

Lu Zhou

Ph.D. in Computer Science

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[Google Scholar](#) • [LinkedIn](#)

Education

- 2016 - 2020 **Ph.D. Computer Science**, Data Semantics Lab, Kansas State University, Manhattan, KS, US (GPA: 4.00)
Dissertation: Towards Automated Complex Ontology Alignment Using Rule-based Machine Learning
- 2012 - 2014 **M.S. Computer Engineering**, Kno.e.sis Center, Wright State University, Dayton, OH US (GPA 3.65)
Thesis: Mining and Understanding Regret Tweets
- 2007 - 2011 **B.S. Computer Science**, Dalian Jiaotong University, Dalian, Liaoning, China

Work Experience

- 2022 - present **Research Engineer**, Tigergraph, Inc., San Diego, CA, US
- Research, design and prototype innovative approaches to implement large-scale Knowledge Graphs
 - Bridge the gaps between large scale RDF Knowledge Graph and TigerGraph Property Graph
 - Design and prototype automated transpiler to translate SPARQL to GSQL query language
 - Author, publish and present innovative ideas in internal and external conferences and online media.
- 2021 - 2022 **Postdoc Fellow**, Data Semantics Lab, Kansas State University, Manhattan, KS, US
- Develop systems for leveraging knowledge graph information within machine learning problems, such as coreference resolution and ranking systems to detect similarities and deduplicate the entities refer to the same concept for Knowledge Graph Enrichment and better inference
 - Lead research projects and guide Ph.D. students on various topics about Knowledge Graphs, Machine Learning, and Natural Language Processing
 - Work in an interdisciplinary team on Knowledge Graph Schema Modeling and Construction by applying Ontology Design Patterns. The Knowledge Graph focuses on spatiotemporal events, e.g., disasters
 - Generate end-to-end pipeline to collect and convert natural disaster datasets in different data formats for Knowledge Graphs Enrichment (over 10 billion triples currently)
- 2016 - 2020 **Research Assistant**, Data Semantics Lab, Kansas State University, Manhattan, KS, US (2019 - 2020)
Research Assistant, Data Semantics Lab, Wright State University, Dayton, OH, US (2016 - 2019)
- Generate rule-based machine learning systems to detect similar graph patterns or complex mapping rules between heterogeneous Knowledge Graphs. By creating this novel complex alignment algorithm based on Association Rules Generation through Frequent Pattern Mining, it is beneficial to solve more complex question answering problems
 - Research on Semantic Web technologies, e.g., Knowledge Representation and Reasoning and Semantic Data Integration for advanced AI systems such as Semantic Search, Question Answering, and Recommender Systems
- 2012 - 2014 **Research Assistant**, Kno.e.sis Center, Wright State University, Dayton, OH, US
- Research on text and sentiment analysis of Twitter users in terms of publishing and deleting tweets (Sample data size contains about 280K users, over 1.25M published tweets, and 440K deleted tweets)
 - Identify and categorize Twitter users into three groups using hierarchical clustering on user's historical statistics; apply SOM to map user vectors to a two-dimensional grid while preserving the cluster structure because the k-means algorithm cannot handle such heavily skewed cluster distributions.
 - Collect and analyze deleted tweets from users to find 10 regrettable reasons. (30K users, over 17M published tweets, over 3M deleted tweets) and create four classifiers (Naïve Bayes, Decision Tree, AdaBoost, SVM) based on the ten content-based features and user-historical statistics-based features and evaluate the performance, which is about 20% better than generic language features such as Unigram, Bigram, and Part-Of-Speech in terms of F-measure.

