

# Muhao Chen

Assistant Professor (Research) of Computer Science, USC.

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## RESEARCH INTERESTS

**Natural Language Processing;** Robustness, Generalizability, and Indirect Supervision in Machine Learning; Knowledge Acquisition from Unstructured Data; Knowledge-driven AI for Interdisciplinary Tasks (Computational Biology, Medicine, and Geoinformatics).

## EDUCATION AND ACADEMIC EXPERIENCE

University of Southern California

2020.9-date

- **Assistant Professor (Research)**, Department of Computer Science
- **Research Lead**, Information Sciences Institute
- **Director**, USC Language Understanding and Knowledge Acquisition Group

University of Pennsylvania, Philadelphia, PA

2019.7-2020.8

*Postdoctoral Fellow, Hosted by Dan Roth, Eduardo D. Glandt Distinguished Professor of Computer and Information Science*

University of California, Los Angeles, USA

*Ph.D. in Computer Science*

2014.9-2019.6

*Dissertation:* Multi-relational Representation Learning and Knowledge Acquisition  
*Advisors:*

- Carlo Zaniolo, *Distinguished Professor of Computer Science, N.E. Friedmann Chair in Knowledge Science* (Committee Chair)
- Kai-Wei Chang, *Associate Professor of Computer Science*
- Wei Wang, *Leonard Kleinrock Chair Professor of Computer Science*

Fudan University, Shanghai, China

*B.S. in Computer Science. Advisor:* X. Sean Wang, *Dorothean Chair Professor of Computer Science*

2010.9-2014.6

## PUBLICATION

\*Indicating equal contributions. ☒ Indicating corresponding authors of journal publications.

*Published in top-tier NLP and AI venues such as TACL, EMNLP, ACL, NAACL, CoNLL, AAAI, ICLR, SIGIR, etc.*

### Tutorials

- [1] **Muhao Chen**, Lifu Huang, Manling Li, Ben Zhou, Heng Ji, Dan Roth. New Frontiers of Information Extraction. In **NAACL**, 2022.
- [2] **Muhao Chen**, Hongming Zhang, Qiang Ning, Manling Li, Heng Ji, Kathleen McKeown, Dan Roth. Event-centric Natural Language Processing. In **ACL**, 2021.
- [3] **Muhao Chen**, Hongming Zhang, Qiang Ning, Manling Li, Heng Ji, Dan Roth. Event-centric Natural Language Understanding. In **AAAI**, 2021.
- [4] Jay Pujara, Pedro Szekely, Huan Sun, **Muhao Chen**. From Tables to Knowledge: Recent Advances in Table Understanding. In **KDD**, 2021.
- [5] **Muhao Chen**, Kai-Wei Chang, Dan Roth. Recent Advances in Transferable Representation Learning. In **AAAI**, 2020.

### Refereed Journal Publication and Book Chapters

- [6] Bangzheng Li, Wenpeng Yin, **Muhao Chen** ☒. Ultra-fine Entity Typing with Indirect Supervision from Natural Language Inference. *Transactions of the Association for Computational Linguistics (TACL)*. MIT Press, 2022.
- [7] Tianran Zhang, **Muhao Chen**, Alex Bui. AdaDiag: Adversarial Domain Adaptation of Diagnostic Prediction with Clinical Event Sequences. *Journal of Biomedical Informatics (JBI)*, vol. 134. Elsevier, 2022.
- [8] Mohammad Rostami, Hangfeng He, **Muhao Chen**, Dan Roth. Transfer Learning via Representation Learning. *Federated and Transfer Learning*. Springer, 2022 (Book Chapter)
- [9] Jyun-Yu Jiang, Chelsea J.-T. Ju, Junheng Hao, **Muhao Chen**, Wei Wang ☒. Circular RNA Prediction based on Junction Encoders and Deep Interaction among Splice Sites. *Bioinformatics*, vol. 37. Oxford University Press, 2021. Full Paper of **ISMB/ECCB**, 2021.

- [10] Guangyu Zhou\*, **Muhao Chen**<sup>✉</sup>\*, Chelsea J. T. Ju\*, Zheng Wang, Jyun-Yu Jiang, Wei Wang<sup>✉</sup>. Mutation effect estimation on protein-protein interactions using deep contextualized representation learning. **NAR Genom. Bioinform**, vol. 2 (2). Oxford University Press. 2020.
- [11] Zequn Sun, Qingheng Zhang, Wei Hu<sup>✉</sup>, Chengming Wang, **Muhao Chen**, Chengkai Li, Yuzhong Qu. A Benchmarking Study of Embedding-based Entity Alignment for Knowledge Graphs. *Proceedings of the VLDB Endowment (PVLDB)*, vol. 13. ACM. 2020
- [12] **Muhao Chen**<sup>✉</sup>\*, Chelsea J. T. Ju\*, Guangyu Zhou, Tianran Zhang, Kai-Wei Chang, Carlo Zaniolo, Wei Wang. Multifaceted Protein-Protein Interaction Prediction Based on Siamese Residual RCNN. **Bioinformatics**, vol. 35 (14) Oxford University Press. Full Paper of **ISMB/ECCB**, 2019.
- [13] Carlo Zaniolo<sup>✉</sup>, Shi Gao, Maurizio Atzori, **Muhao Chen**, Jiaqi Gu. User-Friendly Temporal Queries on Historical Knowledge Bases. **Information and Computation**, Vol. 259 (3). Elsevier, 2018.

