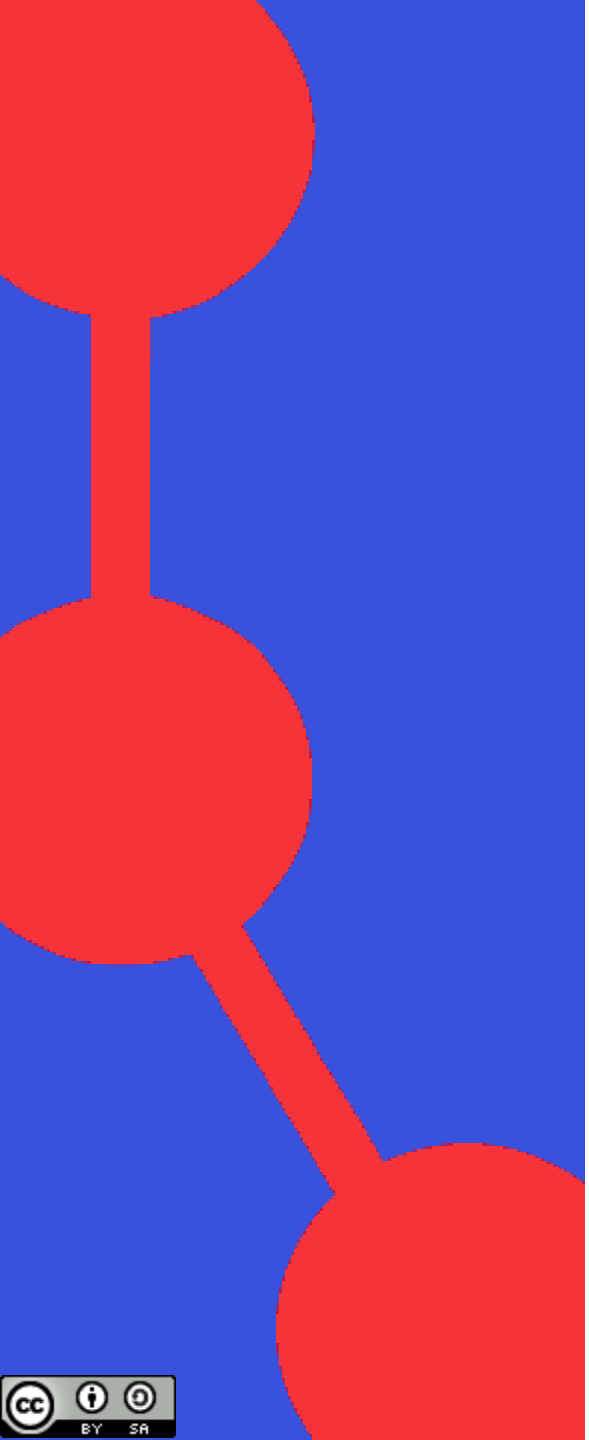

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NLP @ OEG

Summary

- Pablo Calleja
  - “Named Entity Recognition over unstructured documents”
- David Chavez-Fraga
  - “Ontology Learning (Evaluation) From Text”
- Carlos Badenes-Olmedo
  - “Text Mining on Large Datasets with Topic Models”
- Víctor Fernández-Rico
  - “Knowledge Graphs Embeddings”
- Mariano Rico
  - “NL-guided queries”

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Named Entity Recognition over unstructured documents

Pablo Calleja Ibáñez

Unstructured documents → **Structured Information**

Tokenization → Sentence Segmentation → Named Entity Recognition → Co-reference Resolution → Relation Extraction → ...

Named Entity Recognition

Named entities in a natural language document

Named entity: real-world concept denoted with a referent term or proper name. Main classifications:

- Organizations
- Persons
- Places
- Temporal units
- Numerical units

Biomedicine:

- Diseases
- Proteins
- Genes
- Substances

Linguistic models

Rules

"Mr." + { Mayus Noun} ⇨ Person

{Noun _itis} ⇨ Disease

general architecture GATE for text engineering

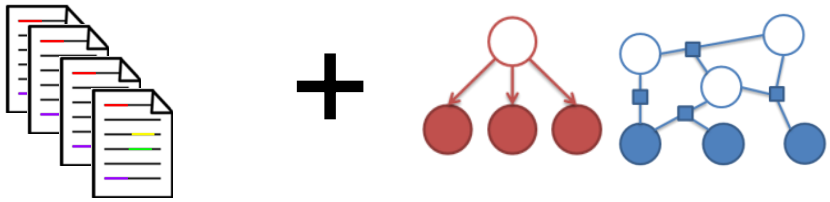
OPEN NLP

Gazetteers

python Natural Language Analyses with NLTK

Stanford University NLP Natural Language Processing

Probabilistic models



Training Corpus

Algorithms:

- **Hidden Markov Models**
- **Conditional random fields**
- **Bi-LSTM**

spaCy

MALLET machine learning for language toolkit

TensorFlow

Summary of Product characteristics

1- Drug Name

Asenapina 300 mg

.....

.....

4.1 Therapeutical information

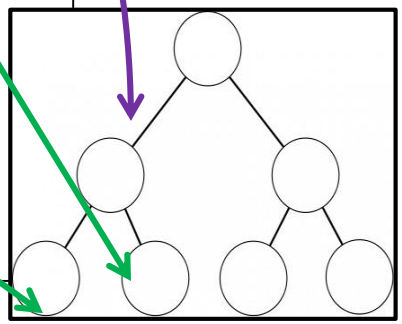
For patients with schizophrenia.

4.7 Adverse reactions

May produce headaches.

