



Insight commercial case studies

Sector: **Health**

# Insight

Centre for Data Analytics

## TOMOE: Knowledge Discovery and Explanation



Fujitsu and Insight develop new methods for automated knowledge discovery and explanation on the top of heterogeneous biomedical data

### Executive Summary

#### Challenges

Fujitsu is a leading provider of customer-focused IT and communications solutions for the global marketplace. Fujitsu Laboratories has recently expanded their research in the area of Artificial Intelligence and Cognitive Computing and is working with insight to:

- Gain expertise in the very new and fast-evolving area of knowledge graphs and associated scalable processing techniques
- Collaborate with computer scientists who have experience with interdisciplinary use cases

#### What Insight Delivered

The collaboration, led by Fujitsu which started in July 2010, brings together experts across a number of disciplines including semantic technologies and computation science to target state of the art research outcomes with the ultimate aim to enable the development of Linked Data solutions. Recently, the joint team of Insight and Fujitsu researchers has been working on a software platform that provides:

- Extraction of knowledge graphs from heterogeneous resources
- Using knowledge graphs for automated discovery via link prediction and similarity-based propagation
- Explanation of the discovery results for easier validation and more reliable decision support

#### Measurable Impacts

The key outputs of this research include:

- Implementation of the modular knowledge discovery and explanation platform
- Number of accepted scientific publications and filed patents describing the research and associated IP
- Engagement with business units across Fujitsu EMEA targeting commercialisation of the research



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## Background

Information overload affects increasing number of the modern knowledge economy markets. One of the most affected areas is life sciences, where experts struggle with vast amounts of research papers, experimental data or patient records. In order to come up with best decisions, stakeholders often need to process far more papers or data points than their time could possibly allow.

This calls for automated or semi-automated techniques for dealing with information overload in life sciences. Robust and efficient methods for turning large amounts of heterogeneous biomedical data into useful insights are still largely unexplored. The ability of an AI system to explain and justify its results is essential for adoption in many mission-critical areas of life sciences.

This is where the collaboration between Fujitsu and Insight can deliver potentially game-changing solutions with long lasting impact. This collaboration has enabled the team to file 7 patents, publish 22 journal articles and conference papers and achieve 5 awards for scientific excellence.

## Solution and Outcome

The ultimate outcome of the project will be the TOMOE platform. The platform is based on basic research in the area of representation models suitable to the loosely structured semantics of knowledge graphs. The team of Insight and Fujitsu researchers works on innovative solutions based on combined graph and tensor models for representation of interlinked data. This enables, for instance, inference of unknown side effects based on propagating the known ones in a drug similarity network. Last but not least, the team is investigating methods for automated elucidation of existing or newly computed findings. This involves both explanations that are an inherent part of the discovery algorithms and approaches using complementary discovery techniques to explain given facts.

Building on the unique research delivered by the Insight and Fujitsu team, the TOMOE platform will eventually be rolled out as a demonstrator in order to validate it in realistic trials with biomedical experts. The early adopters of the TOMOE technology will then be able to base their decision on the full range of biomedical and chemical data augmented by information extracted from the latest scientific publications.

### Fujitsu

For further details on Fujitsu's products and services see <http://www.fujitsu.com/ie/>

"With Insight we have found a partner that understands the commercial realities of applied research and the requirement to drive new, innovative solutions with the purpose of furthering Fujitsu's research and commercial roadmap."  
Anthony McCauley, Head of Research

### Insight

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