Linking Geoscience Entity Mentions to the Web of Data

2014 Testbed Project

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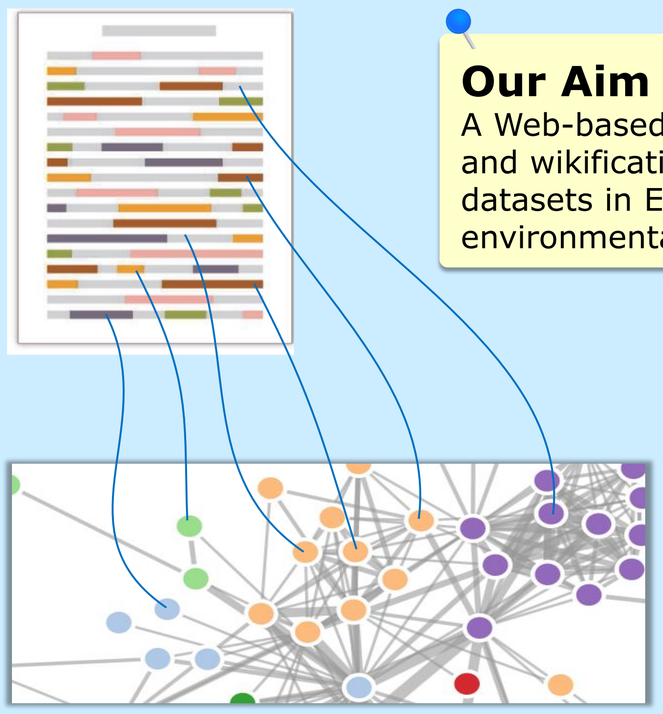
Background

- Entity recognition and linking among heterogeneous datasets are of great value in data integration and reuse
- Detecting and linking entity mentions in datasets can be facilitated by using knowledge bases on the Web, such as ontologies and vocabularies
- The number of ontologies and vocabularies, including those in the field of geosciences, has been continually increasing. Those are valuable contributions to the Web of Data

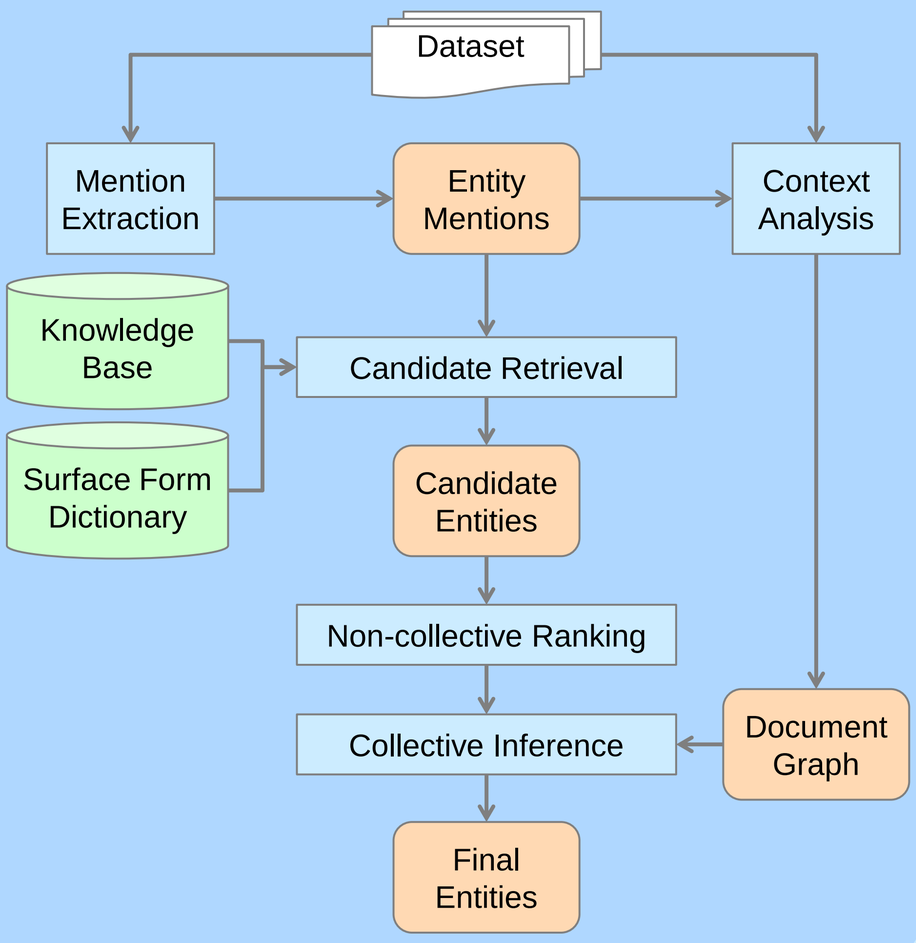


Our Aim
A Web-based entity linking and wikification service for datasets in Earth and environmental sciences

Image credit: sciencemag.org and gravity.com

Nature of Efforts

- *Challenge*: Existing supervised approaches require a large amount of manually-labeled training data. Such training data are limited in Earth and environmental sciences.
- *Approach*: An un-supervised collective inference approach for entity linking.



