Data Taxonomy of AO Video Intelligence Features

Epic : Data Solutions | Feature: Knowledge Graphs

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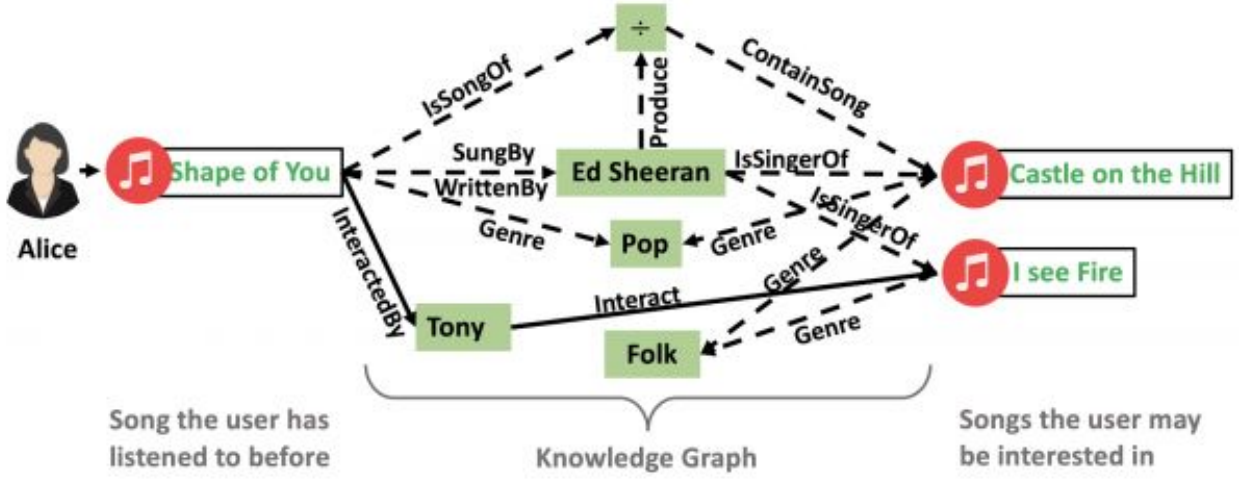
Introduction

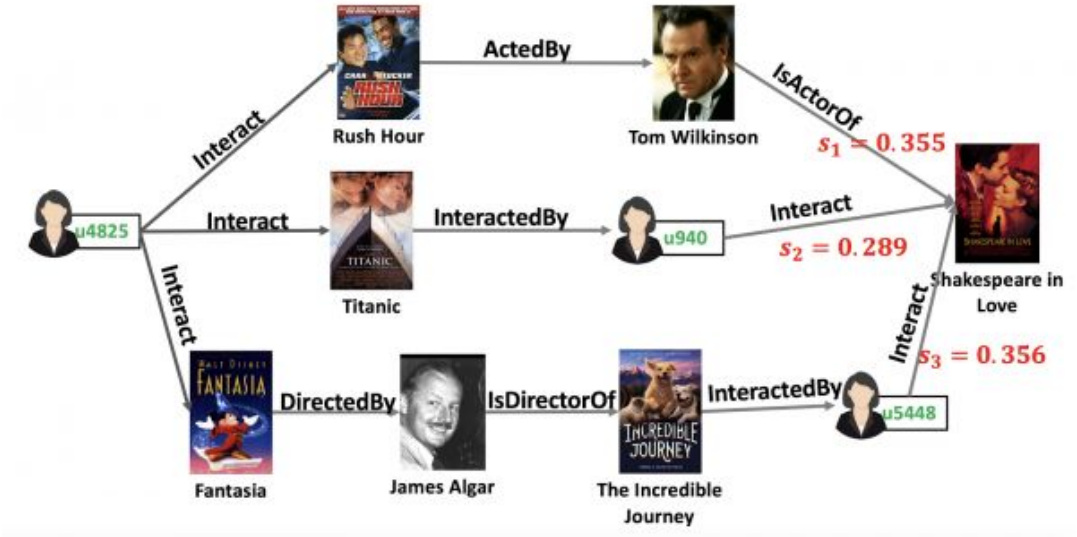
Objectives

Exploring how extracted data features can be leveraged for Media purposes through ML/AI techniques ie. making Knowledge Graphs and Taxonomies. Focus is on how these and other heterogeneous data sources and techniques can be combined into a flexible architecture that can further build a high-level Architecture to create Taxonomies and Knowledge Graphs. **Use the Graph Index and Other representations to tell the Taxonomies, for say, a Search Recommendation System**. Knowledge graphs can be made by using JSON for better SEO to leveraging taxonomy ie. Combining knowledge graphs and machine learning etc.

