# A Semantically Enabled Geographic Information Retrieval Framework by using Representation Learning: A Simple Case Study of DBpedia
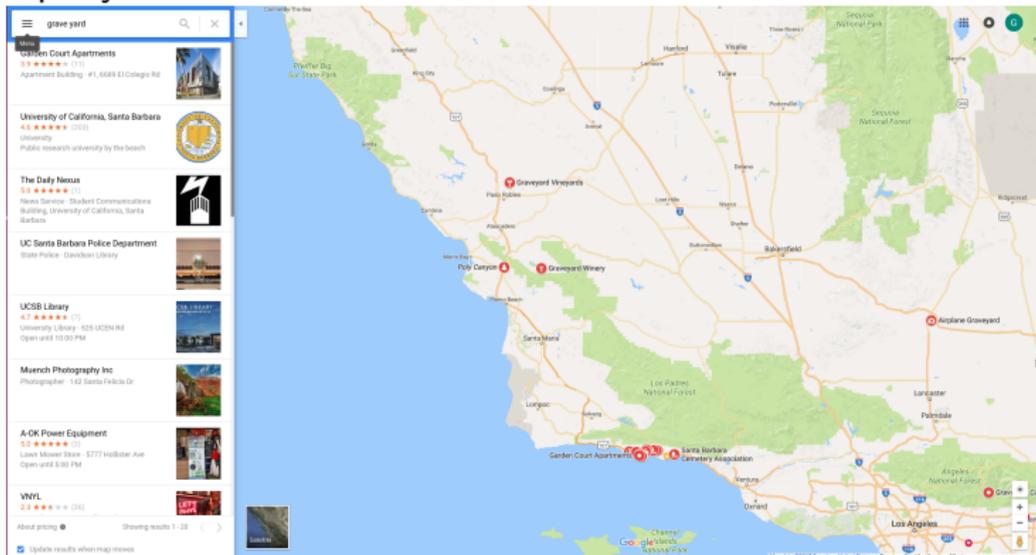
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November, 2017

# Traditional Map Search v.s. Semantically Enabled Search

- Traditional map/placename search fails to understand the query



- How to let our GIR system understand the semantic of geographic information and do a more intelligent search: Semantically Enabled GIR system

## Data Source and Representation Learning Method

- **Data Source:** All entities typed dbo:HistoricalPlace in DBpedia

- **Method:** Doc2Vec Model (PVDM)
  - Treat each place as a document whose content is its description from DBpedia/Wikipedia
  - Use a Representation Learning method (Doc2Vec) to learn a dense embedding for each place and each word token.
  - Cosine similarity between embeddings encodes their semantic similarity.
  - Apply dimension reduction techniques to these embeddings of places into 2D.
  - Cluster these places into different groups/topics
  - Construct concave hulls for each topic to give a semantic view of these places

## Result

**A Semantically Enabled GIR system (Semantic View):**

# Result

## Semantically Enabled Search:

# Result

**Display search result in geographic space:**
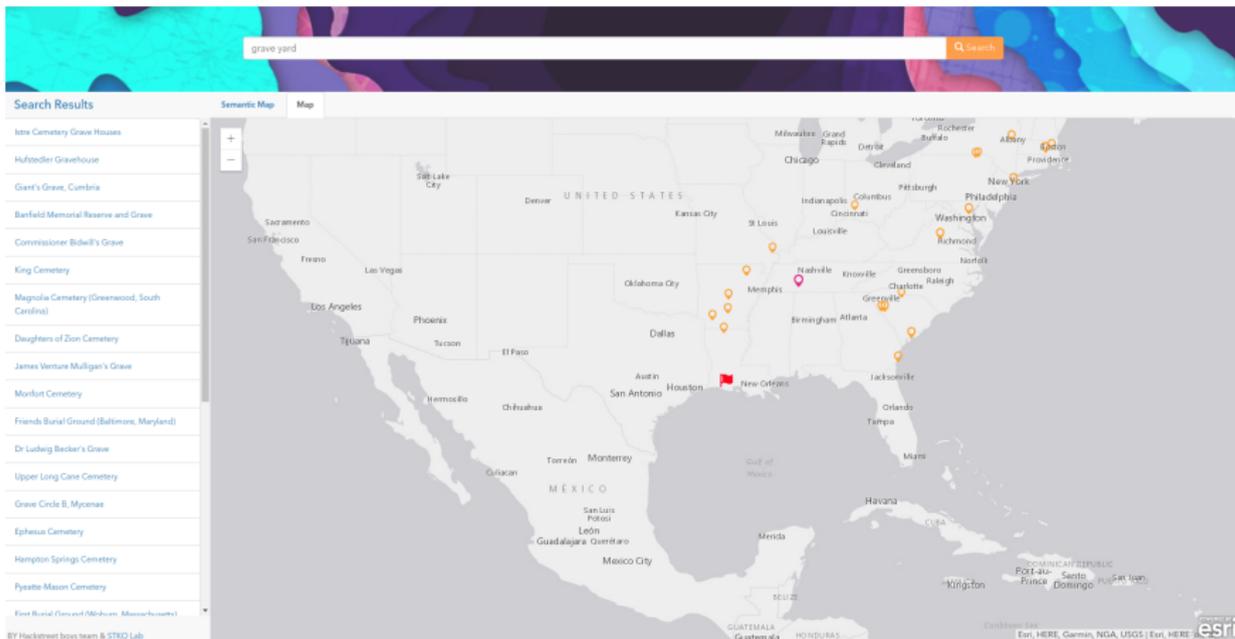
## Conclusion & Future Work

- Representation learning/Deep Learning methods provide us a nice tool to encode the semantic information of geographic features which facilitate semantically enabled geographic knowledge discovery.
- Future work will focus on how to combine this bottom-up method with the top-down methods to better capture the semantics of geographic information.