### Refereed Publication in Conference Proceedings

- [14] Wenxuan Zhou, Fangyu Liu, Huan Zhang, **Muhao Chen**. Sharpness-Aware Minimization with Dynamic Reweighting. In *the 37th Conference on Empirical Methods in Natural Language Processing (EMNLP)*, 2022.
- [15] Nan Xu, Fei Wang, Bangzheng Li, Mingtao Dong, **Muhao Chen**. Does Your Model Classify Entities Reasonably? Diagnosing and Mitigating Spurious Correlations in Entity Typing. In *the 37th Conference on Empirical Methods in Natural Language Processing (EMNLP)*, 2022.
- [16] Fei Wang, Kaiqiang Song, Hongming Zhang, Lifeng Jin, Sangwoo Cho, Wenlin Yao, Xiaoyang Wang, **Muhao Chen**, Dong Yu. Saliency Allocation as Guidance for Abstractive Summarization. In *the 37th Conference on Empirical Methods in Natural Language Processing (EMNLP)*, 2022.
- [17] Keming Lu, I-Hung Hsu, Wenxuan Zhou, Mingyu Derek Ma, **Muhao Chen**. Summarization as Indirect Supervision for Relation Extraction. In *the 37th Conference on Empirical Methods in Natural Language Processing (EMNLP)* - Findings, 2022.
- [18] Zekun Li, Jina Kim, Yao-Yi Chiang, **Muhao Chen**. SpaBERT: Pretrained Language Models on Geographic Data for Geo-Entity Representation. In *the 37th Conference on Empirical Methods in Natural Language Processing (EMNLP)* - Findings, 2022.
- [19] Ehsan Qasemi, Filip Ilievski, **Muhao Chen**, Pedro Szekely. PaCo: Preconditions Attributed to Commonsense Knowledge. In *the 37th Conference on Empirical Methods in Natural Language Processing (EMNLP)* - Findings, 2022.
- [20] Yiwei Wang, **Muhao Chen**, Wenxuan Zhou, Yujun Cai, Yuxuan Liang, Dayiheng Liu, Baosong Yang, Juncheng Liu, Bryan Hooi. Should We Rely on Entity Mentions for Relation Extraction? Debiasing Relation Extraction with Counterfactual Analysis. In *the 20th Annual Conference of the North American Chapter of the Association for Computational Linguistics (NAACL)*, 2022.
- [21] Fei Wang, Zhewei Xu, Pedro Szekely, **Muhao Chen**. Robust (Controlled) Table-to-Text Generation with Structure-Aware Equivariance Learning. In *the 20th Annual Conference of the North American Chapter of the Association for Computational Linguistics (NAACL)*, 2022.
- [22] James Y. Huang, Bangzheng Li, Jiashu Xu, **Muhao Chen**. Unified Semantic Typing with Meaningful Label Inference. In *the 20th Annual Conference of the North American Chapter of the Association for Computational Linguistics (NAACL)*, 2022.
- [23] Wenxuan Zhou, Qiang Ning, Heba Elfardy, Kevin Small, **Muhao Chen**. Answer Consolidation: Formulation and Benchmarking. In *the 20th Annual Conference of the North American Chapter of the Association for Computational Linguistics (NAACL)*, 2022.
- [24] Juncheng Liu, Zequn Sun, Bryan Hooi, Yiwei Wang, Dayiheng Liu, Baosong Yang, Xiaokui Xiao, **Muhao Chen**. Dangling-Aware Entity Alignment with Mixed High-Order Proximities. In *the 20th Annual Conference of the North American Chapter of the Association for Computational Linguistics (NAACL)* - Findings, 2022.
- [25] Yiwei Wang, **Muhao Chen**, Wenxuan Zhou, Yujun Cai, Yuxuan Liang, Bryan Hooi. GraphCache: Message Passing as Caching for Sentence-Level Relation Extraction. In *the 20th Annual Conference of the North American Chapter of the Association for Computational Linguistics (NAACL)* - Findings, 2022.
- [26] Wenxuan Zhou\*, Fangyu Liu\*, Ivan Vulić, Nigel Collier, **Muhao Chen**. Prix-LM: Pretraining for Multilingual Knowledge Base Construction. In *Proceedings of the 60th Annual Meeting of the Association for Computational Linguistics (ACL)*, 2022.
- [27] Peifeng Wang, Jonathan Zamora, Junfeng Liu, Filip Ilievski, **Muhao Chen**, Xiang Ren. Contextualized Scene Imagination for Generative Commonsense Reasoning. In *the 10th International Conference on Learning Representations (ICLR)*, 2022.
- [28] Wenxuan Zhou, **Muhao Chen**. An Improved Baseline for Sentence-level Relation Extraction. In *the 2nd Conference of the Asia-Pacific Chapter of the Association for Computational Linguistics (AACL)*, 2022.
- [29] Ehsan Qasemi, Piyush Khanna, Qiang Ning, **Muhao Chen**. PInKS: Preconditioned Commonsense Inference with Minimal Supervision. In *the 2nd Conference of the Asia-Pacific Chapter of the Association for Computational Linguistics (AACL)*, 2022.

