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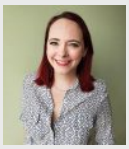
Technology and Innovation

Graph Technology Puts Data at the Heart of Government Decision-Making

Dr. Alicia Frame



Dr. Alicia Frame
Lead Product Manager
and Data Scientist
Neo4j

Biography

Alicia Frame is Lead Product Manager and Data Scientist at Neo4j (https://neo4j.com/), where she works on the company's Product Management team to set the roadmap and strategy for developing graph-based machine learning tools.

Earning her Ph.D. in Computational Biology from the University of North Carolina at Chapel Hill and a B.S. in Biology and Mathematics from the College of William and Mary in Virginia, Alicia has over eight years of experience in enterprise data science at BenevolentAI, Dow AgroSciences, and the EPA.

Alicia blogs at https://neo4j.com/blog/

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Paper type Research

Abstract

The ability to use data is becoming essential to governing well. With digital technologies having transformed our economy, society and daily lives, the challenge for governments is to make use of new sources of data and the emergence of new data science technologies to solve problems and make decisions. In this article, the author explains how graph technology is helping to solve government problems by offering a new way of working with connected data.

Introduction

Graph technology is widely used by both private businesses and the public sector. Connected data has proved to be critical in many scenarios, including search engines, GPS navigation, social analysis, and increasingly in a wide variety of citizen-facing contexts.

One of the primary reasons for the rapid adoption of graph database technology is that it is better at representing the connections between concepts than its relational database predecessors. Owing to their ability to make sense of connected data, graphs have been applied to many problems in government, helping governments make better decisions and meet the public sector target of value for money.

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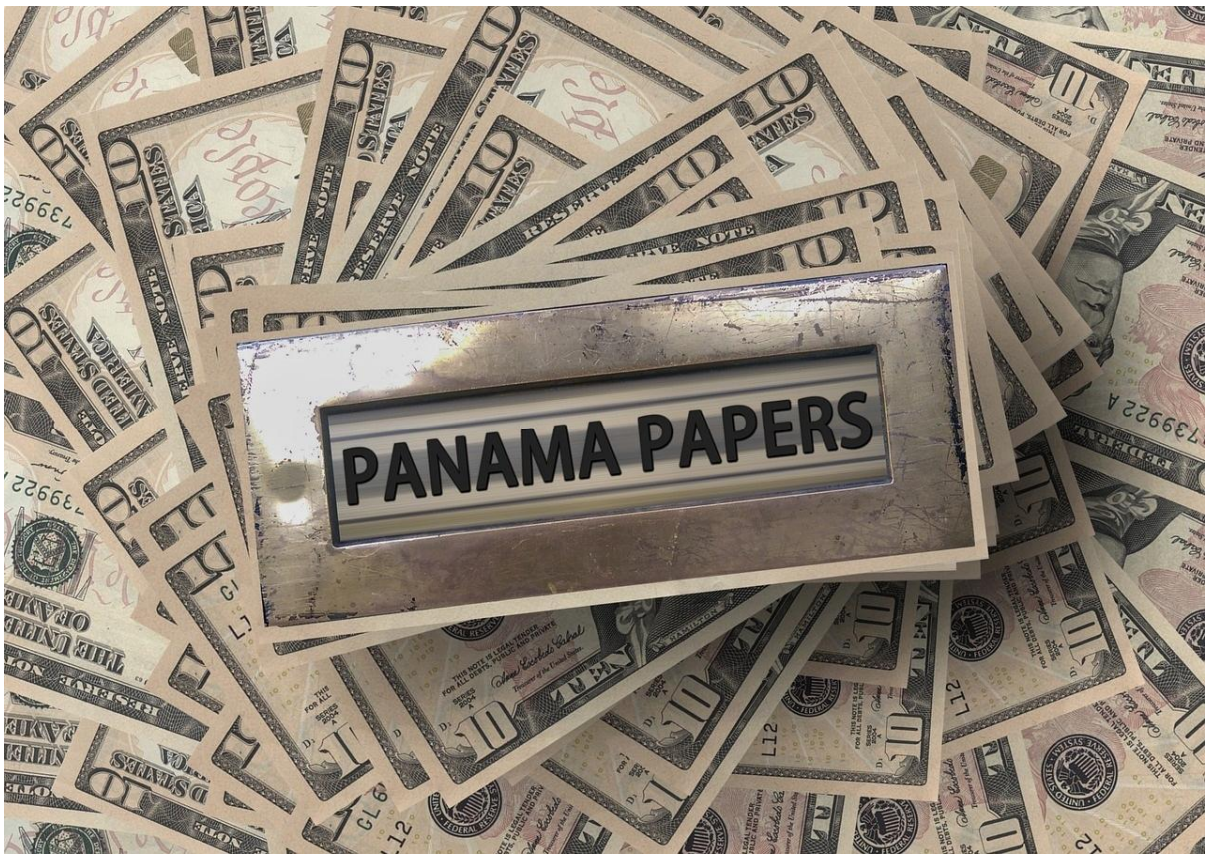
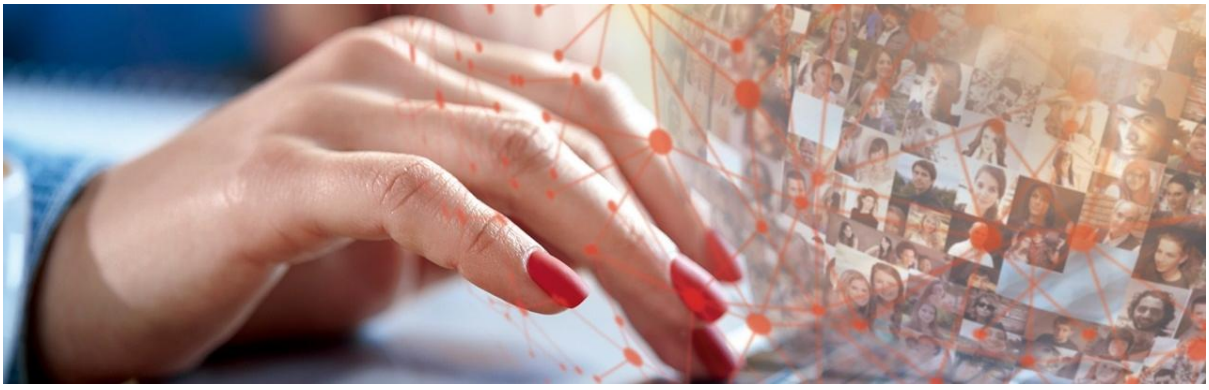