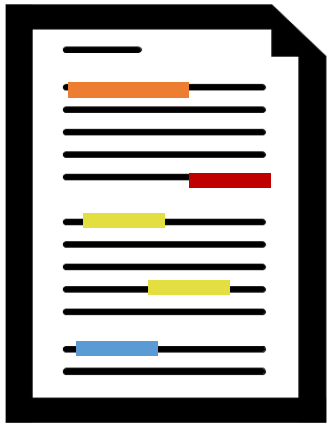
.....

.....



SNOMED-CT

High noisy and unstructured texts:
- Leaks, emails, phone tapping…



- Person
- Company
- Phone Number
- Direction
- …

Calleja, P., García-Castro, R., Aguado-de-Cea, L., Gómez-Pérez, A. (2017). **Expanding SNOMED-CT through Spanish Drug Summaries of Product Characteristics**. In Proceedings of the 9th International Conference on Knowledge Capture (K-CAP).

Calleja, P., García-Castro, R., Aguado-de-Cea, L., Gómez-Pérez, A. (2017). **Role-based model for Named Entity Recognition**. In Proceedings of the 11th International Conference Recent Advances in Natural Language Processing (RANLP)

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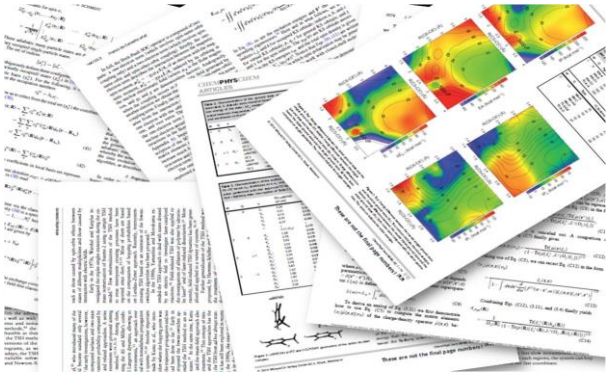
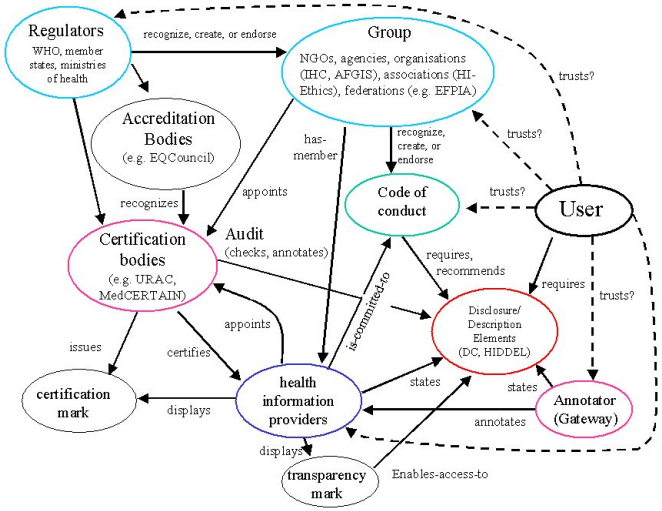
Ontology Learning (Evaluation) From Text