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2019 May - Aug **Research Scientist Intern**, Bosch, Sunnyvale, CA, US

- Research on understanding and analysis of user behaviors in multiple domains, such as music listening, GPS navigating, daily commute trajectory, etc.; generate a pipeline to create synthetic user profiles in using in-car infotainment systems based on the previous statistical analysis to mimic the real-world data
- Research on performance improvement of recommender systems with implicit feedbacks with A/B testing and cold start issue and carry out two patents

2015 Feb - Aug **Software Engineer Intern**, The University of Texas at Austin, Austin, TX, US

- Conduct Requirement Analysis with bioinformatical experts to understand the goal of the software
- Lead the design and implementation of immune repertoire pipeline software for analyzing DNA sequences' VDJ combination and lineage to find structure and mutation for bioinformatics research

2012 - 2014 **Research Assistant**, Kno.e.sis Center, Wright State University, Dayton, OH, US

- Research on text and sentiment analysis of Twitter users in terms of publishing and deleting tweets (Sample data size contains about 280K users, over 1.25M published tweets, and 440K deleted tweets)
- Identify and categorize Twitter users into three groups using hierarchical clustering on user's historical statistics; apply SOM to map user vectors to a two-dimensional grid while preserving the cluster structure because the k-means algorithm cannot handle such heavily skewed cluster distributions.
- Collect and analyze deleted tweets from users to find 10 regrettable reasons. (30K users, over 17M published tweets, over 3M deleted tweets) and create four classifiers (Naive Bayes, Decision Tree, AdaBoost, SVM) based on the ten content-based features and user-historical statistics-based features and evaluate the performance, which is about 20% better than generic language features such as Unigram, Bigram, and Part-Of-Speech in terms of F-measure.

Research Projects

- [Enslaved: Peoples of the Historical Slave Trade \(phase 3\)](#) (The Andrew W. Mellon Foundation, Mar 2021 - Feb 2023)
- [EAGER: Open Science Data in Semantic Web Research](#) (National Science Foundation, Aug 2020 - July 2022)
- [Convergence Accelerator Phase II: A1: KnowWhereGraph: Enriching and Linking Cross-Domain Knowledge Graphs using Spatially Explicit AI Technologies](#) (National Science Foundation, Aug 2020 - July 2022)
- [Convergence Accelerator Phase I \(RAISE\): Spatially explicit models, methods, and services for Open Knowledge Networks \(OKN\)](#) (National Science Foundation, Aug 2019 - Apr 2020)
- [Ontology Modeling for the Historic Slave Trade](#). (The Andrew W. Mellon Foundation, Apr 2018 - Sep 2020)
- [EarthCube Building Blocks: GeoLink - Leveraging Semantics and Linked Data for Data Sharing and Discovery in the Geosciences](#) (National Science Foundation, Sep 2014 - Aug 2017)

Publications

Edited Book

Advances in Pattern-Based Ontology Engineering

Editors: Eva Blomqvist, Torsten Hahmann, Karl Hammar, Pascal Hitzler, Rinke Hoekstra, Raghava Mutharaju, María Poveda-Villalón, Cogan Shimizu, Martin G. Skjæveland, Monika Solanki, Vojtěch Svátek, **Lu Zhou**

In: ISO Press, 2021

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Journal

Know, Know Where, KnowWhereGraph: A densely connected, cross-domain knowledge graph and geo-enrichment service stack for applications in environmental intelligence

Krzysztof Janowicz, Pascal Hitzler, Wenwen Li, Dean Rehberger, Mark Schildhauer, Rui Zhu, Cogan Shimizu, Colby K Fisher, Ling Cai, Gengchen Mai, Joseph Zalewski, **Lu Zhou**, Shirly Stephen, Seila Gonzalez, Bryce Mecum, Anna Lopez-Carr, Andrew Schroeder, David Smith, Dawn Wright, Sizhe Wang, Yuanyuan Tian, Zilong Liu, Meilin Shi, Anthony D'Onofrio, Zhining Gu, Kitty Currier
In: AI Magazine, vol 43. issue 1, pages 30-39, 2022

Neuro-Symbolic Approaches in Artificial Intelligence

Pascal Hitzler, Aaron Eberhart, Monireh Ebrahimi, Md Kamruzzaman Sarker, **Lu Zhou**
In: National Science Review, 2022

Diverse data! Diverse schemata?