- [30] Jihoon Sohn, Mingyu Derek Ma, **Muhao Chen**. Bending the Future: Autoregressive Modeling of Temporal Knowledge Graphs in Curvature-Variable Hyperbolic Spaces. In *the 4<sup>th</sup> Conference on Automated Knowledge Base Construction (AKBC)*, 2022.
- [31] Bonan Kou, Yifeng Di, **Muhao Chen**, Tianyi Zhang. SOSum: A Dataset of Stack Overflow Post Summaries. In *Proceedings of the 19<sup>th</sup> International Conference on Mining Software Repositories (MSR)*, 2022. (Data/Tool Showcase Track)
- [32] Wenxuan Zhou, Fangyu Liu, **Muhao Chen**. Contrastive Out-of-Distribution Detection for Pretrained Transformers. In *Proceedings of the 36<sup>th</sup> Conference on Empirical Methods in Natural Language Processing (EMNLP)*, 2021.
- [33] Wenxuan Zhou, **Muhao Chen**. Learning from Noisy Labels for Entity-Centric Information Extraction. In *Proceedings of the 36<sup>th</sup> Conference on Empirical Methods in Natural Language Processing (EMNLP)*, 2021.
- [34] Haoyu Wang, Hongming Zhang, **Muhao Chen**, Dan Roth. Learning Constraints and Descriptive Segmentation for Subevent Detection. In *Proceedings of the 36<sup>th</sup> Conference on Empirical Methods in Natural Language Processing (EMNLP)*, 2021.
- [35] Xiyang Zhang, **Muhao Chen**, Jonathan May. Saliency-Aware Event Chain Modeling for Narrative Understanding. In *Proceedings of the 36<sup>th</sup> Conference on Empirical Methods in Natural Language Processing (EMNLP)*, 2021.
- [36] Fei Wang, Kexuan Sun, Jay Pujara, Pedro Szekely, **Muhao Chen**. Table-based Fact Verification With Saliency-aware Learning. In *the 36<sup>th</sup> Conference on Empirical Methods in Natural Language Processing (EMNLP) - Findings*, 2021.
- [37] Mingyu Derek Ma, **Muhao Chen**, Te-lin Wu, Nanyun Peng. HyperExpan: Taxonomy Expansion with Hyperbolic Representation Learning. In *the 36<sup>th</sup> Conference on Empirical Methods in Natural Language Processing (EMNLP) - Findings*, 2021.
- [38] Fangyu Liu, **Muhao Chen**, Dan Roth, Nigel Collier. Visual Pivoting for (Unsupervised) Entity Alignment. In *the 35<sup>th</sup> AAAI Conference on Artificial Intelligence (AAAI)*, 2021.
- [39] Cunchao Zhu, **Muhao Chen**, Changjun Fan, Guangquan Cheng, Yan Zhang. Learning from History: Modeling Temporal Knowledge Graphs with Sequential Copy-Generator Networks. In *the 35<sup>th</sup> AAAI Conference on Artificial Intelligence (AAAI)*, 2021.
- [40] Zequn Sun, **Muhao Chen**, Wei Hu. Knowing the No-match: Entity Alignment with Dangling Cases. In *Proceedings of the 59<sup>th</sup> Annual Meeting of the Association for Computational Linguistics (ACL)*, 2021.
- [41] Peifeng Wang, Filip Ilievski, Muhao Chen, Xiang Ren. Do Language Models Perform Generalizable Commonsense Inference? In *Proceedings of the 59<sup>th</sup> Annual Meeting of the Association for Computational Linguistics (ACL) - Findings*, 2021.
- [42] **Muhao Chen**, Weijia Shi, Ben Zhou, Dan Roth. Cross-lingual Entity Alignment with Incidental Supervision. In *the 16<sup>th</sup> Conference of the European Chapter of the Association for Computational Linguistics (EACL)*, 2021.
- [43] Xuelu Chen\*, Michael Boratko\*, **Muhao Chen**, Shib Sankar Dasgupta, Xiang Li, Andrew McCallum. Probabilistic Box Embeddings for Uncertain Knowledge Graph Reasoning. In *the 19<sup>th</sup> Annual Conference of the North American Chapter of the Association for Computational Linguistics (NAACL)*, 2021.
- [44] Fei Wang, Kexuan Sun, **Muhao Chen**, Jay Pujara, Pedro Szekely. Retrieving Complex Tables with Multi-Granular Graph Representation Learning. In *Proceedings of the 44<sup>th</sup> ACM SIGIR Conference on Research and Development in Information Retrieval (SIGIR)*, 2021.
- [45] Minh Pham, Craig Knoblock, **Muhao Chen**, Binh Vu, Jay Pujara. SPADE: A Semi-supervised Probabilistic Approach for Detecting Errors in Tables. In *Proceedings of the 30<sup>th</sup> International Joint Conference on Artificial Intelligence (IJCAI)*, 2021.
- [46] Kexuan Sun, Fei Wang, **Muhao Chen**, Jay Pujara. Tabular Functional Block Detection with Embedding-based Agglomerative Cell Clustering. In *Proceedings of the 30<sup>th</sup> ACM International Conference on Information and Knowledge Management (CIKM)*, 2021.
- [47] **Muhao Chen**, Hongming Zhang, Haoyu Wang, Dan Roth. “What Are You Trying to Do?” Semantic Typing of Event Processes. In *Proceedings of the 24<sup>th</sup> SIGNLL Conference on Computational Natural Language Learning (CoNLL)*, 2020. **Best Paper Nomination**
- [48] Zequn Sun, **Muhao Chen**, Wei Hu, Chengming Wang. Knowledge Association with Hyperbolic Representation Learning of Knowledge Graphs. In *Proceedings of the 25<sup>th</sup> Conference on Empirical Methods in Natural Language Processing (EMNLP)* 2020.
- [49] Haoyu Wang, **Muhao Chen**, Hongming Zhang, Dan Roth. Joint Constrained Learning for Event-Event Relation Extraction. In *Proceedings of the 25<sup>th</sup> Conference on Empirical Methods in Natural Language Processing (EMNLP)*, 2020.
- [50] Hongming Zhang, **Muhao Chen**, Haoyu Wang, Y. Song, Dan Roth. Analogous Process Structure Induction for Sub-event Sequence Prediction. In *Proceedings of the 25<sup>th</sup> Conference on Empirical Methods in Natural Language Processing (EMNLP)*, 2020.
- [51] Xuelu Chen, **Muhao Chen**, Changjun Fan, Ankith Uppunda, Yizhou Sun, Carlo Zaniolo. Multilingual Knowledge Graph Completion via Ensemble Knowledge Transfer. In *Proceedings of the 25<sup>th</sup> Conference on Empirical Methods in Natural Language Processing (EMNLP) - Findings*, 2020.
- [52] Zequn Sun, Chengming Wang, Wei Hu, **Muhao Chen**, Jian Dai, Wei Zhang, Yuzhong Qu. Knowledge Graph Alignment Network with Gated Multi-hop Neighborhood Aggregation. In *the 34<sup>th</sup> AAAI Conference on Artificial Intelligence (AAAI)*, 2020.