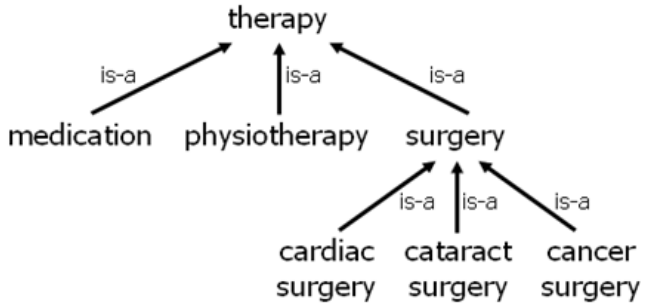
David Chaves-Fraga

Big corpus of scientific papers from a domain



Bag of terms

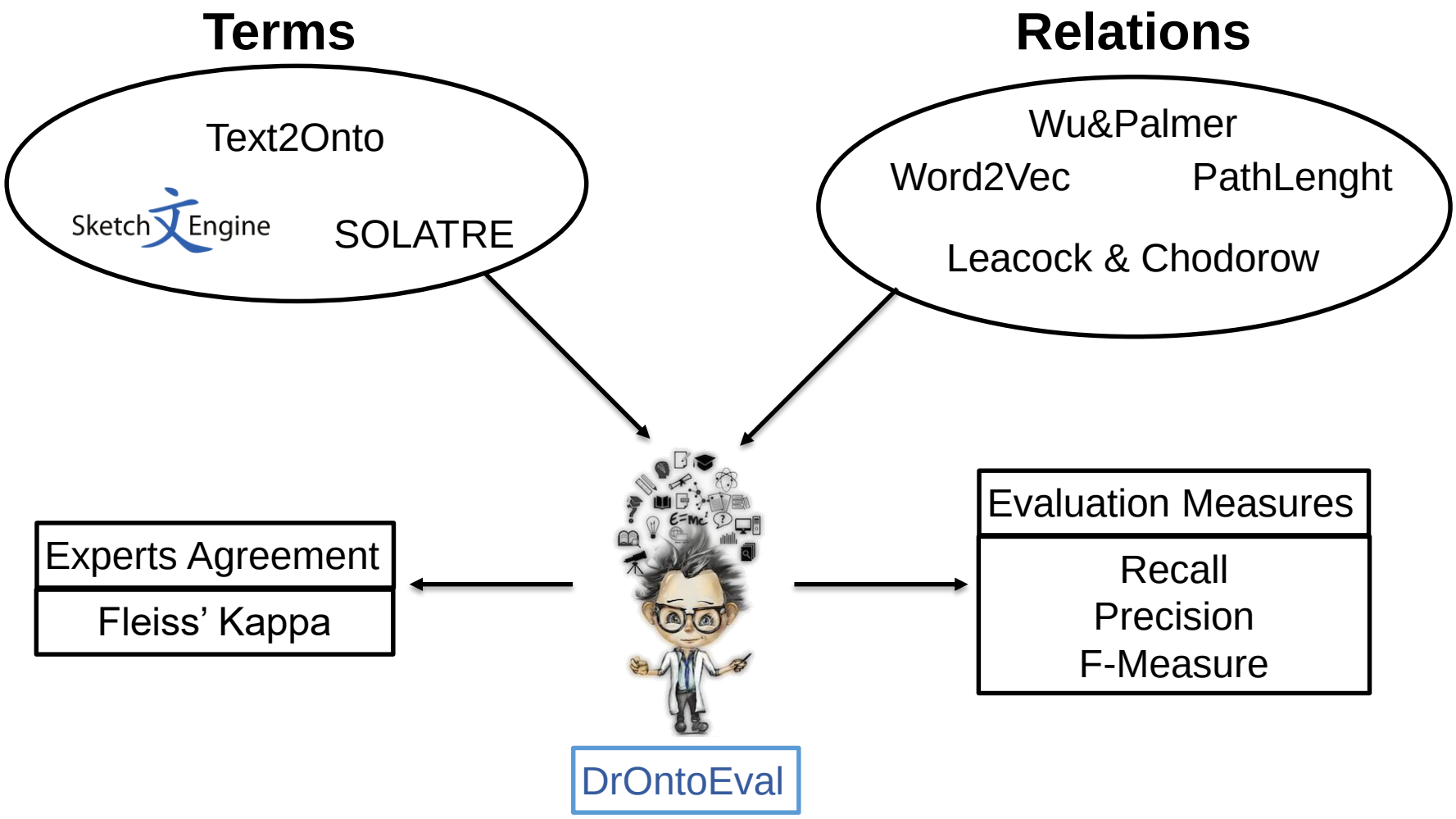




Ontology

Taxonomy

- OEG's ontology learning approach: SOLATRE
  - Only extracts terms (not very well)
  - Using by Zaporozhye National University
- Problems:
  - Developed by an ex-OEG member
  - Performance
  - External Word2Vec approach to identify relations
- Future work:
  - Implementation of new approach (part of Librairy)
  - From taxonomy to terms
  - Analysis of new systems like LexNET



Chaves-Fraga, D., Redondo-Garcia, J. L., & Corcho, O. (XXXX). **Towards an Integrated Approach for Ontology Learning Evaluation**. XXXXXXXXXX.

Text Mining on Large Datasets with Topic Models

Carlos Badenes-Olmedo

Probabilistic Topic Models

Topics

gene	0.04
dna	0.02
genetic	0.01
. . .	

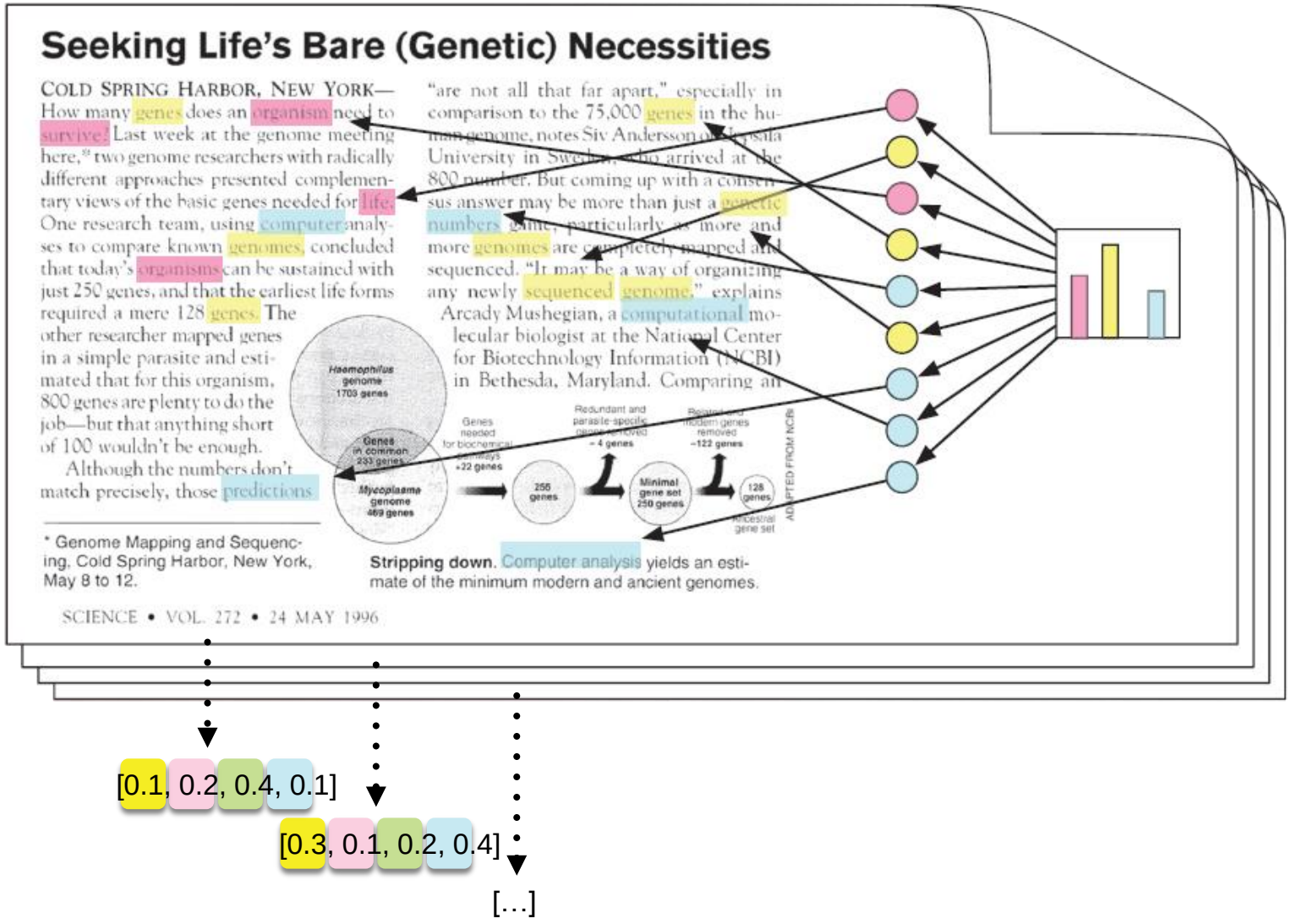
life	0.02
evolve	0.01
organism	0.01
. . .	

brain	0.04
neuron	0.02
nerve	0.01
. . .	

data	0.02
number	0.02
computer	0.01
. . .	

