibility into vast patient data to improve members' health. Using Neo4j with Databricks, data scientists rapidly pull touchpoints into a graph and analyze patient journeys to see when to engage with their members.

BY THE NUMBERS

1.4B nodes

2.8B relationships

150% increase in user adoption

PLATFORM

Databricks and Neo4j on Azure

INDUSTRY

Insurance

USE CASE

Patient Journey

CHALLENGE

A complex data environment with many data sources containing elements of patient journeys

SOLUTION

Bring together all clinical and non-clinical touch points in a graph in Neo4j and analyze them using graph algorithms.

RESULTS

- Gain visibility into individual patient journeys
- Analyze patient journeys to find the next best action for those with chronic health conditions
- Examine patient journeys for biomarkers

The Company

A leading state health insurer, serving 3.5 million members, is committed to serving its members and investing in their care.

The Challenge

In the U.S. alone, healthcare for chronic conditions costs \$1.5 trillion annually. But the real-world impact of these conditions on people, their quality of life, their longevity, and their loved ones cannot be quantified. Preventive care can offer a better quality of life – and a longer one, too.

At this health insurer, the business leads the way, specifying which chronic health conditions they want to target, such as congestive heart failure (CHF). Then the teams in the Data Science Center of Excellence (COE) get to work.

"The VP of our division came to us with a high-level problem," said the I/S Team Lead for the MLOps team in the Data Science COE. "Our VP wanted us to figure out the next best action for our members based on where they are in their clinical or non-clinical journey. Essentially, if the member did A, B, and then C, what should D be?"

The MLOps team thought about the journeys hidden in insurance claims. What if they could connect all the events associated with a patient?

The Strategy

The data scientists wanted to see all the claims connected to a single person. "We started hashing it out and thought about how we would do it, at a conceptual level," said the team lead. "We said, 'This is really a graph problem. We want to connect all the elements of a member's journey and figure out what the next best step is.'"

Studying individual patient journeys requires the granularity of a graph. "We don't want to look at columns and aggregate them using GROUP BY," said the team lead. "We need to get down to the member level and follow all these members based on the path they're taking and identify patterns in member paths. That's how we came to the conclusion that we have a graph problem."



"We're trying to load in as many of the different touch points around our members as possible, clinical and non-clinical, and quickly connect them in a graph so that we can better identify when we need to engage with our members."

MLOps Team Lead

The Solution

The MLOps team started looking at graph technology. "Once we identified that the nature of the problem was graph-based, we started looking at which data technologies could best support that scenario. We looked at various graph database solutions out there, and it seemed to us that Neo4j is the name of the game," said the team lead. "There are other products out there, but Neo4j is at the forefront and is the one blazing the trail. Neo4j also has a much stronger enterprise story than a lot of the others, which, obviously, in a highly regulated industry like ours is important."

One example is Neo4j's role-based access control. The team was impressed "by the fact that we can control even down to the node and label level, who can see what." Sensitive information can be locked down in a granular way.

The health insurer was primed for Neo4j; they had already adopted Databricks, a cloud-based platform that accelerates machine learning (ML) workflows. "Databricks has enabled us to do a lot more and move a lot faster than previously," said the team lead.

Using Databricks has driven data scientist productivity up. "We have the same number of data scientists, but they're able to do a lot more, faster," said Colvin. Data scientist adoption rose 150% as the whole team jumped on board, a marked contrast from the lackluster uptake for their on-premise platform. "Now with Databricks, all the data scientists are really excited. We have the whole group on there. We went from nobody wanting to use it to people even outside our team wanting to take advantage," said the team lead.

The Results

The health insurer is just beginning its graph-based identification and exploration of patient journeys, and applying the insights gained from them. And although their graph already has 1.4 billion nodes and 2.8 billion relationships, they have only begun to add data that they could incorporate into Neo4j.

For example, data scientists at the health insurer use natural language processing (NLP) to harvest health information from nurse's notes, test results, and more. They use Named Entity Recognition to get data about all the relevant entities. The model also brings back relationships between the entities that they defined. The insurer could store both the entities and their relationships in Neo4j.

The health insurer and its Data Science COE are at the forefront of innovation, using state-of-the-art tools and techniques to recommend the next best step for members. The best part is that the insurer is learning from the vast data it already has and making sense of its inherent connections and patterns to support members with chronic conditions.