Motivation	DEKDIV	Methods	Architecture	Demo

DEKDIV: A Linked-Data-Driven Web Portal for Learning Analytics Data Enrichment, Interactive Visualization, and Knowledge Discovery

Yingjie Hu, Grant McKenzie, Jiue-An Yang, Song Gao, Amin Abdalla, and Krzysztof Janowicz

The STKO Lab Department of Geography University of California Santa Barbara

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- 2 DEKDIV: A Quick Flyby
- 3 Concepts and Methods behind the Scene
- 4 Architecture and Design Principles





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Motivation				

- The LAK dataset provides a rich amount of information about researchers, papers, and conferences in the field of learning analytics.
- This dataset has already been structured in a machine readable format (RDF).

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Motivation				

Question: How can we design effective tools to gain more insights from the LAK dataset?



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• DEKDIV is a unified Web portal consists of a number of functional modules for interactive visualization and knowledge discovery.





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DEKDIV:	A Quick Flyby			

Dataset:

- LAK dataset in RDF
- Concepts and topics extracted from papers' full text
- Geospatial locations for research institutes and conferences
- External citation data from Microsoft Academic Search as well as expertise information from ArnetMiner





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Interactive Visualization:

- Where do the conference participants come from?
- What are the major concepts in a paper?
- Who are the collaborators of a researcher?
- Which researchers and institutes are citing your papers?





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DEKDIV:	A Quick Flyby			

Knowledge Discovery:

- Who are the most active scholars in a conference?
- How similar are two scholars in their research topic space?
- Who can be suitable reviewers for a newly submitted paper?
- Who can be your potential collaborators?







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- Scientometrics refers to the science of analyzing and measuring a discipline's research topics, authors, publications and so forth.
- In previous works, we have proposed a framework for spatiotemporal scientometrics which focuses on discovering the spatiotemporal patterns of a research discipline (Hu etc., ISWC 2013; Gao etc., ACMGIS 2013).
- **DEKDIV** is an **Online scientometrics workbench** for the LAK community.



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- LDA is an unsupervised, generative probabilistic model used to infer topics from a textual corpus.
- LDA represents each topic using a mixture of keywords. Each paper is described as a number of topics with associated probability values.
- LDA has also been applied to describe the interested topics for each researcher.



Motivation DEKDIV Methods Oco-O Demo

- **MDS** is a method to visualize the similarity among individual cases in a dataset.
- MDS can take multiple attributes of individual cases, and put these cases into N-dimensional space so that the between-object distances can represent the corresponding similarity.
- In this work, **MDS** has been used to represent the similarity between researchers based on their research topics extracted using **LDA**.







- An **academic graph** can be constructed by considering researchers as **nodes** and co-authorships as **edges**.
- From each node in the graph, we calculate its **shortest path distance** to other nodes (researchers) using Dijkstra's Algorithm.
- The shortest path distance has been used to represent how far (or how close) that two researchers are connected.
- Application: finding potential collaborators for researchers.

 $potential = sim(a_1, a_2) \times (1 - 1/d)$



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• The Web portal is designed as a general framework, and each function is implemented as a self-contained module.





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Functional S	calability			

• Users can "plug" or "unplug" functional modules by adding or removing the import statement of the corresponding JavaScript files.

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Data Scalabil	ity			

- A customized script can be designed to synchronize data and ensure the data in the triple store is up to date.
- This strategy has already been used in the Linked Data portal of the Semantic Web Journal (http://semantic-web-journal.com/SWJPortal/).



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Usability Des	ign			

- Simple and intuitive user interface: Four access points (conferences, researchers, papers, and analytics); "follow your nose" data exploration.
- **Configurable layout of modules**: Each module is displayed in a separate window whose position can be configured based on users' preference.
- **Rich help document**: Each module is accompanied with a help description, and a Youtube tutorial video has also been provided to facilitate the understanding of the system.





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Technology	Stack			

- Client side: JQuery, ExtJS, HTML5, CSS, D3, Leaflet, ...
- Server side: Java Servlet, Jena API, SPARQL queries, Jena Fuseki, ...
- Client-server interaction: AJAX requests and responses
- Data models/formats: RDF, GeoJSON/TopoJSON, ...
- **Performance strategies**: dynamic information caching for frequently requested authors and papers, ...



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