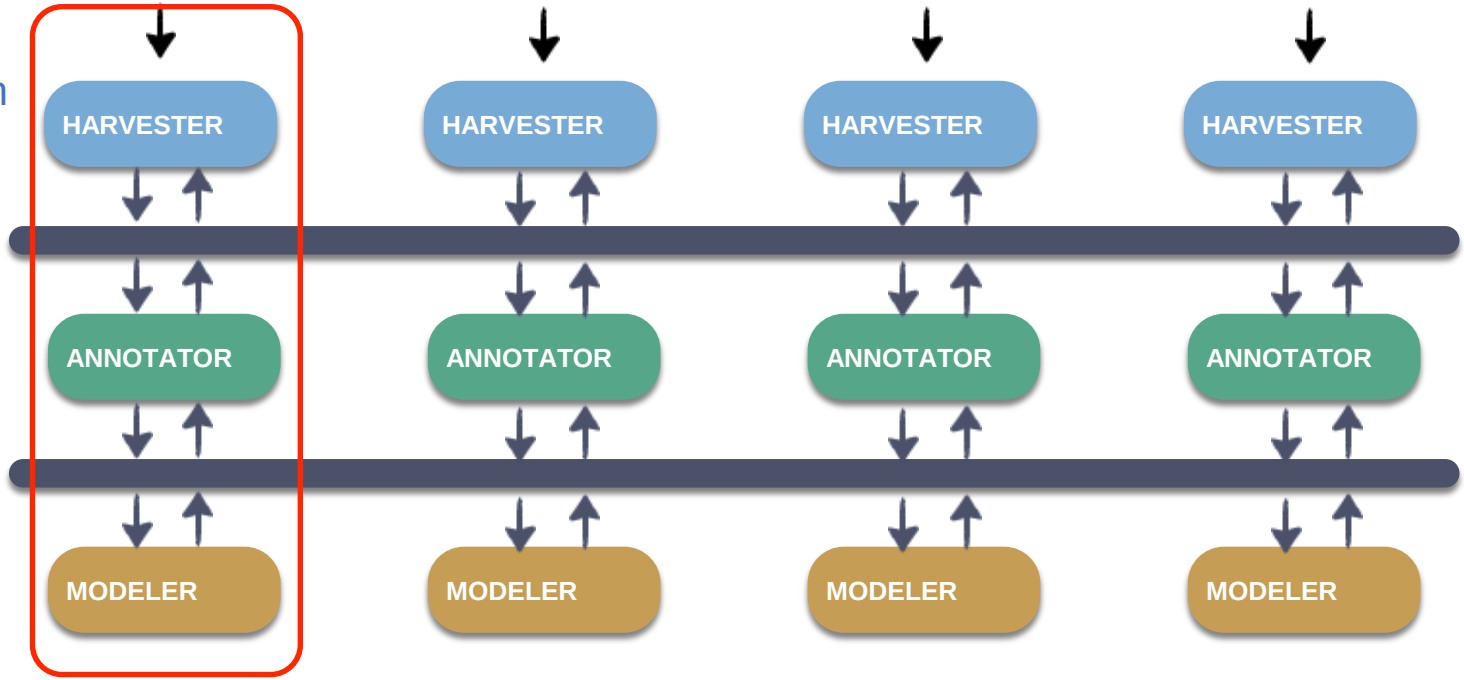
Documents

Topic proportions and assignments



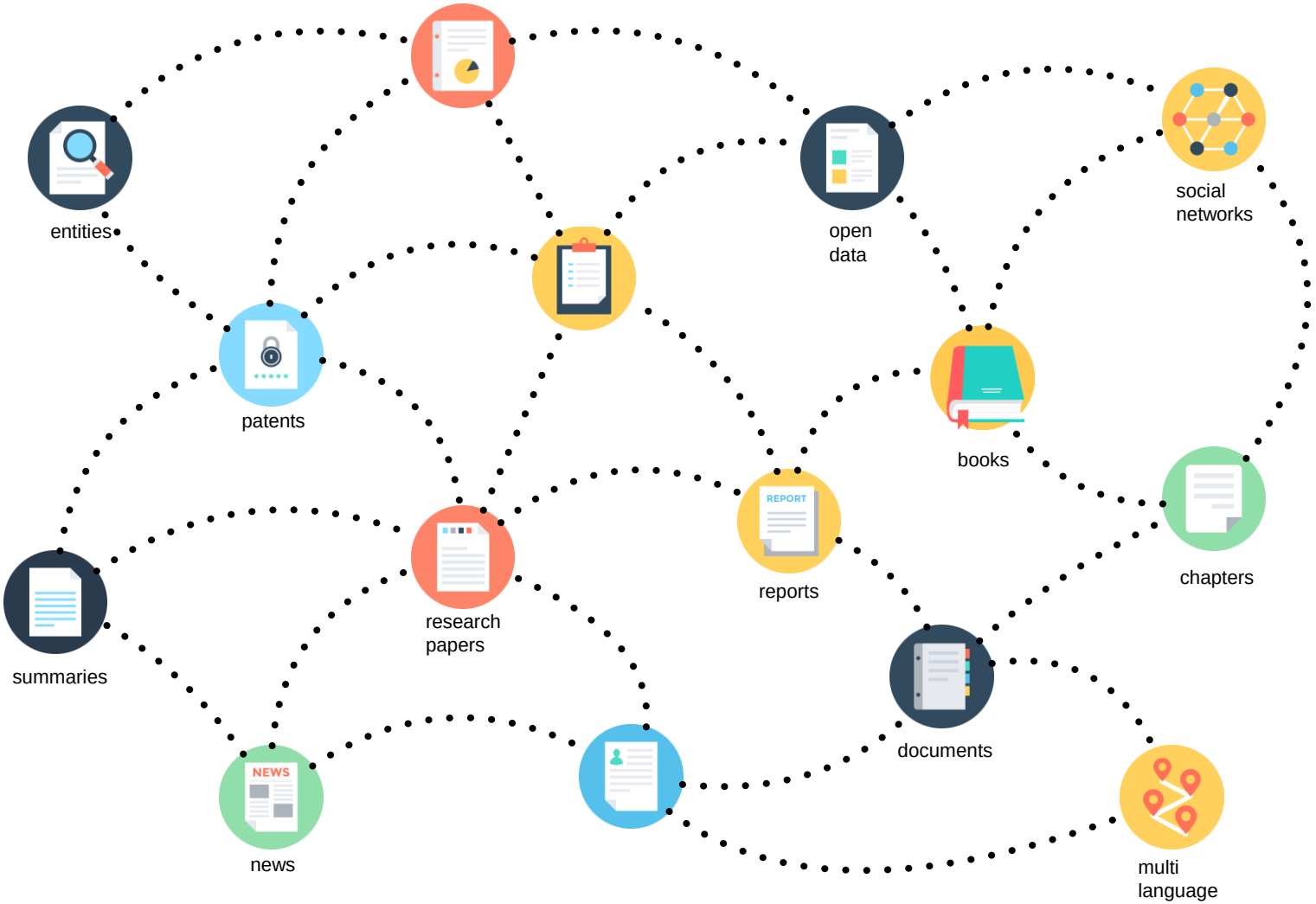
Large Datasets

classical approach



Badenes-Olmedo, C., Redondo-Garcia, J. L., & Corcho, O. (2017). **Distributing Text Mining tasks with librAIry**. In Proceedings of the 17th ACM Symposium on Document Engineering (DocEng). http://doi.org/https://doi.org/10.1145/3103010.3121040

Research



