Liyuan Liu

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"We are trying to prove ourselves wrong as quickly as possible, because only in that way can we find progress. — Richard Feynman"

RESEARCH INTEREST

Achieving **better resource productivity** is crucial to accommodate the ever-growing resource consumption of neural networks, and such productivity is in great demand to advance cutting-edge models or apply them to real-world applications. **To this end, I strive to build more productive algorithms to reach higher model performance and lower resource consumption.**

EDUCATION

UNIVERSITY OF ILLINOIS, URBANA-CHAMPAIGN (UIUC) *Illinois, USA*

PH.D. IN COMPUTER SCIENCE *September 2016 – Present*
- Advisor: Prof. Jiawei Han.

UNIVERSITY OF SCIENCE AND TECHNOLOGY OF CHINA (USTC) *Hefei, China*

B.E. IN COMPUTER SCIENCE *September 2012 – June 2016*
- Advisor: Prof. Linli Xu. Graduated *summa cum laude*.

HONORS & AWARDS

HIGHLIGHTS

Winner of the Topcoder Arabic NER Challenge 2018
- **Ranked 1st among 137 registrants and 220 submissions.**

Guo Moruo Scholarship 2015
- **Highest honor for USTC undergraduate students.**

Google Excellent Scholarship 2015
- **Only 58 graduate and undergraduate recipients nationwide.**

SCHOLARSHIPS AND AWARDS

Yee Fellowship Award	2020
Data Mining Group Research Award	2019, 2018, 2017
3th Place at WSDM Cup 2017 (Vandalism Detection Task)	2017
Samsung Scholarship	2015
Tencent Innovative Scholarship	2014
Seagate Scholarship	2013
Scholarship for Outstanding Students	2012, 2013

HIGHLIGHT PROJECTS

RAdam	**2400+ stars** and 300+ forks (since 2019).	[included in PyTorch] if **warmup** is the answer, what is the question?
LM-LSTM-CRF	**800+ stars** and 200+ forks (since 2018).	**first character-level LM**-based representation learning method
AutoNER	400+ stars (since 2018)	entity recognition **without line-by-line annotations**
Transformer Clinic	200+ stars (since 2020)	what complicates **Transformer** training?
LD-Net	100+ stars (since 2018)	**first** pre-trained language model **acceleration** method
Torch-Scope	**42k+ downloads** (since 2018)	toolkit for PyTorch model training

Professional Service

SPC Member	IJCAI2021
PC Member	WWW2021, AAAI2021, NIPS2020, EMNLP2020, ACL2020, WWW2020, AAAI2020, IJCAI2020, EMNLP2019, LLD2019, ACL2019, NAACL2019, AAAI2019, EMNLP2018
External Reviewer	ACL2018, NAACL2018, WWW2018, AAAI2018, KDD2018, ACL2017, EMNLP2017, KDD2017

Experience

Data Mining Group @ UIUC *IL, USA*
Research Assistant, Advisor: Prof. Jiawei Han *September 2016 – PRESENT*

Deep Learning Group @ MICROSOFT RESEARCH REDMOND *IL, USA*
Part-time Researcher, Advisor: Dr. Xiaodong Liu & Dr. Jianfeng Gao *August 2021 – PRESENT*

Deep Learning Group @ MICROSOFT RESEARCH REDMOND *IL, USA*
Research Intern, Advisor: Dr. Xiaodong Liu & Dr. Jianfeng Gao *May 2021 – August 2021*

AI Lab @ TENCENT *WA, USA*
Research Intern, Advisor: Dr. Jianshu Chen & Dr. Liwei Wang *May 2020 – August 2020*

Deep Learning Group @ MICROSOFT RESEARCH REDMOND *IL, USA*
Part-time Researcher, Advisor: Dr. Xiaodong Liu & Dr. Jianfeng Gao *January 2020 – May 2020*

D365 AI & MSR @ MICROSOFT *WA, USA*
Research Intern, Advisor: Dr. Weizhu Chen & Dr. Jianfeng Gao *May 2019 – August 2019*

AllenNLP @ AI2 *WA, USA*
Research Intern, Advisor: Dr. Matthew E. Peters *May 2018 – August 2018*

Social Computing Group @ MICROSOFT RESEARCH ASIA *Beijing, China*
Research Intern, Advisor: Dr. Ruihua Song *July 2015 – May 2016*

Laboratory of Semantic Computing and Data Mining @ USTC *Anhui, China*
Undergraduate Researcher, Advisor: Prof. Linli Xu *October 2013 – June 2015*

National Student Innovation Tranining Program @ USTC *Anhui, China*
Project Leader, Advisor: Prof. Kai Xing *April 2013 – May 2015*

Publications

Summary

During the last five years, I have published **20+ papers** in top conferences. These papers have been **cited about 1,500 times**, received about **4,000 stars** and **600+ forks** on Github, been awarded a **Grand Prize** in the Topcoder Named Entity Recognition Challenge, placed first in various benchmarks (e.g., WMT'14 En-Fr), been downloaded 42,000+ times, and been successfully deployed in a wide range of applications (from entity recognition for COVID-19 literature to large-scale online recommendation).