Krzysztof Janowicz, Cogan Shimizu, Pascal Hitzler, Gengchen Mai, Shirly Stephen, Rui Zhu, Ling Cai, **Lu Zhou**, Mark Schildhauer, Zilong Liu, Zhangyu Wang, Meilin Shi
In: Semantic Web, vol 13, issue 1, pages, 1-3, IOS Press, 2022

Open Science data and the Semantic Web journal

Pascal Hitzler, Krzysztof Janowicz, Cogan Shimizu, **Lu Zhou**, Andrew Eells
In: Semantic Web, IOS Press, pp,1-2, 2021

Towards Evaluating Complex Ontology Alignments

Lu Zhou, Elodie Thieblin, Michelle Cheatham, Daniel Faria, Catia Pesquita, Cassia Trojahn, Ondrej Zamazal
In: Knowledge Engineering Review (KER), 35:e21, 2020, Cambridge University Press.

Alignment of Surface Water Ontologies: A comparison of manual and automated approaches

Michelle Cheatham, Dalia Varanka, Fatima Arauz, **Lu Zhou**
In: Journal of Geographical Systems (JGS), 2020, Springer, Vol 22, pp. 267-289.

GeoLink Data set: A Complex Alignment Benchmark from Real-world Ontology

Lu Zhou, Michelle Cheatham, Adila Krisnadhi, Pascal Hitzler
In: Data Intelligence (DI), 2020 2:3, 353-378, MIT Press.

Conference

RDF2TG: Towards Supporting RDF in TigerGraph Property Graph Database System

Lu Zhou, Jay Yu
In: International Semantic Web Conference, 2022

SOSA-SHACL: Shapes Constraint for the Sensor, Observation, Sample, and Actuator Ontology

Rui Zhu, Cogan Shimizu, Shirly Stephen, **Lu Zhou**, Ling Cai, Gengchen Mai, Krzysztof Janowicz, Mark Schildhauer, Pascal Hitzler
In: International Joint Conference on Knowledge Graphs, pages 99-107, 2021

A Pattern for Features on a Hierarchical Spatial Grid

Cogan Shimizu, Rui Zhu, Gengchen Mai, Colby Fisher, Ling Cai, Mark Schildhauer, Krzysztof Janowicz, Pascal Hitzler, **Lu Zhou**, Shirly Stephen
In: International Joint Conference on Knowledge Graphs, pages 108-114, 2021

Neuro-symbolic artificial intelligence

Md Kamruzzaman Sarker, **Lu Zhou**, Aaron Eberhart, Pascal Hitzler

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In: AI Communications, pages 1-13, IOS press, 2021

Environmental Observations in Knowledge Graphs

Rui Zhu, Shirly Ambrose, Lu Zhou, Cogan Shimizu, Ling Cai, Gengchen Mai, Krzysztof Janowicz, Pascal Hitzler, Mark Schildhau

In: Workshop on Data and research objects management for Linked Open Science, pages 1-11, 2021

Wikipedia Knowledge Graph for Explainable AI

Md Kamruzzaman Sarker, Joshua Schwartz, Pascal Hitzler, **Lu Zhou**, Srikanth Nadella, Brandon Minnery, Ion Juvina, Michael L. Raymer and William R. Aue

In: Iberoamerican Knowledge Graph and Semantic Web Conference (KGSWC), Virtual Meeting, 2020

The Enslaved Dataset: A Real-world Complex Ontology Alignment Benchmark using Wikibase

Lu Zhou, Cogan Shimizu, Pascal Hitzler, Alicia M. Sheill, Seila Gonzalez Estrecha, Catherine Foley, Duncan Tarr, and Dean Rehberger

In: International Conference on Information and Knowledge Management (CIKM), Virtual Meeting, Iceland, pp. 3197- 3204. 2020.

