GraphAware: ESA Case Study

Hume maps a segment of the space and satellite ecosystem for the European Space Agency

Company

The European Space Agency (ESA)

Business

Europe's gateway to space

Established in 1975
with 22 Member States

Pushes the frontiers
of science and technology

Timeframe

August - November 2019

Challenge

Drastically reduce human intervention
to map the satellite ecosystem
into a knowledge graph

Solution

Hume Knowledge Graphs
Hume Orchestra
Hume Labs
GraphAware Consultancy

Result

End to end solution for creating
a knowledge graph from structured
and unstructured data, mapping
the space and satellite ecosystem

Inspired by the International Consortium of Investigative Journalists (ICIJ) use of Neo4j in their highly popular Panama Papers exposé, the European Space Agency decided to try new methods to support their goal of monitoring the satellite technology market.

The challenge was to keep a track of constantly increasing data in a dynamic domain.

The Challenge

The European Space Agency (ESA) is dedicated to the peaceful exploration and use of space for the benefit of humankind. Established in 1975, the ESA works together with 22 Member States to further its mission to shape the development of Europe's space capability and ensure that investment in space continues to deliver benefits to the citizens of Europe and the world.

An independent, internal exercise to survey a portion of the market produced encouraging results and clearly demonstrated the visual benefit of graph databases.

However, the amount of human effort required to ingest and map data into the graph made it unrealistic to proceed. ESA envisioned an automated Machine Learning (ML) powered enrichment workflow to create and grow their knowledge graph from structured and unstructured (textual) data.

The Solution

ESA approached GraphAware to learn more about the Natural Language Processing (NLP) capabilities of Hume, GraphAware's flagship product, a graph-powered insights engine. Following a valuable demo of Hume by the ML experts at GraphAware, ESA decided to strengthen its understanding of GraphAware capabilities through a proof of concept activity.

First, GraphAware consultants configured Hume to automate the ingestion of unstructured data. This data was comprised of PDF's, CSV's, RSS feeds and spreadsheets containing URL's of web pages. The data gateway either extracted text content directly from file types such as PDF's, or crawled the web pages to extract their content. This unstructured text was then picked up for processing by Hume Orchestra.

Hume Orchestra is a key component of the Hume Ecosystem and manages the workflow of operations for storage, analysis, and post-processing of unstructured text.

For ESA, it was configured to include Named Entity Recognition, Entity Relationship Extraction and post-processing of results, including materialisation of results including named entities, to align the resulting NLP graph with the domain model.

The ESA team worked with Labs, Hume's collaborative, supervised annotation system to train Machine Learning algorithms that leverage knowledge of domain experts. This was then used to enhance the ability to recognise key entity types and relationships between them, and produce a knowledge graph from the unstructured text input.

Hume Knowledge Graphs provided an intuitive and visual mechanism to wire up the schema of the knowledge graph and style it.

Finally, the Knowledge Graph visualisation built on top of the Keylines toolkit generated much excitement at ESA, demonstrating that custom insights could be delivered and visualised easily through configuration of Hume Actions. ESA acknowledged that GraphAware partnering with Cambridge Intelligence to leverage Keylines as Hume's visualisation toolkit allowed more focus on the core features of Hume.

> "The ability to customise Hume Actions via Cypher queries provided ESA with flexibility to cover a range of use cases and customers."

Hume Orchestra workflow
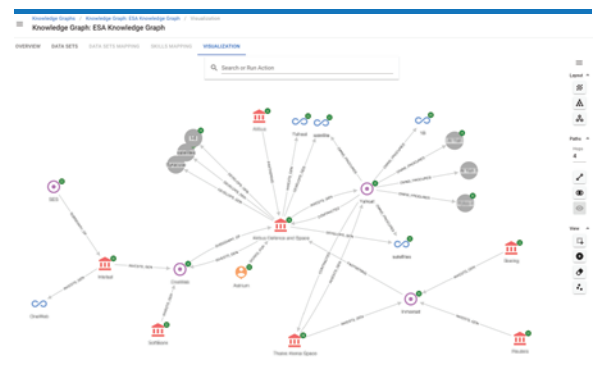
Hume Knowledge Graph visualisation

The Result

ESA initially engaged with GraphAware for their NLP capabilities, but were delighted to receive an end to end solution that mapped a segment of the space ecosystem, right from automated ingestion of data to NLP and Machine Learning models with an enrichment workflow, and delivering business value by making insights accessible through an actionable graph visualisation.

"Hume being a complete product is a key factor for ESA. The ability to customise Hume Actions via Cypher queries provided ESA with flexibility to cover a range of use cases and customers".

Having met the brief by speeding up and simplifying the creation of ESA's knowledge graph, and receiving unanticipated added value in the form of insights surfaced in the visualisation, the ESA team expressed their appreciation for the professionalism of the GraphAware consultants that propelled them beyond their initial goal.

European Space Agency are now preparing to build on this successful initial demonstration and drive more usage through the organisation in order to help it best focus its support efforts.

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