Badenes-Olmedo, C., Redondo-Garcia, J. L., & Corcho, O. (2017). **Efficient Clustering from Distributions over Topics**. In Proceedings of the 9th International Conference on Knowledge Capture (K-CAP).

Badenes-Olmedo, C., Redondo-Garcia, J. L., & Corcho, O. (2017). **An Initial Analysis of Topic-based Similarity among Scientific Documents based on their rhetorical discourse parts**. In Proceedings of the 1st SEMSCI workshop co-located with ISWC.

Knowledge Graphs Embeddings

Víctor Fernández-Rico

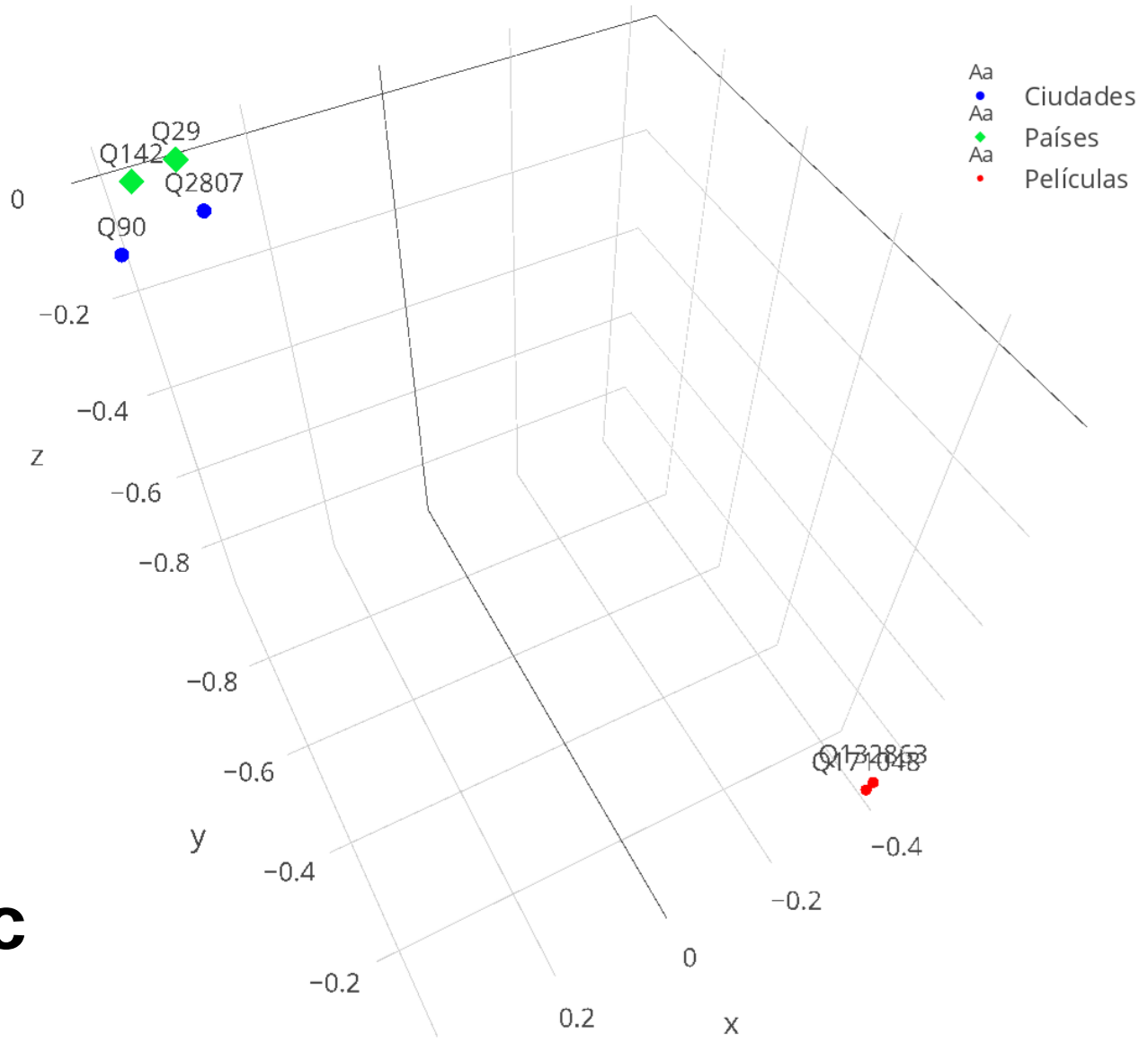
What an *Embedding* is?