GeoLink Cruises: A Non-Synthetic Benchmark for Co-Reference Resolution on Knowledge Graphs

Reihaneh Amini, **Lu Zhou**, Pascal Hitzler

In: International Conference on Information and Knowledge Management (CIKM), Virtual Meeting, Iceland, pp. 2959- 2966. 2020.

Completion Reasoning Emulation for the Description Logic EL+

Aaron Eberhart, Monireh Ebrahimi, **Lu Zhou**, Cogan Shimizu, Pascal Hitzler

In: AAAI Combining Machine Learning and Knowledge Engineering in Practice (AAAI-MAKE), Palo Alto, US, 2020.

Towards Association Rule-based Complex Ontology Alignment

Lu Zhou, Michelle Cheatham, Pascal Hitzler

In: Semantic Technology - 9th Joint International Conference (JIST), Hangzhou, China, November 25-27, 2019, Proceedings, Springer, pp. 287-303

A Complex Alignment Benchmark: GeoLink Dataset

Lu Zhou, Michelle Cheatham, Adila Krisnadhi, Pascal Hitzler

In: The Semantic Web - the 17th International Semantic Web Conference (ISWC), Monterey, US, October 8-12, 2018, Proceedings, Part II., Springer, pp. 273-288.

Tweet Properly: Analyzing Deleted Tweets to Understand and Identify Regrettable Ones

Lu Zhou, Wenbo Wang, Keke Chen

In: Proceedings of the 25th International Conference on World Wide Web (WWW), Montreal, Canada, April 11-15, 2016, ACM, pp. 603-612.

Scalable Euclidean Embedding for Big Data

Alavi Zohreh, Sagar Sharma, **Lu Zhou**, Keke Chen

In: Proceedings of the 8th International Conference on Cloud Computing (IEEE CLOUD), New York City, June 27- July 2, 2015, IEEE Computer Society, pp. 773-780.

RASP-QS: efficient and confidential query services in the cloud

Alavi Zohreh, **Lu Zhou**, James Powers, Keke Chen

In: Proceedings of the 40th International Conference on Very Large Data Bases (VLDB), Hangzhou, China, September 1-5, 2014, VLDB Endowment, pp. 1685-1688.

Workshop and Poster

AROA Results of OAEI 2020

Lu Zhou, Pascal Hitzler

In: Proceedings of the 15th International Workshop on Ontology Matching (OM) co-located with the 19th International Semantic Web Conference (ISWC), Athens, Greece, November 1-6, 2020, CEUR-WS.org.

AROA Results of 2019 OAEI

Lu Zhou, Michelle Cheatham, Pascal Hitzler

In: Proceedings of the 14th International Workshop on Ontology Matching (OM) co-located with the 18th International Semantic Web Conference (ISWC), Auckland, New Zealand, October 26-30, 2019, CEUR-WS.org, pp. 107.

Results of the ontology alignment evaluation initiative 2020

Alsayed Algergawy, Daniel Faria, Alfio Ferrara, Irini Fundulaki, Ian Harrow, Sven Hertling, Ernesto Jimenez-Ruiz, Naouel Karam, Abderrahmane Khat, Patrick Lambrix, Huanyu Li, Stefano Montanelli, Heiko Paulheim, Catia Pesquita, Tzanina Saveta, Pavel Shvaiko, Andrea Splendiani, Elodie Thiéblin, Cássia Trojahn, Jana Vataščinová, Ondrej Zamazal, **Lu Zhou** (based on last name in ascending order)

In: Proceedings of the 15th International Workshop on Ontology Matching (OM) co-located with the 19th International Semantic Web Conference (ISWC), Athens, Greece, November 1-6, 2020, CEUR-WS.org.