- [53] Changping Meng, **Muhao Chen**, Jie Mao, Jennifer Neville. ReadNet: A Hierarchical Transformer Framework for Readability Analysis. In *the 42<sup>nd</sup> European Conference on Information Retrieval (ECIR)*, 2020.
- [54] Junheng Hao, Chelsea J. T. Ju, **Muhao Chen**, Yizhou Sun, Carlo Zaniolo, Wei Wang. Bio-JOIE: Joint Representation Learning of Biological Knowledge Bases. In *the 11<sup>th</sup> ACM SIGBio Conference on Bioinform., Comput. Bio. and Health Inform. (ACM-BCB)*, 2020 (**SIGBio Best Student Paper Award**, ~0.8%)
- [55] Tianran Zhang, **Muhao Chen**, Alex Bui. Diagnostic Prediction with Sequence-of-sets Representation Learning for Clinical Events. In *Proceedings of the 18<sup>th</sup> International Conference on Artificial Intelligence in Medicine (AIME)*, 2020
- [56] **Muhao Chen**, Yingtao Tian, Haochen Chen, Kai-Wei Chang, Steve Skiena, Carlo Zaniolo. Learning to Represent Bilingual Dictionaries. In *Proceedings of the 23rd SIGNLL Conference on Computational Natural Language Learning (CoNLL)*, 2019
- [57] Junheng Hao, **Muhao Chen**, Wenchao Yu, Yizhou Sun, Wei Wang. Universal Representation Learning of Knowledge Bases by Jointly Embedding Ontological Concepts and Instances. In *Proceedings of the 25<sup>th</sup> ACM SIGKDD Conference on Knowledge Discovery and Data Mining (KDD)*, 2019.
- [58] Xuelu Chen, **Muhao Chen**, Weijia Shi, Yizhou Sun, Carlo Zaniolo. Uncertain Knowledge Graphs Embeddings. In *the 33<sup>rd</sup> International Conference on Artificial Intelligence (AAAI)*, 2019.
- [59] **Muhao Chen**<sup>\*</sup>, Weijia Shi<sup>\*</sup>, Pei Zhou, Kai-Wei Chang. Retrofitting Contextualized Word Embeddings with Paraphrases. In *Proceedings of the 24th Conference on Empirical Methods in Natural Language Processing (EMNLP)*, 2019.
- [60] Pei Zhou, Weijia Shi, Jieyu Zhao, Kuan-Hao Huang, **Muhao Chen**, Ryan Cotterell, Kai-Wei Chang. Examining Gender Bias in Languages with Grammatical Gender. In *Proceedings of the 24th Conference on Empirical Methods in Natural Language Processing (EMNLP)*, 2019.
- [61] **Muhao Chen**, Chris Quirk. Embedding Edge-attributed Relational Hierarchies. In *Proceedings of the 42<sup>nd</sup> ACM SIGIR Conference on Research and Development in Information Retrieval (SIGIR)*, 2019.
- [62] Qingheng Zhang, Zequn Sun, Wei Hu, **Muhao Chen**, Lingbing Guo, Yuzhong Qu. Multi-view Knowledge Graph Embedding for Entity Alignment. In *Proceedings of the 28<sup>th</sup> International Joint Conference on Artificial Intelligence (IJCAI)*, 2019. Also in **ISWC 2020** Invited Sister Conference Track.
- [63] Zequn Sun, Jiacheng Huang, Wei Hu, **Muhao Chen**, Yuzhong Qu. TransEdge: Translating Relation-contextualized Embeddings for Knowledge Graphs. In *the 18<sup>th</sup> International Semantic Web Conference (ISWC)*, 2019.
- [64] Haochen Chen, Syed Fahad Sultan, Yingtao Tian, **Muhao Chen**, Steven Skiena. Fast and Accurate Network Embeddings via Very Sparse Random Projection. In *Proceedings of the 28<sup>th</sup> ACM International Conference on Information and Knowledge Management (CIKM)*, 2019.
- [65] Changjun Fan, Yuhui Ding, Li Zeng, **Muhao Chen**, Yizhou Sun and Zhong Liu. Learning to Identify High Betweenness Centrality Nodes from Scratch: A Novel Graph Neural Network Approach. In *Proceedings of the 28<sup>th</sup> ACM International Conference on Information and Knowledge Management (CIKM)*, 2019.
- [66] **Muhao Chen**, Changping Meng, Gang Huang, Carlo Zaniolo. Learning to Differentiate Between Main-articles and Sub-articles in Wikipedia. In *IEEE International Conference on Big Data (BigData)*, 2019.
- [67] Yingtao Tian, Haochen Chen, Bryan Perozzi, **Muhao Chen**, Xiaofei Sun, Steven Skiena. Social Relation Inference via Label Propagation. In *the 41<sup>st</sup> European Conference on Information Retrieval (ECIR)*, 2019.
- [68] Qi Zhao, **Muhao Chen**, Pengyuan Du, Tuan Le, Mario Gerla. Towards Efficient Cellular Traffic Offloading via Dynamic MPTCP Path Configuration with SDN. In *IEEE International Conference on Computing, Networking and Communications (ICNC)*, 2019.
- [69] **Muhao Chen**, Gang Huang, Changping Meng, Carlo Zaniolo. Neural Article Pair Modeling for Wikipedia Sub-article Matching. In *the 29<sup>th</sup> European Conference on Machine Learning (ECML)*, 2018 (**Plenary Presentation**, ~1.7% acceptance rate)
- [70] **Muhao Chen**, Yingtao Tian, Kai-Wei Chang, Steven Skiena, Carlo Zaniolo. Co-training Embeddings of Knowledge Graphs and Entity Descriptions for Cross-lingual Entity Alignment. In *the 27<sup>th</sup> International Joint Conference on Artificial Intelligence (IJCAI)*, 2018.
- [71] **Muhao Chen**, Yingtao Tian, Xuelu Chen, Zijun Xue, Carlo Zaniolo. On2Vec: Embedding-based Relation Prediction for Ontology Population. In *Proceedings of the 17<sup>th</sup> SIAM International Conference on Data Mining (SDM)*. SIAM, 2018
- [72] Haochen Chen, Xiaofei Sun, Yingtao Tian, Bryan Perozzi, **Muhao Chen** and Steven Skiena. Enhanced Network Embeddings via Exploiting Edge Labels. In *the 27th ACM Conference on Information and Knowledge Management (CIKM)*. ACM 2018.
- [73] Pengyuan Du, Seunghyun Yoo, Qi Zhao, **Muhao Chen**, Mario Gerla. Towards Opportunistic Resource Sharing in Mobile Social Networks - an Evolutionary Game Theoretic Approach. In *Proceedings of the 19th ACM International Symposium on Mobile Ad Hoc Networking and Computing (MobiHoc)*, ACM 2018.