Madrid

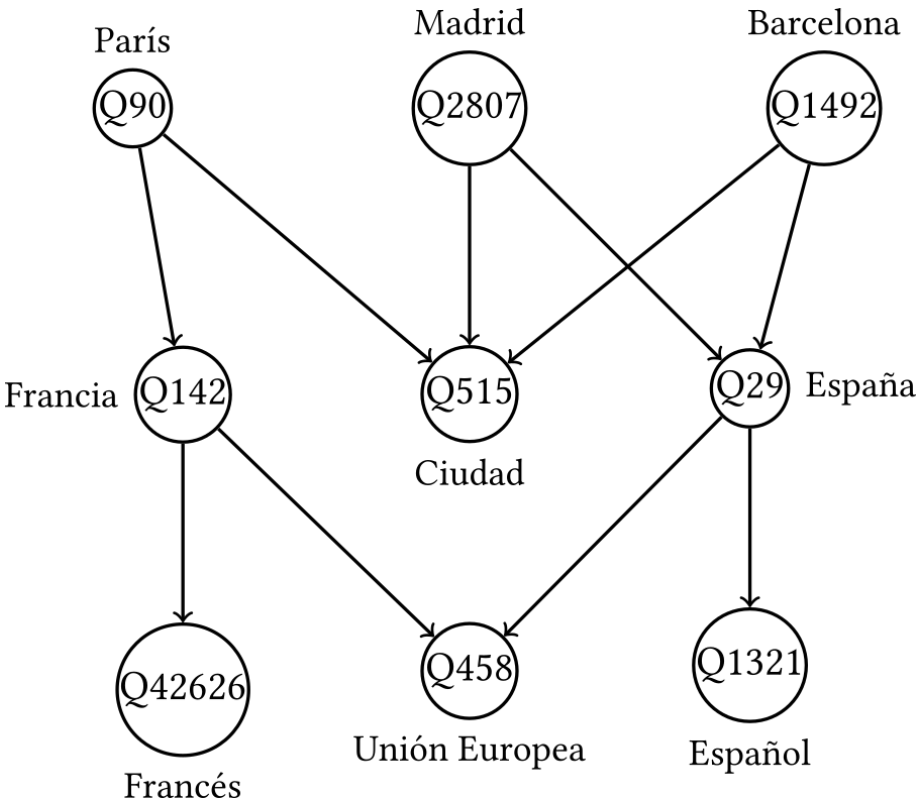
M = [0.73 … 0.28]

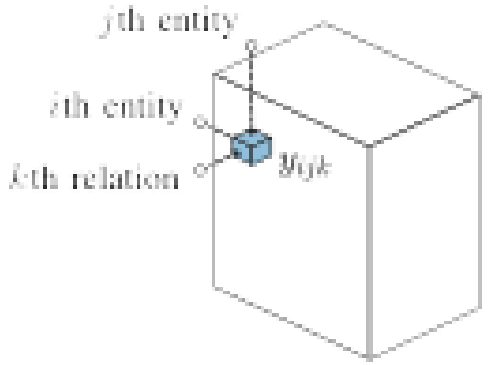
$M \subset \mathbb{R}^n$

Word2vec



Embeddings in Knowledge Graphs



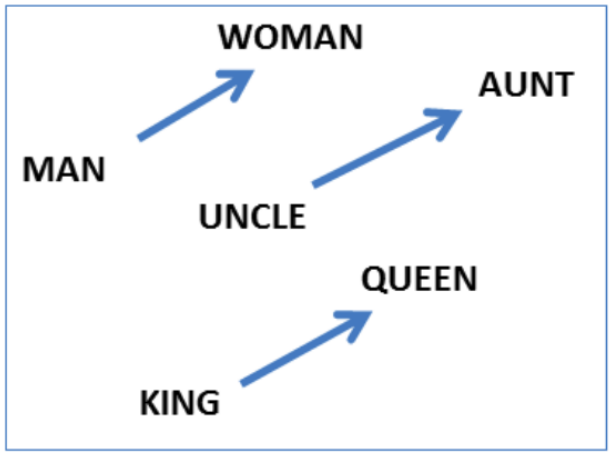


TransE [1]

[0.73 … 0.28 … 0.65 ;
0.48 … 0.92 … 0.42 ;
…]