Results of the ontology alignment evaluation initiative 2019

Alsayed Algergawy, Daniel Faria, Alfio Ferrara, Irini Fundulaki, Ian Harrow, Sven Hertling, Ernesto Jimenez-Ruiz, Naouel Karam, Abderrahmane Khat, Patrick Lambrix, Huanyu Li, Stefano Montanelli, Heiko Paulheim, Catia Pesquita, Tzanina Saveta, Pavel Shvaiko, Andrea Splendiani, Elodie Thiéblin, Cássia Trojahn, Jana Vataščinová, Ondrej Zamazal, **Lu Zhou** (based on last name in ascending order)

In: Proceedings of the 14th International Workshop on Ontology Matching (OM) co-located with the 18th International Semantic Web Conference (ISWC), Auckland, New Zealand, October 26-30, 2019, CEUR-WS.org.

Results of the ontology alignment evaluation initiative 2018

Alsayed Algergawy, Michelle Cheatham, Daniel Faria, Alfio Ferrara, Irini Fundulaki, Ian Harrow, Sven Hertling, Ernesto Jiménez-Ruiz, Naouel Karam, Abderrahmane Khat, Patrick Lambrix, Huanyu Li, Stefano Montanelli, Heiko Paulheim, Catia Pesquita, Tzanina Saveta, Daniela Schmidt, Pavel Shvaiko, Andrea Splendiani, Elodie Thiéblin, Cassia Trojahn, Jana Vataschinov, Ondrej Zamazal, **Lu Zhou** (based on last name in ascending order)

In: Proceedings of the 13th International Workshop on Ontology Matching (OM) co-located with the 17th International Semantic Web Conference (ISWC), Monterey, USA, October 8, 2018, CEUR-WS.org.

The First Version of the OAEI Complex Alignment Benchmark

Elodie Thiéblin, Michelle Cheatham, Cassia Trojahn, Ondrej Zamazal, **Lu Zhou**

In: Proceedings of the 17th International Semantic Web Conference (ISWC) Posters and Demonstrations, Industry and Blue-Sky ideas Tracks, Monterey, US, October 8-12, 2018, CEUR-WS.org.

A Journey from Simple to Complex Alignment on Real-World Ontologies

Lu Zhou

In: Proceedings of the Doctoral Consortium at the 17th International Semantic Web Conference (ISWC), Monterey, US, October 8-12, 2018, CEUR-WS.org, pp. 93-101.

A Replication Study: Understanding What Drives the performance in WikiMatch

Lu Zhou, Michelle Cheatham

In: Proceedings of the 12th International Workshop on Ontology Matching (OM) co-located with the 16th International Semantic Web Conference (ISWC), Vienna, Austria, October 21, 2017, CUR-WS.org, pp. 215-216.

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Identifying Regrettable Messages from Tweets

Lu Zhou, Wenbo Wang, Keke Chen

In: Proceedings of the 24th International Conference on World Wide Web Conference (WWW), Florence, Italy, May 18-22, 2015, ACM, pp. 145-146.

Benchmarks

Benchmarks for the Workshop on Ontology Alignment Evaluation Initiative (OAEI)

- GeoLink; PopGeoLink; Hydrography; PopEnslaved; Geolink Cruise benchmark

Skills

- Major Programming Languages: Java, Python, SQL, SPARQL, etc.
- Machine Learning: Weka, Scikit-Learn, Classification, Regression, Clustering
- Deep Learning: TensorFlow, PyTorch, Keras, CNN, RNN, LSTM, GNN, Word Embedding, Knowledge Graph Embedding
- Natural Language Processing: NLTK, Stanford CoreNLP, DBpedia Spotlight, OpenNLP
- Big Data: Spark, Hadoop, MapReduce, AWS
- Knowledge Representation: Protégé, Apache Jena, OWL, RDF, RDFS, RDFLib, GraphDB, Virtuoso, Neo4J, AWS Naptune
- Database Management: MySQL, PostgreSQL
- Code Management: GitHub
- Coursera Certificates: Neural Networks and Deep Learning, Sequence Models, Structuring Machine Learning Projects