- [74] **Muhao Chen**, Qi Zhao, Pengyuan Du, Carlo Zaniolo, Mario Gerla. Demand-driven Cache Allocation Based on Context-aware Collaborative Filtering. In *Proceedings of the 19th ACM International Symposium on Mobile Ad Hoc Networking and Computing (MobiHoc)*, ACM 2018.
- [75] **Muhao Chen**, Yingtao Tian, Mohan Yang, Carlo Zaniolo. Multilingual Knowledge Graph Embeddings for Cross-lingual Knowledge Alignment. In *Proceedings of the 26th International Joint Conference on Artificial Intelligence (IJCAI)*. 2017.
- [76] **Muhao Chen**, Shi Gao, X. Sean Wang. Converting Spatiotemporal Data Among Heterogeneous Granularity Systems. In *Proceedings of the 25th IEEE International Conference on Fuzzy Systems (FUZZ-IEEE)*. IEEE, 2016.

### Refereed Workshop and System Demonstration Papers

- [77] Weijia Shi, **Muhao Chen**, Yingtao Tian, Kai-Wei Chang. Learning Bilingual Word Embeddings Using Lexical Definitions. In *Proceedings of ACL Workshop on Representation Learning for NLP (RepL4NLP)*, 2019.
- [78] Zhubo Deng, Pei Zhou, Weijia Shi, **Muhao Chen**, Kai-Wei Chang. Computational Analysis of French-origin Reborrowing Process for English Loanwords. In *ICDM Workshop on Multilingual Cognitive Services (ICDMW)*, 2019
- [79] Changjun Fan, Yizhou Sun, Li Zeng, Yang-Yu Liu, **Muhao Chen**, Zhong Liu. Dismantle Large Networks through Deep Reinforcement Learning. In *ICLR Workshops*, 2019.
- [80] Pei Zhou, **Muhao Chen**, Kai-Wei Chang, Carlo Zaniolo. Quantification and Analysis of Scientific Language Variation by Research Fields. In *Proceedings of the ICDM Workshops (ICDMW)*, 2018.
- [81] **Muhao Chen**, Tao Zhou, Pei Zhou, Carlo Zaniolo. Multi-graph Affinity Embeddings for Multilingual Knowledge Graphs. **Contributed talk** in the *6th Workshop on Automated Knowledge Base Construction at NIPS (AKBC)*. 2017.
- [82] **Muhao Chen**, Carlo Zaniolo. Learning Multi-faceted Knowledge Graph Embeddings for Natural Language Processing. In *Proceedings of the 26th International Joint Conference on Artificial Intelligence (IJCAI)*. 2017 (Extended abstract)
- [83] Tao Zhou, **Muhao Chen**, Demetri Terzopoulos, Jie Yu. Attention-based Natural Language Person Retrieval. In *Proceedings of the IEEE Conference on Computer Vision and Pattern Recognition Workshops (CVPRW)*. IEEE, 2017.
- [84] Shi Gao, **Muhao Chen**, Maurizio Atzori, Carlo Zaniolo. SPARQL<sup>T</sup> and its User-Friendly Interface for Managing and Querying the History of Knowledge Bases. In *the 14th International Semantic Web Conference (ISWC)*, 2015 (demo).