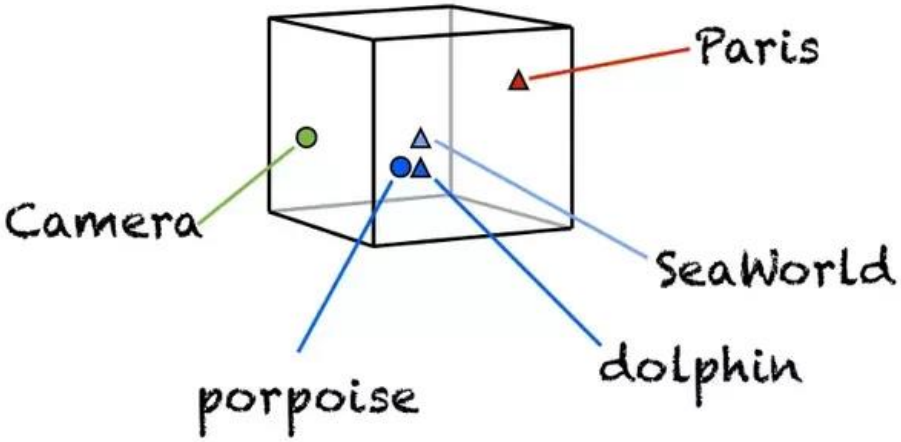
[1] A. Bordes, N. Usunier, A. Garcia-Duran, J. Weston y O. Yakhnenko, «Translating embeddings for modeling multi-relational data», en Advances in Neural Information Processing Systems 26.

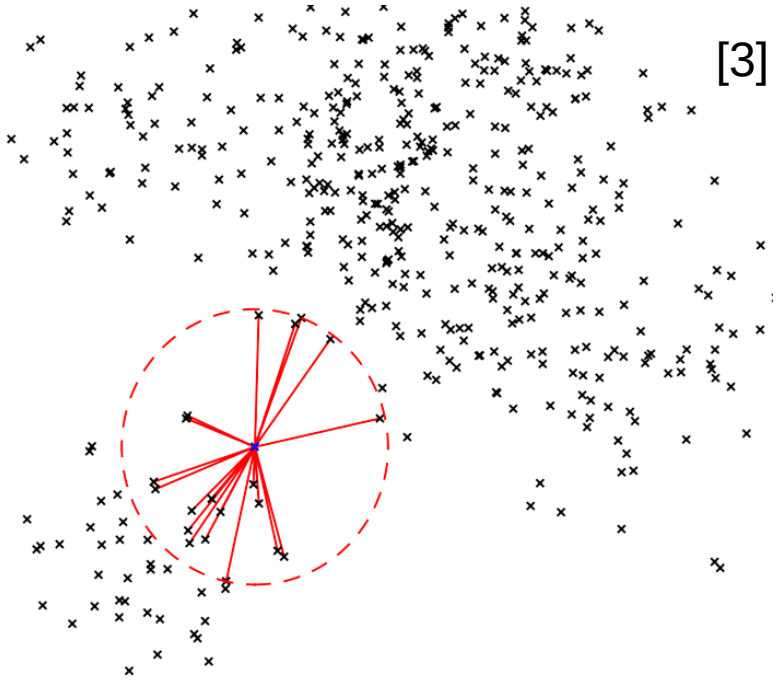
Properties and applications of E*mbeddings*



[2]

$$Madrid \approx E_{Paris} - E_{France} + E_{Spain}$$





[3]

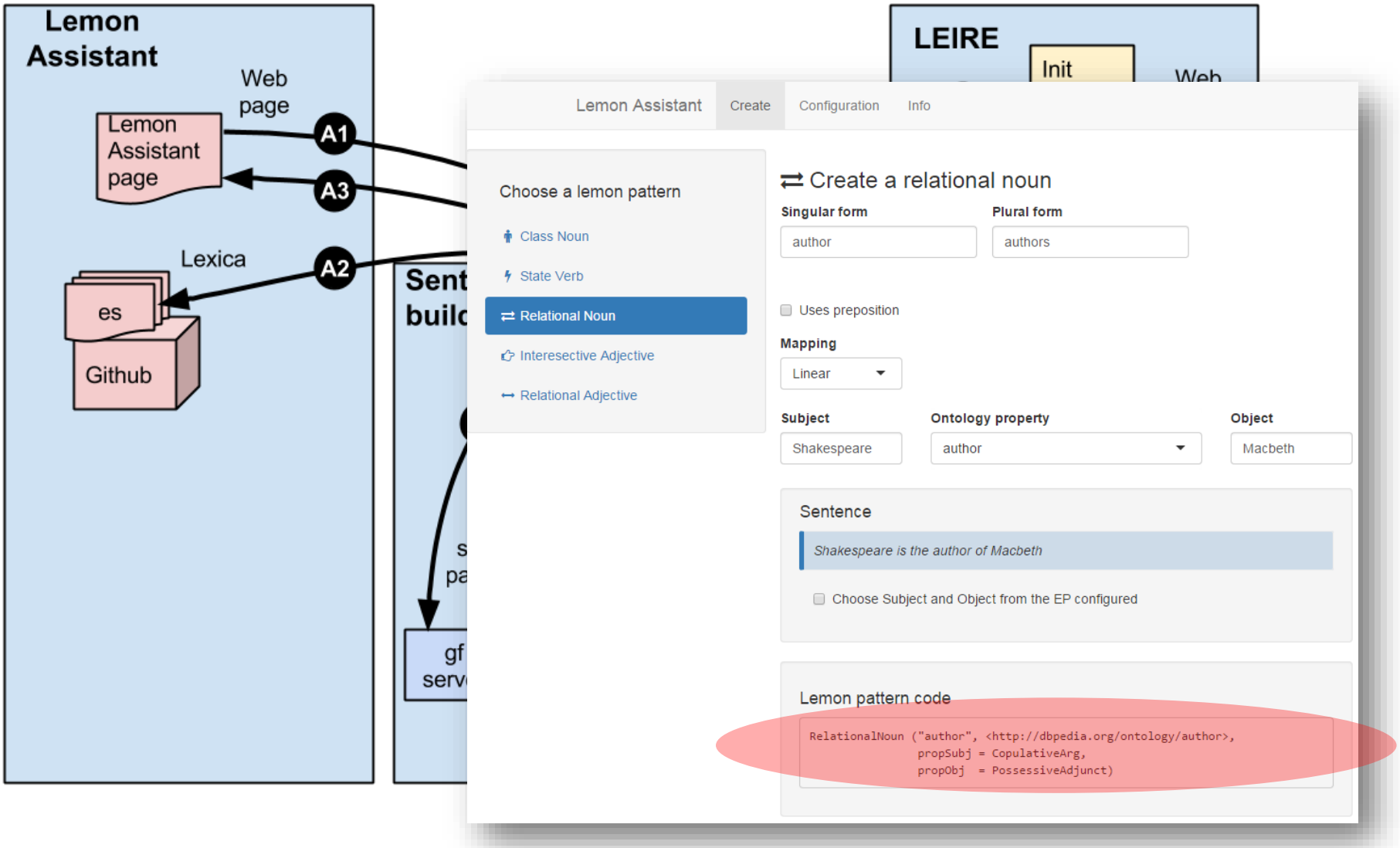
[2] Linguistic Regularities in Continuous Space Word Representations – Mikolov et al. 2013
[3] Nearest neighbor methods and vector models - Erik Bernhardsson – Annoy (Spotify)