Preprint Papers

[1] Multi-head or Single-head? An Empirical Comparison for Transformer Training
Liyuan Liu, Jialu Liu, and Jiawei Han
arXiv preprint arXiv:2106.09650 [cs], Jun. 2021

[2] Very Deep Transformers for Neural Machine Translation
Xiaodong Liu, Kevin Duh, Liyuan Liu, and Jianfeng Gao
arXiv preprint arXiv:2008.07772 [cs], Aug. 2020.
Without introducing hyper-parameters, ranked 1st on WMT'14 En-Fr w./w.o. extra data as of Nov. 2020.

[3] Partially-Typed NER Datasets Integration: Connecting Practice to Theory
Shi Zhi**, Liyuan Liu***, Yu Zhang, Shiyin Wang, Qi Li, Chao Zhang, and Jiawei Han (*** Equal Contribution**)
arXiv preprint arXiv:2005.00502 [cs], May. 2020.

[4] Raw-to-End Name Entity Recognition in Social Media
Liyuan Liu, Zihan Wang, Jingbo Shang, Dandong Yin, Heng Ji, Xiang Ren, Shaowen Wang, and Jiawei Han
arXiv preprint arXiv:1908.05344 [cs], Aug. 2019.

Conference Papers

[6] On the Transformer Growth for Progressive BERT Training
Xiaotao Gu, Liyuan Liu, Hongkun Yu, Jing Li, Chen Chen, and Jiawei Han
*Proceeding of the 2021 Annual Conference of the North American Chapter of the Association for Computational Linguistics (**NAACL-HLT**), to appear.*

[7] Empower Distantly Supervised Relation Extraction with Collaborative Adversarial Training
Tao Chen, Haochen Shi, Liyuan Liu, Siliang Tang, Jian Shao, Zhigang Chen, and Yueting Zhuang
*Proceeding of the 2021 AAAI Conference on Artificial Intelligence (**AAAI**), Feb. 2021.*

[8] Graph Clustering with Embedding Propagation
Carl Yang, Liyuan Liu , Mengxiong Liu, Zongyi Wang, Chao Zhang, and Jiawei Han
*Proceeding of the 2020 IEEE International Conference on Big Data (**BigData**), Dec. 2020.*

[9] Understanding the Difficulty of Training Transformers
Liyuan Liu, Xiaodong Liu, Jianfeng Gao, Weizhu Chen, and Jiawei Han
*Proceeding of the 2020 Conference on Empirical Methods in Natural Language Processing (**EMNLP**), Nov. 2020.*
Open-sourced software received about 100 stars on Github as of Nov. 2020.

[10] Towards Adaptive Residual Network Training: A Neural-ODE Perspective
Chengyu Dong, Liyuan Liu, Zichao Li, and Jingbo Shang
*Proceeding of the 2020 International Conference on Machine Learning (**ICML**), Jul. 2020.*

[11] Joint Aspect-Sentiment Analysis with Minimal User Guidance
Honglei Zhuang, Fang Guo, Chao Zhang, Liyuan Liu, and Jiawei Han
*Proceeding of the 2020 ACM SIGIR International Conference on Research and development in Information Retrieval (**SIGIR**), Jul. 2020.*

[12] Facet-Aware Evaluation for Extractive Summarization
Yuning Mao, Liyuan Liu, Qi Zhu, Xiang Ren, and Jiawei Han
*Proceeding of the 2020 Annual Conference of the Association for Computational Linguistics (**ACL**), Jul. 2020.*

[13] Learning to Contextually Aggregate Multi-Source Supervision for Sequence Labeling
Ouyu Lan, Xiao Huang, Bill Yuchen Lin, He Jiang, Liyuan Liu, and Xiang Ren
*Proceeding of the 2020 Annual Conference of the Association for Computational Linguistics (**ACL**), Jul. 2020.*

[14] On the Variance of the Adaptive Learning Rate and Beyond
Liyuan Liu, Haoming Jiang, Pengcheng He, Weizhu Chen, Xiaodong Liu, Jianfeng Gao, and Jiawei Han
*Proceeding of the 2020 International Conference on Learning Representations (**ICLR**), Apr. 2020.*

As of Jun 2021, the algorithm is included as **one of 13 optimizers in the official PyTorch library**, together with Adadelta, Adagrad, Adam, AdamW, SparseAdam, Adamax, ASGD, LBFGS, NAdam, RMSprop, Rprop, and SGD.

[15] NetTaxo: Automated Topic Taxonomy Construction from Large-Scale Text-Rich Network
Jingbo Shang, Xinyang Zhang, Liyuan Liu, Sha Li, and Jiawei Han
*Proceeding of the 2020 International World Wide Web Conference (**WWW**), Apr. 2020.*

[16] CrossWeigh: Training Named Entity Tagger from Imperfect Annotations
Zihan Wang**, Jingbo Shang**, Liyuan Liu***, Lihao Lu, Jiacheng Liu, and Jiawei Han (*** Equal Contribution**)
*Proceeding of the 2019 Conference on Empirical Methods in Natural Language Processing (**EMNLP**), Hong Kong,*

China, Nov. 2019.