Input and Output Data form [**Choice of data** (Volume and Variety)]

The resulting metadata (topics, named entities, sentiments, etc.) from the features team [JSON] are to be Analysed and stored in a graph database to support further analyses and more precise retrieval. **The graph is structured according to a well-defined and evolving ontology and these Graph databases can understand the connections in large and varied data sets**. Metadata can run through further ML pipelines for single- and multi-label classification, clustering, event detection, and social network analysis in general.



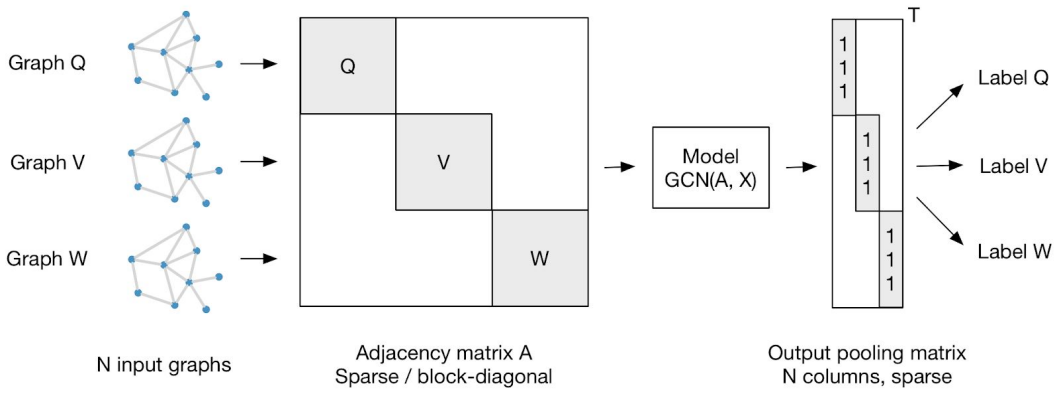


Semantic AI Applications [**Test cases** (for use-cases and problems)]

- Search Engine Optimisation
- Visualisation
- Name Entity Recognition
- Content Retrieval or Recommendation tool

Concept [One.Zero]

MultiScale GCN (Graph Convolutional Network) Methods

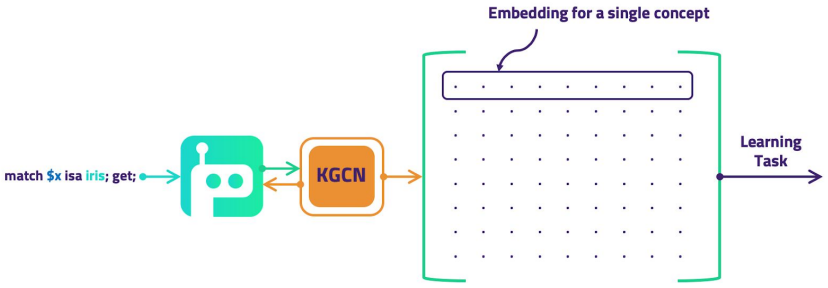


- Supervised learning from a knowledge graph for prediction e.g. multi-class classification (implemented), regression, link prediction
- Unsupervised creation of Knowledge Graph Embeddings, e.g. for clustering and node comparison tasks

Git Repo Link[for Reference]

https://tkipf.github.io/graph-convolutional-networks/ https://github.com/tkipf/gcn
https://github.com/1049451037/GCN-Align
https://github.com/graknlabs/kglib/tree/master/kglib/kgcn

- Using Neural Network models on graphs
- Spectral graph convolutions and Graph Convolutional Networks (GCNs)
  Demo: Graph embeddings with a simple 1st-order GCN model GCNs



Concept [Two.Zero]

Platforms [API Methods]

These Platforms consists of a **set of Databases**, machine learning **Algorithms**, **APIs and tools** we use to build various solutions for specific enterprise needs. At a high level, these platforms consist of:

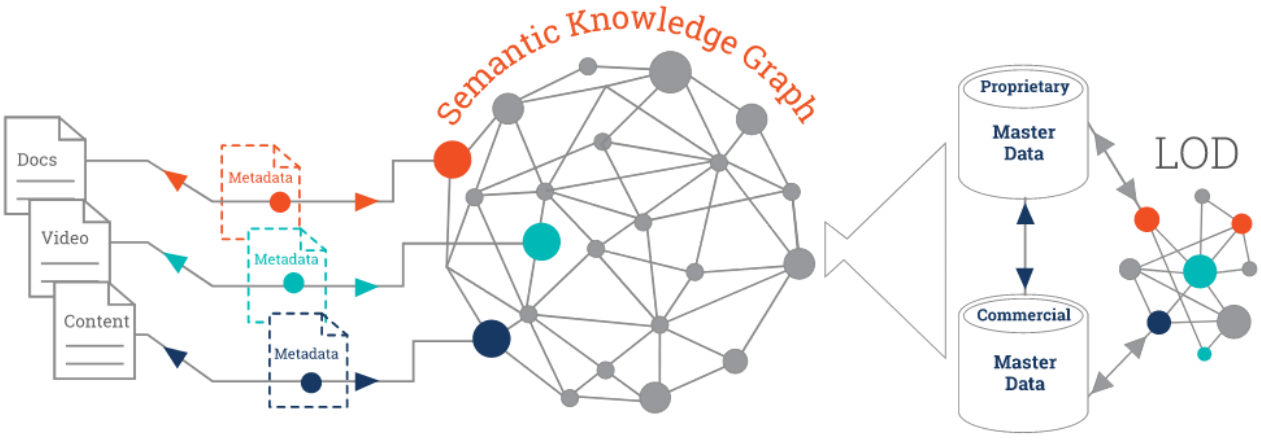
- Graph as a semantic graph database for storing semantic indexes, consolidated entity profiles, linked open data and user behaviour profiles.
- Machine learning models for text analysis, disambiguation of entities, concept extraction and classification.
- APIs for text analysis, model training, search, recommendations, content management and concept profiles.

Protege [Graph based Softwares API by Stanford]

Google API [Google's Knowledge Graph API with Python eg. SEO]

Neo4j [Graph based Software API]

Ontotext Platform



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Git Repo Link

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https://developers.google.com/knowledge-graph/

https://developers.google.com/apis-explorer/?hl=en_US#p/kgsearch/v1/kgsearch.entities.search?limit=10&query=virat+kohli&_h=7&

Protege [Graph based Softwares API by Stanford]

https://protege.stanford.edu/products.php#web-protege

Neo4j [Graph based Softwares]

https://neo4j.com/use-cases/knowledge-graph/ the Neo4j database

Ontotext Platform [Meta Data to Semantic Knowledge Graphs]

https://www.ontotext.com/products/ontotext-platform/

Concept [Three.Zero]

Deep Representation Clustering

Exploring the possibility of employing deep learning in graph clustering.

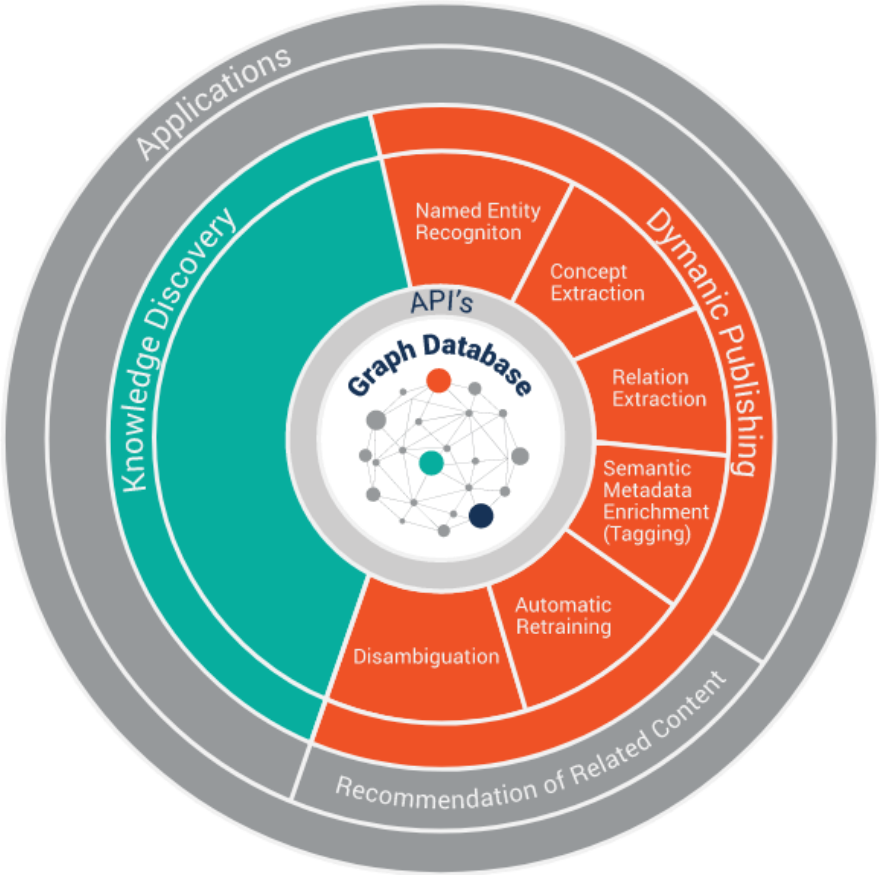
- GraphEncoder (for graph clustering.) O (ncd), d is the maximum dimension of the hidden layer, c is the average dimension of the graph.
- Perform k-means clustering (Sparse-AutoEncoders)
- AutoEncoder stacks 3 layers of input layer, hidden layer and output layer.