The evolution of graph tech

Graph technology hit the headlines in 2016 when *The Panama Papers*[1] used relationships buried in complex legal and financial records to expose wrongdoing. Graphs highlighted the connections public officials and executives had tried to keep hidden.

More recently, health authorities in countries including Singapore and Vietnam have deployed graph applications during the pandemic. Graph technology is perfectly suited to helping scientists and policymakers understand the connections between data, helping the authorities understand the dependencies between people, places, and events as the virus spreads.



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Graph technology and smart cities

Graph technology is also contributing to smart city projects. In Turku, Finland[2], graph technology is leveraging IoT data to help city planners make better decisions. Turku City Data, responsible for building smart city functionality, found that graphs represent data in a way that may be effectively mapped to tackling business problems – enabling it to match datasets to solve business problems.

In the pandemic, the application of graph technology has enabled the city to deliver daily supplies to elderly citizens who could not leave their homes. Graph-based route optimization aids the planning and management of safe and resource-efficient food distribution. The service determines routes that optimize transportation resources, while at the same time maintaining temperature-controlled shipping for food and medication.

Driving cost savings at the Department for Education

At the Department for Education (DfE), graph technology is driving value for money KPIs. The department provides services across England, where a complex landscape can make it difficult to identify opportunities for savings. Now, a graph-based centralized information repository enables service component reuse. This results in immediate and projected cost savings.

“The Department for Education delivers critical services across the education sector, for which we depend on a complex IT infrastructure composed of multiple business systems, services, applications and components,” says Luke Slowen, Head of Architecture, DfE.


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DfE needed visibility of services data across its entire IT infrastructure. Creating a central repository of services information accessible to all users supports faster decision-making and avoids duplication of effort and resource. “Our new graph creates a shared view of our service landscape, which we use to find ways to reuse capability, improve usability and rationalize – delivering better value services for our users,” continues Slowen.

The DfE has been able to map services to help identify opportunities for modernization and cost-cutting and speed up the development and rollout of new services. “Graph tech helps us visualize our data and the opportunities in one place, so we can focus our efforts on streamlining our service delivery and operations,” he adds. All of which helps to eliminate duplication and empower the DfE to make better-informed business decisions.

Contracts, finance, service documentation, resources, and capabilities information are also linked in the DfE graph implementation, making it easier for civil servants to see the cost of each service and how they are procured.

“Our initial cost savings will only grow as we pull in more areas of the department over the next two years,” Slowen concludes. “All in all, our investment in graph tech is already starting to pay terrific dividends.”

Government recommendations

In a 2020 GOV.UK blog post, *One Graph to rule them all* Whitehall data scientists Felisia Loukou and Dr. Matthew Gregory shared interesting results from their deployment of a machine learning model with the help of graph technology. The

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scientists had developed a graph-based system that automatically recommends content to GOV.UK users based upon the page they are currently visiting.

The system quickly 'learns' continuous feature representations[4] (a list of numbers) for the nodes. These numbers can be used for various machine learning tasks, such as recommending relevant content.

Connecting the data

Graph databases will prove an invaluable tool to help meet the growing, complex public sector challenges of the coming decade. As the pace of societal change accelerates, Government departments can tap into graph technology's inherent approach to handling interconnected data to run deep, complex queries that will reduce infrastructure costs and provide a higher quality public service.

Reference

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