NL-guided queries

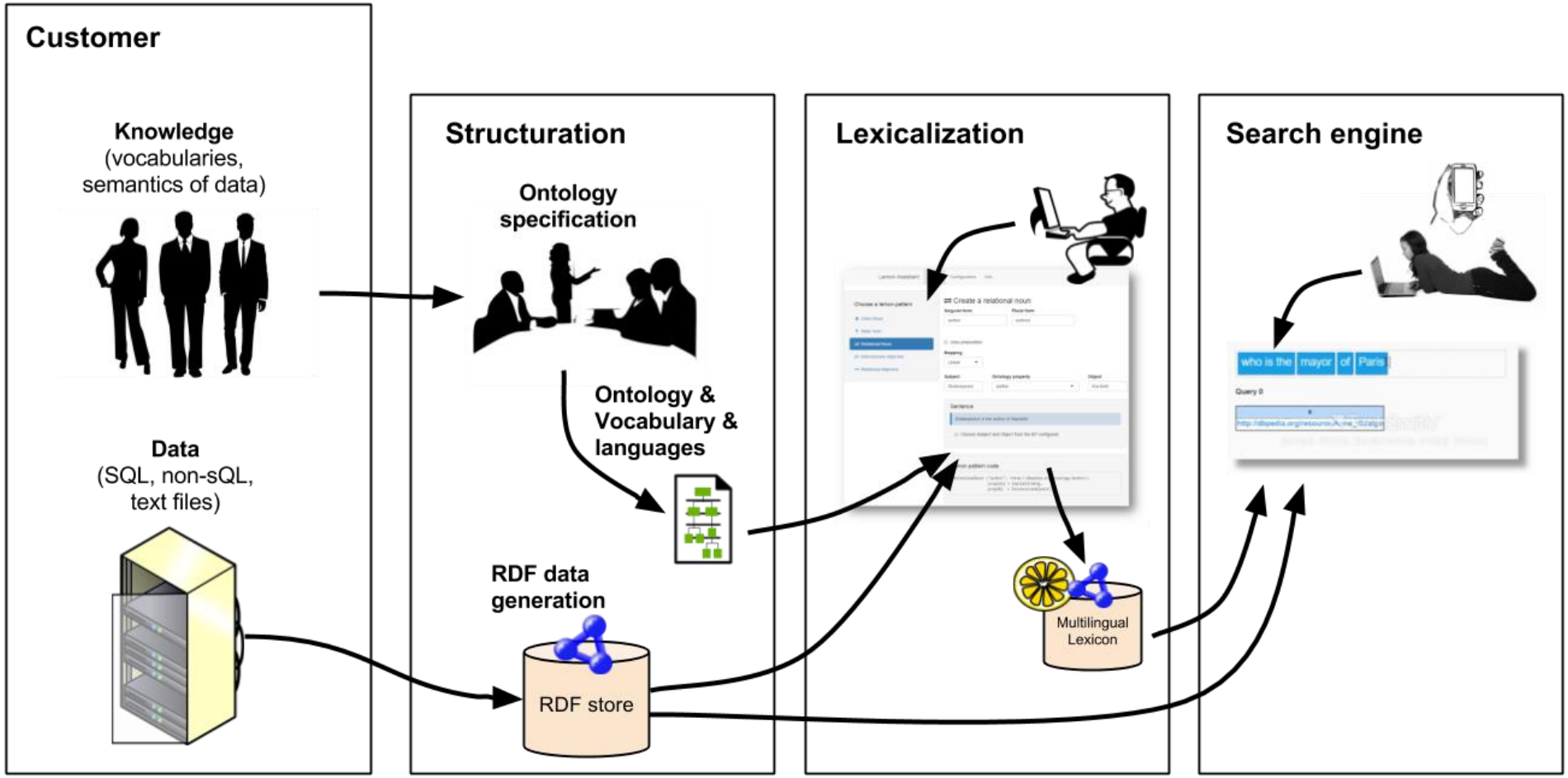
Mariano Rico

- An animation is worth 1K words

- Lemonade: Lexicalizing ontologies



- Pipeline


Customer
Knowledge
(vocabularies,
semantics of data)
Data
(SQL, non-sQL,
text files)
Structuration
Ontology
specification
Ontology &
Vocabulary &
languages
RDF data
generation
RDF store
Lexicalization
Multilingual
Lexicon
Search engine
who is the
mayor
of
Paris