## AWARDS

- *Cisco Faculty Research Award*. 2022
- *NSF CISE Research Initiation Initiative (CRII) Award*. 2021
- *ACM SIGBio Best Student Paper Award*. 2020
- *UCLA Dissertation Fellowship*. 2018-2019
- *Tung OoCL Scholarships*. Tung's Foundation of Hong Kong & The Oriental Overseas Container Line. 2012, 2013
- *Wang-Dao Fellowship*. President of Fudan University. 2013
- *Chun-Tsung Fellowship*. Hui-Chun Chin and Tsung-Dao Lee Chinese Undergraduate Research Endowment. 2012

## FUNDING

Total funds acquired as PI or Co-PI: **\$1.24M** (my share)

<b>Cisco Faculty Research Award: Robust Knowledge Extraction from Text.</b>	2022-2023
• \$70.4K unrestricted fund. (Sole PI)	
<b>DARPA KMASS: Knowledge Needed in Context.</b>	2022-2025
• \$866K my share out of \$6.64M in total. (Co-PI, Lead of TA-B)	
<b>NSF Cloud Access Grant.</b>	2022-2023
• \$80K cloud computing credits. (Sole PI)	
<b>Robust Table-Text Understanding with Structure-Aware Equivariance Pre-training.</b>	2022-2023
• Gift award from Amazon Alexa. PI of \$50K unrestricted fund.	
<b>Google GCP Grant.</b>	2022-2023
• \$5K Google cloud credits.	
<b>Improved Performance, Analytics and Summarization of Synergistic Anticipation of Geopolitical Events.</b>	2022-2023
• ARLIS INFER research grant. \$50K my share. (Co-PI)	

<b>CRII: III: Knowledge Graph Completion with Transferable Representation Learning.</b>	2021-2023
• NSF IIS Grant, \$175K. (Sole PI)	
<b>DARPA MCS: Multi-modal Open World Grounded Learning and Inference.</b>	2021-2023
• \$400K my share. (Senior Personnel)	

## TEACHING AND MENTORING

### Teaching

Instructor at USC

- CSCI 544: Applied Natural Language Processing (Graduate-level course; Enrollment: 307) Spring 2022

Teaching assistant (2015.9-2016.6), associate (2016.9-2017.6), fellow (2017.9-2018.6) at UCLA

- Data Structures and Algorithms; Introduction to Computer Science.

### Lab Members/Students at USC

Fei Wang, Ph.D. Student in Computer Science.	Fall 2022-date
• Viterbi Honors Program; <b>USC CS Departmental Best Research Award 2022; Annenberg Fellow.</b>	
• Joined the lab as a M.S. student in Fall 2020	
Bangzheng Li, Ph.D. Student in Computer Science.	Fall 2022-date
• <b>Provost PhD Fellow.</b>	
• Joined the lab as an undergraduate researcher in Summer 2021	
Qin (Jacqueline) Liu, Ph.D. Student in Computer Science. (USC PhD Fellowship)	Fall 2022-date
Tenghao Huang, Ph.D. Student in Computer Science (Viterbi-ISI Fellow; Co-advised with Xuezhe Ma)	Fall 2022-date
Nan (Nancy) Xu, Ph.D. Student in Computer Science (Co-advised with Xuezhe Ma)	Spring 2022-date
James Y. Huang. PhD Student in Computer Science.	Fall 2021-date
Eric (Ehsan) Qasemi, PhD Student in Computer Science. (Co-advised with Pedro Szekely)	Fall 2020-date
Wenxuan Zhou, PhD Student in Computer Science.	Fall 2020-date
Keming (Luke) Lu, MS Student in Industrial and System Engineering.	Fall 2021-date
Shikhar Singh, MS Student in Computer Science.	Fall 2021-Summer 2022
Tianyi (Lorena) Yan, Undergraduate Student, Computer Science (CURVE Fellowship)	Fall 2022-date
Jacky Mo, Undergraduate Student, Computer Science (CURVE Fellowship)	Fall 2022-date
Mingtao Dong, Undergraduate Student, Computer Science (Provost's Research Fellowship)	Spring 2022-date
Jiashu Xu, Undergraduate Student, Computer Science (CURVE Fellowship)	Fall 2021- Spring 2022
Zhewei Xu, Undergraduate Student, Computer Science (CURVE Fellowship)	Fall 2021-Spring 2022
Logan Norman, Undergraduate Student, Computer Science (Viterbi Fellowship)	Fall 2021-Spring 2022