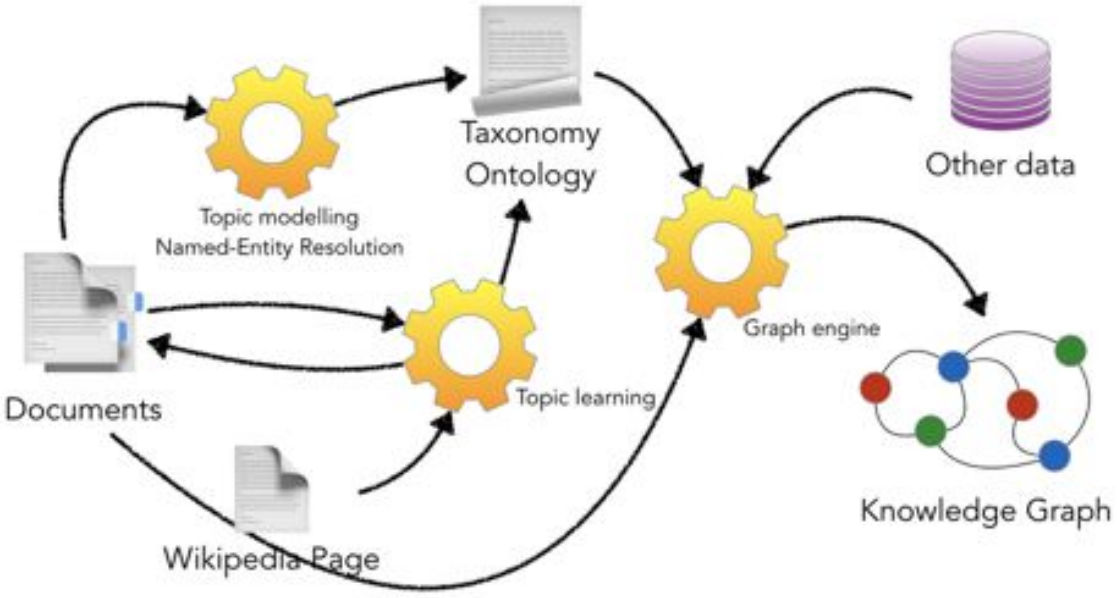
Research Paper

https://www.aaai.org/ocs/index.php/AAAI/AAAI14/paper/view/8527

https://github.com/quinngroup/deep-representations-clustering

User interface layer [End-to-End Prototype]





Prerequisites [for Concept Exploration]

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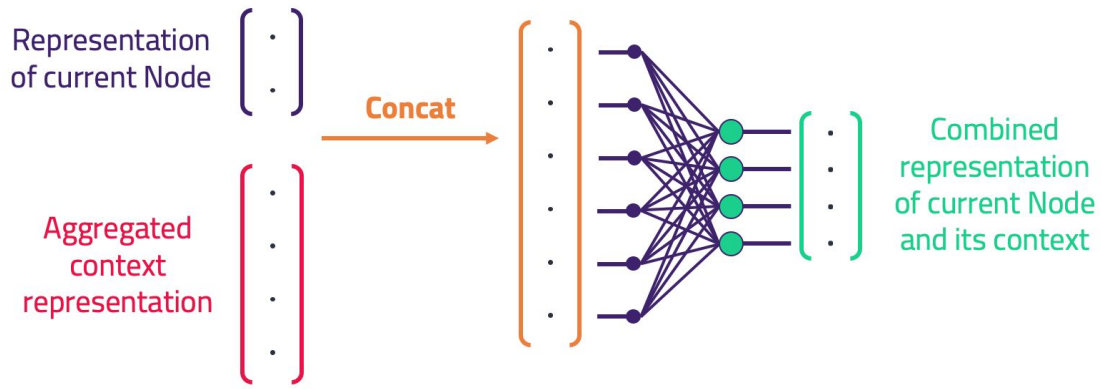
MultiScale GNN and GCN

https://github.com/afansi/multiscalegnn

https://github.com/yangji9181/GRACE



Deep Representation Clustering

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Ontotext Platform [Meta Data to Semantic Knowledge Graphs]

https://www.ontotext.com/products/ontotext-platform/

Relatable Articles*

https://www.ebayinc.com/stories/blogs/tech/explainable-reasoning-over-knowledge-graphs-for-recommendation/
https://searchenterpriseai.techtarget.com/feature/Knowledge-graph-applications-in-the-enterprise-gain-steam
https://dzone.com/articles/knowledge-graphs-ai-and-interoperability-the-year

Relatable Repositories*

https://github.com/SmartDataAnalytics/Knowledge-Graph-Analysis-Programming-Exercises

[RDF Graph Analysis]

https://github.com/IBM/build-knowledge-base-with-domain-specific-documents

[Textual Information Oncology]