Service

Organization

- **Editorial Assistant:** Semantic Web Journal (SWJ), 2020 -2022
- **Pattens Chair:** Workshop on Ontology Design and Patterns (WOP), 2022
- **Organizing Chair:** Workshop on Geospatial Knowledge Graph (GeoKG), 2022
- **Proceedings Chair:** Workshop on Ontology Design and Patterns (WOP), 2020
- **Organizer:** Session in Inter-operational Semantic Resources in Earth and Environmental Science, U.S. Semantic Technologies Symposium (US2TS), 2020
- **Organizer:** GeoLink Cruise track, Ontology Alignment Evaluation Initiative (OAEI), 2020 - 2021
- **Organizer:** Conference track, Ontology Alignment Evaluation Initiative (OAEI), 2019 - present
- **Organizer:** Complex track, Ontology Alignment Evaluation Initiative (OAEI), 2018 - 2021

Reviewing

- **PC Member:** International Semantic Web Conference (ISWC), 2022
- **PC Member:** Iberoamerican Knowledge Graph and Semantic Web Conference (KGSWC), 2022
- **PC Member:** The Web Conference (WWW), 2022, 2023
- **PC Member:** International Artificial Intelligence in Bergen Research School (AIB), 2022
- **PC Member:** International Conference on Information Management and Big Data (SIMBig), 2021
- **PC Member:** International Conference on Knowledge Capture (K-CAP), 2021
- **PC Member:** International Semantic Web Conference (ISWC), 2021
- **PC Member:** International Conference on Advances in Semantic Processing (SEMAPRO), 2021
- **PC Member:** Iberoamerican Knowledge Graph and Semantic Web Conference (KGSWC), 2021
- **PC Member:** Workshop on The Semantic Web in Practice: Tools and Pedagogy (PRAXIS), 2020
- **PC Member:** International Conference on Information and Knowledge Management (CIKM), 2020
- **Peer Reviewer:** ACM Transactions on the Web (TWEB)
- **Peer Reviewer:** Future Generation Computer Systems (FGCS)
- **Peer Reviewer:** The Knowledge Engineering Review Journal (KER)

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- **Peer Reviewer:** International Journal of Computers and Applications (IJCA)
- **Peer Reviewer:** Data Science Journal
- **Sub-Reviewer:** The Web Conference (WWW), 2022
- **Sub-Reviewer:** ACM Transactions on Social Computing (TSC)
- **Sub-Reviewer:** The Web Conference, 2022
- **Sub-Reviewer:** International Joint Conference on Learning & Reasoning (IJCLR), 2021
- **Sub-Reviewer:** International Semantic Web Conference (ISWC), 2017, 2018, 2020
- **Sub-Reviewer:** Iberoamerican Knowledge Graph and Semantic Web Conference (KGSWC), 2019
- **Sub-Reviewer:** International Workshop on Deep Learning for Knowledge Graphs (DL4KG), 2019
- **Sub-Reviewer:** IEEE International Conference on Big Data (BigData), 2018
- **Sub-Reviewer:** Extended Semantic Web Conference (ESWC), 2017, 2018
- **Sub-Reviewer:** Society, Privacy and the Semantic Web - Policy and Technology (PrivOn), 2016
- **Sub-Reviewer:** International Conference on Knowledge Engineering and Knowledge Management (EKAW), 2016

Awards & Nominations

- Gattani Outstanding Graduate Student Award nominees at Kansas State University, 2020
- Best Paper nominees in Resource Track, ISWC, 2018
- Student travels grant, ISWC, 2018

Invited Talks

- “Research on Generation of Complex Ontology Alignment Benchmark”, The 2nd Data Intelligence and Knowledge Service conference, Nanjing, China, 2021
- “GeoLink Data Set: A Complex Alignment Benchmark from Real-world Ontology”, Data Intelligence, Virtual, Beijing, China, 2021