### Visiting Scholars/Students at USC

Tianqing Fang. PhD Student in Computer Science, HKUST (Hong Kong PhD Fellow)	Summer 2022-Spring 2023
Zhaotian Weng. Undergraduate, Tsinghua University. (USC-THU Summer Research Program)	Summer 2022
Xiaocong Yang. Undergraduate, Tsinghua University.	Summer-Fall 2022
Amani Rune Maina-Kilaas. Undergraduate, Harvey Mudd College (NSF REU Student)	Summer 2022
Tanay Dixit. Undergraduate, IIT Madras, Computer Science (NSF REU Student)	Summer 2022
Devadutta Dash. Undergraduate, IIT Varanasi, Computer Science (IUSSFT-Viterbi Research Intern)	Summer 2022
Jihoon Sohn. USC PhD Student in Mathematics	Spring 2021-Spring 2022
Bangzheng Li. UIUC, B.S. in Computer Science (Now PhD student in my lab)	Summer 2021-Fall 2021
Shanxiu He. Undergraduate, UCLA Computer Science (USC ISI NLP Intern; Now PhD student at UCSB)	Summer 2021
Piyush Khanna, Undergraduate, Delhi Tech Univ., Computer Science	Summer 2021
Yueguan Wang. Undergraduate, Tsinghua Univ., EE (USC-THU Summer Research Program)	Summer 2021

### Dissertation/Qualification Committee

Binh Vu, USC PhD Student in Computer Science (Chair: Craig Knoblock)  
Yizhou Zhang, USC PhD Student in Computer Science. (Chair: Yan Liu)  
Jihoon Sohn, USC PhD in Mathematics, 2022. (Chair: Francis Bonahon)  
Tianran Zhang, UCLA PhD in Bioengineering, 2022. (Chair: Alex Bui)  
Peifeng Wang, USC PhD Student in Computer Science. (Chair: Pedro Szekely)

Michiel de Jong, USC PhD Student in Computer Science. (Chair: Leana Golubchik)  
Minh Pham, USC PhD Student in Computer Science. (Chair: Craig Knoblock)  
Kexuan Sun, USC PhD Student in Computer Science. (Chair: Jay Pujara)  
Xuelu (Shirley) Chen, UCLA PhD in Computer Science, 2021. (Chair: Carlo Zaniolo)  
Jeong Hyun An, USC M.S. in Computer Science, 2022. (Committee Chair)

### Mentoring (Before USC)

Haoyu Wang, UPenn MS Student in CIS (Now PhD student at UPenn). <b>Research mentor</b>	Fall 2019-Spring 2022
Tianran Zhang, UCLA PhD student in Bioengineering. <b>Research mentor</b>	Fall 2019-Winter 2021
Junheng Hao, UCLA PhD student in Computer Science. <b>Research mentor</b>	Fall 2017-Fall 2019
Xuelu (Shirley) Chen, UCLA PhD student in Computer Science. <b>Research mentor</b>	Fall 2017-Winter 2020
Pei Zhou, UCLA undergraduate student (Now PhD student at USC CS). <b>Research mentor</b>	Winter 2017-Spring 2019
Weijia Shi, UCLA undergraduate student (Now PhD student at UW CSE). <b>Research mentor</b>	Summer 2018-Spring 2019
Ankith Uppunda. UCLA undergraduate student. <b>Research mentor.</b>	Spring 2019
Zhubo Deng, UCLA undergraduate student. <b>Research mentor.</b>	Spring 2019
Xiaoshuang Wei, UCLA MS student in Computer Science (Now software engineer at Google). <b>Thesis mentor</b>	Spring 2017

## PROFESSIONAL SERVICE

### Panelist:

2021, 2022: NSF CISE Core Panel

### Conference Organization/Senior Committee Member:

2023: AAAI (**Area Chair**)  
2022: AAAI (Senior PC), NAACL (**Senior Area Chair** – Information Extraction), NAACL SRW (Faculty Mentor), EMNLP (**Area Chair** – Commonsense Reasoning), ACL (**Area Chair** – Information Retrieval and Text Mining)  
2021: AAAI (Senior PC), IJCAI (Senior PC)  
2019: IEEE AIKE (Doctoral Consortium Chair)

### Workshop Organization Member:

Indirect, Weak and Self Supervision for Knowledge Extraction (Wise-Supervision@AKBC), 2022  
Deep Learning on Graphs for Natural Language Processing (DLG4NLP@NAACL), 2022

### PC Member:

2021: ACL, EACL, NAACL, WSDM, WWW.  
2020: AAAI, ACL-IJCNLP, AKBC, COLING, EMNLP, IJCAI, ISWC, KDD, SIGIR, WSDM, \*SEM.  
2019: AAAI, AKBC, NAACL, ACL, EMNLP-IJCNLP, BigData, NLPCC, WISE, ICSC.  
2018: AAAI, EMNLP, BigData, NLPCC, SoCal NLP.

### Editorial Board: Frontiers in Big Data

**Journal Reviewer:** TPAMI, TACL, TNNLS, TASLP, Pattern Recognition, Bioinformatics, PLOS Computational Biology, Briefings in Bioinformatics, Cell Systems, Clinical and Translational Medicine, Comput. & Struct. Biotechnol., TKDD, TOIS, W3J, TKDE, TII, BMC Genomics, BMC Medical Genomics, BMC Human Genetics, Human Genomics, Quantitative Biology, GeoInformatica, Information Sciences.