Technical Details

Mention Extraction:
- Uses publicly available name tagger and regular expressions to extract entity mentions

Context Analysis:
- Sentence level: If terms appear in same sentence, then we consider they are related to each other
- Paragraph level: If terms appear in same paragraph, then we

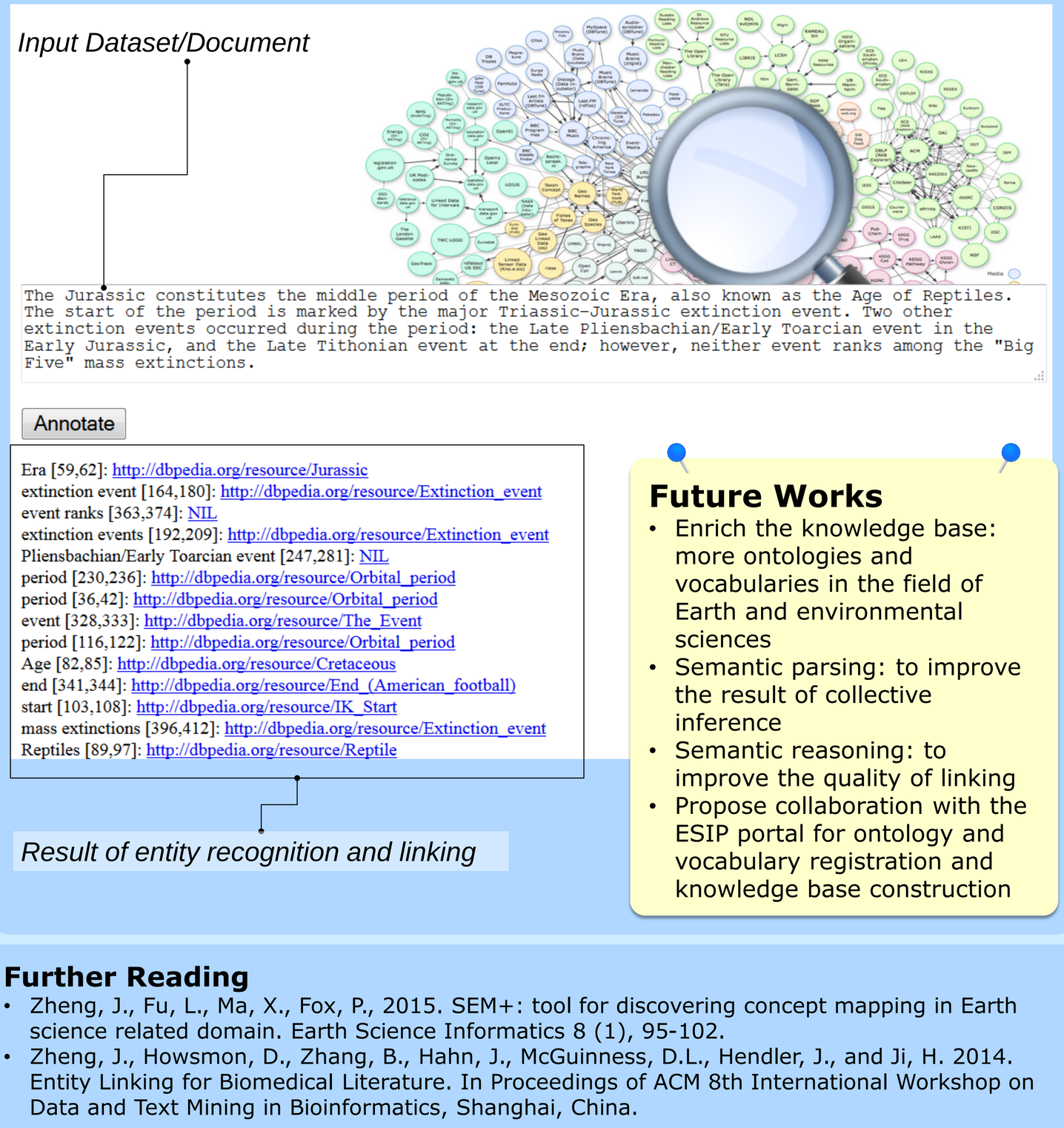
Candidate Retrieval:
- Given a surface form of entity mentions, retrieve all entities with surface form that are similar to the mentions' surface form
- Surface form is the textual appearance of entities/mentions. The Surface form dictionary is constructed based on the knowledge base

Non-collective Ranking:
- Apply to the candidate entities
- Assign entities with higher popularity a higher score, similar to PageRank

Collective Inference:
- Analyze the mentions in a context simultaneously to determine the best reference entities
- Both document graph and graph of candidate entities contain important contextual information about mentions and entities

Initial Results

Our current demo system uses DBPedia as the knowledge base.



Future Works

- Enrich the knowledge base: more ontologies and vocabularies in the field of Earth and environmental sciences
- Semantic parsing: to improve the result of collective inference
- Semantic reasoning: to improve the quality of linking
- Propose collaboration with the ESIP portal for ontology and vocabulary registration and knowledge base construction

Further Reading

- Zheng, J., Fu, L., Ma, X., Fox, P., 2015. SEM+: tool for discovering concept mapping in Earth science related domain. Earth Science Informatics 8 (1), 95-102.
- Zheng, J., Howsmon, D., Zhang, B., Hahn, J., McGuinness, D.L., Hendler, J., and Ji, H. 2014. Entity Linking for Biomedical Literature. In Proceedings of ACM 8th International Workshop on Data and Text Mining in Bioinformatics, Shanghai, China.

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