[17] Looking Beyond Label Noise: Shifted Label Distribution Matters in Distantly Supervised Relation Extraction
Qinyuan Ye*****, <u>Liyuan Liu</u>*****, Maosen Zhang, and Xiang Ren (***** Equal Contribution)
*Proceeding of the 2019 Conference on Empirical Methods in Natural Language Processing (**EMNLP**), Hong Kong, China, Nov. 2019.*

[18] Arabic Named Entity Recognition: What Works and What's Next
<u>Liyuan Liu</u>, Jingbo Shang, and Jiawei Han
*Proceeding of the 2019 Arabic Natural Language Processing Worksho (**WANLP**), co-located with ACL 2019, Florence, Italy, July 2019.*
Ranked 1st in the Topcoder Arabic NER Challenge.

[19] Reliability-aware Dynamic Feature Composition for Name Tagging
Ying Lin, <u>Liyuan Liu</u>, Heng Ji, Dong Yu, and Jiawei Han
*Proceeding of the 2019 Annual Meeting of the Association for Computational Linguistics (**ACL**), Florence, Italy, Jul. 2019.*

[20] Constructing and Mining Heterogeneous Information Networks from Massive Text
Jingbo Shang, Jiaming Shen, <u>Liyuan Liu</u>, and Jiawei Han
*Conference tutorial at the 2019 ACM SIGKDD International Conference on Knowledge Discovery and Data Mining (**KDD**), Anchorage, AK, Aug. 2019.*

[21] Cross-relation Cross-bag Attention for Distantly-supervised Relation Extraction
Yujin Yuan, <u>Liyuan Liu</u>, Siliang Tang, Zhongfei Zhang, Yueting Zhuang, Fei Wu, and Xiang Ren
*Proceeding of the 2019 AAAI Conference on Artificial Intelligence (**AAAI**), Honolulu, HI, Jan. 2019.*

[22] Learning Named Entity Tagger using Domain-Specific Dictionary
Jingbo Shang*****, <u>Liyuan Liu</u>*****, Xiaotao Gu, Xiang Ren, Teng Ren, and Jiawei Han (***** Equal Contribution)
*Proceeding of the 2018 Conference on Empirical Methods in Natural Language Processing (**EMNLP**), Brussels, Belgium, Oct. 2018.*
Open-sourced software received about 300 stars on Github as of Nov. 2020.

[23] Efficient Contextualized Representation: Compressing Language Models for Sequence Labeling
<u>Liyuan Liu</u>, Xiang Ren, Jingbo Shang, Jian Peng, and Jiawei Han
*Proceeding of the 2018 Conference on Empirical Methods in Natural Language Processing (**EMNLP**), Brussels, Belgium, Oct. 2018.*
Open-sourced software received about 150 stars on Github as of Nov. 2020.

[24] Empower Sequence Labeling with Task-Aware Neural Language Model
<u>Liyuan Liu</u>, Jingbo Shang, Frank Xu, Xiang Ren, Huan Gui, Jian Peng, and Jiawei Han
*Proceeding of the 2018 AAAI Conference on Artificial Intelligence (**AAAI**), New Orleans, LA, Feb. 2018.*
Open-sourced software received about 750 stars on Github as of Nov. 2020.

[25] Heterogeneous Supervision for Relation Extraction: A Representation Learning Approach
<u>Liyuan Liu</u>*****, Xiang Ren*****, Qi Zhu, Shi Zhi, Huan Gui, Heng Ji, and Jiawei Han (***** Equal Contribution)
*Proceeding of the 2017 Conference on Empirical Methods in Natural Language Processing (**EMNLP**), Copenhagen, Denmark, Sept. 2017.*

[26] TrioVecEvent: Embedding-Based Online Local Event Detection in Geo-Tagged Tweet Streams
Chao Zhang, <u>Liyuan Liu</u>, Dongming Lei, Quan Yuan, Honglei Zhuang, Tim Hanratty, and Jiawei Han
*Proceeding of the 2017 ACM SIGKDD International Conference on Knowledge Discovery and Data Mining (**KDD**), Halifax, Nova Scotia, Canada, Aug. 2017.*

[27] Wikidata Vandalism Detection—The Loganberry Vandalism Detector at WSDM Cup 2017
Qi Zhu, Hongwei Ng, <u>Liyuan Liu</u>, Ziwei Ji, Bingjie Jiang, Jiaming Shen, and Huan Gui
*Proceeding of the WSDM Cup 2017 Notebook Papers (**WSDM Cup**), Feb. 10, Cambridge, UK.*

[28] Community Detection Based on Structure and Content: A Content Propagation Perspective
<u>Liyuan Liu</u>, Linli Xu, Zhen Wang, and Enhong Chen

*Proceeding of the 2015 International Conference on Data Mining (**ICDM**), Atlantic City, NJ, USA, Nov. 2015.*