### University Service

NSF REU Site, Co-organizer	2022
USC ISI Institutional AI Seminar, <b>Organizer</b>	2021.7-date
Department of Computer Science, <b>Faculty Hiring Committee</b>	2021, 2022
Viterbi School of Engineering, <b>Fellowship Committee</b>	2021
Department of Computer Science, <b>PhD Admission Fellowship Committee</b>	2021

## PRESENTATIONS

### *Invited talks, colloquia and tutorials*

1. Robust and Indirectly Supervised Information Extraction. *Invited talk, AI & ML Seminar, UCI*. Nov 2022 (scheduled)

2. Robust and Indirectly Supervised Information Extraction. *Invited talk, NL Seminar, UMN*. Nov 2022 (scheduled)
3. Robust and Indirectly Supervised Information Extraction. *Invited talk, CS Department Seminar (CS201), UCLA*. Oct 2022.
4. Robust and Indirectly Supervised Information Extraction. *Invited talk, CS Department Seminar (remote), Nanjing University*. Sept 2022.
5. Robust and Indirectly Supervised Information Extraction. *Invited talk, Apple, San Jose*. Aug 2022.
6. Robust and Indirectly Supervised Information Extraction. *Invited talk, Microsoft CSR Distinguished Talk Series*. July 2022.
7. New Frontiers of Information Extraction. *Half-day Tutorial at NAACL*. July, 2022.
8. Understanding Event Processes in Natural Language. *Invited talk, NLP Seminar, UC Santa Cruz*. April 2022.
9. Understanding Event Processes in Natural Language. *Invited talk, CS Department Seminar, Rutgers–New Brunswick*. March 2022.
10. Understanding Event Processes in Natural Language. *Invited talk, ML Seminar, Purdue University*. Sept 2021.
11. Understanding Event Processes in Natural Language. *Invited talk, Tencent AI Lab, Seattle*. Sept 2021.
12. Understanding Event Processes in Natural Language. *Invited talk, University of Central Florida*. Aug 2021.
13. Understanding Event Processes in Natural Language. *Invited talk, IBM Research Almaden*. July 2021.
14. Understanding Event Processes in Natural Language. *Invited talk, CS Department Seminar, Fudan University*. June 2021.
15. Understanding Event Processes in Natural Language. *Invited talk, CS Department Seminar, Nanjing University*. June 2021.
16. Understanding Event Processes in Natural Language. *Invited talk, NLP Seminar, National University of Singapore*. May 2021.
17. Understanding Event Processes in Natural Language. *Invited talk, NLP Seminar, OSU*. May 2021
18. Understanding Event Processes in Natural Language. *Invited talk, CS Research Colloquium, UCSB*. April 2021
19. Understanding Event Processes in Natural Language. *Invited talk, Frontier Topics in Vision and Language, ASU*. Mar 2021.
20. Understanding Event Processes in Natural Language. *Invited talk at Machine Learning and Big Data Seminar, UCLA*. Nov 2020
21. Event-Centric Natural Language Processing. *Half-day Tutorial at ACL*. Aug, 2021.
22. From Tables to Knowledge: Recent Advances in Table Understanding. *Half-day Tutorial at KDD*. Aug, 2021.
23. Understanding Event Processes in Natural Language. Understanding Event Processes in Natural Language. *Invited talk at Language Technology Seminar, University of Cambridge*. Nov 2020
24. Event-Centric Natural Language Understanding. *Half-day Tutorial at AAAI*. Feb, 2021.
25. Knowledge Acquisition with Transferable Representation Learning. *CS Research Colloquium, USC*. Nov 2020
26. Knowledge Acquisition with Transferable Representation Learning. *AI Seminar, USC ISI*. Los Angeles, Jan 2020.
27. Knowledge Acquisition with Transferable Representation Learning. *IBM Research Almaden*. San Jose, Jan 2020.
28. Knowledge Acquisition with Transferable Representation Learning. *Invited talk at FDSiF, Fudan Univ., Shanghai, China*. Dec 2019.
29. Knowledge Acquisition with Transferable Representation Learning. *Invited talk at SNAP Seminar, Stanford University*. Jan 2019.
30. Knowledge Acquisition with Transferable Representation Learning. *Machine Learning and Big Data Seminar, UCLA*. Jan 2019.
31. Recent Advances in Transferable Representation Learning. *Half-day tutorial at AAAI*. NYC, NY, Feb 2020.
32. Neural Article Pair Modeling for Wikipedia Sub-article Matching. *Google Search Intelligence Seminar Talk*. Sept 2017
33. Reasoning Across Multiple Spatiotemporal Granularity Systems. *Invited talk at Teradata Labs, El Segundo, CA, USA*. Mar 2015

## INDUSTRIAL EXPERIENCE

Microsoft Research, Redmond, WA (NLP Group) 2018.6-2018.9

- **Research Intern**, *Embedding Edge-attributed Relational Hierarchies*. [61]

Google, Mountain View, CA (Google Knowledge Graph) 2017.6~2017.9

- **Research Intern**, *Neural Article Pair Modeling for Large-scale Sub-article Relation Extraction*. [69,66,53]

Google, Mountain View, CA (Procella Real-time Data Infrastructure) 2016.6~2016.9



Chen, Muhao – CV (10/11/2022)

- **System SDE Intern**, *Dynamic Shard-partitioning for Large-scale Windowed Event Streams*.

Teradata Labs, Los Angeles, CA (Optimizer Group)

2015.6~2015.9

- **R&D Intern**, *Multi-task Learning for Cost-based Database Optimizers*.