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Created: 2023-11-27 12:09:14-05:00

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## ACADEMIC BACKGROUNDS

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**Department of Computer Science, Emory University**  
*Tenure-Track Assistant Professor*

*Aug. 2020 - present*  
*Atlanta, GA, US*

- Research interests: graph data mining, applied machine learning, knowledge graphs, federated learning; recommender systems, social networks, neuroscience, healthcare.
- Assistant Professor (secondary appointment), Department of Biostatistics and Bioinformatics, Rollins School of Public Health (RSPH).
- Core Faculty, Emory Global Diabetes Research Center (EGDRC).
- Center Member, Georgia Center for Diabetes Translation Research (GCDTR).
- CSI Ph.D. Admission Committee, Dean's Teaching Fellowship Faculty Committee, Academic Standards Committee (Natural Science and Mathematics).
- Mentor at the NSF REU/RET in Maths/CS at Emory; Mentor at the KDD Undergraduate Consortium.

**Intelligent Systems Lab, Oxford University**

*Postdoctoral Research Fellow, Supervisor: Thomas Lukasiewicz*

*Apr. 2020 - Mar. 2022*  
*Oxford, UK*

- Research interests: multi-modality knowledge extraction, question answering, commonsense reasoning.

**Data Mining Group, University of Illinois, Urbana Champaign**

*Ph.D. in Computer Science, Research Assistant, Teaching Assistant*

*Committee: Jiawei Han (chair), Jian Peng, Chengxiang Zhai, Jure Leskovec*

*Aug. 2014 - Dec. 2020*

*Urbana, IL, US*

- GPA 3.95/4.0; Research interests: graph data mining, network data science, applied machine learning.
- Thesis: Multi-Facet Graph Mining with Contextualized Projections
- KDD 2021 Dissertation Award Nomination (9 world-wide)

**Chu Kochen Honors College, Zhejiang University**

*B.Eng. in Computer Science & Technology, Advisor: Xiaofei He*

*Sep. 2010 - Jun. 2014*  
*Hangzhou, Zhejiang, China*

- GPA: Major: 3.97/4.0, Overall: 3.86/4.0; Ranking: Top 2% of 201 students.

## SELECTED HONORS

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- NIH K25 Award (No. K25DK135913), 2023.
- NSF IIS/III Core Medium Award (No. 2312502), 2023.
- NSF NCS Foundations Award (No. 2319449), 2023.
- Microsoft Accelerating Foundation Models Research Award, 2023.
- OpenAI Researcher Access Award, 2023.
- Amazon Research Award, 2022.
- Emory URC Award, 2022.
- Halle Global Research Award, 2021.
- Best Paper Award of ML4H, 2022.
- Best Paper Award of KDD Health Day, 2022.
- Best Paper Award of CIKM-FedGraph, 2022.
- Best Paper Award of ICDM (1 from 930 submissions), 2020.
- Best Paper Award Runner-Up of KDD Applied Data Science, 2020.
- UIUC Doctoral Dissertation Completion Fellowship (at most 1 per department), 2020.

## PEER-REVIEWED PUBLICATIONS

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### Since 2021 (Tenure-Track):

- Zhenghong Lin, Yanchao Tan, Qishan Yan, Weiming Liu, Shiping Wang, Menghan Wang, **Carl Yang**: *Automatic Hypergraph Generation for Enhancing Recommendation with Sparse Optimization*. IEEE Transactions on Multimedia (**TMM**), 2024.
- Carlo De Cecco, Marly van Assen, Amara Tariq, Alexander Razavi, **Carl Yang**, Imon Banerjee: *Combining Imaging and Electronic Medical Record Data for Risk Stratification and Outcome Prediction in Cardiology*. Circulation: Cardiovascular Imaging, 2024.
- Amit Roy, Juan Shu, Jia Li, **Carl Yang**, Olivier Elshocht, Jeroen Smeets, Pan Li: *GAD-NR: Graph Anomaly Detection via Neighborhood Reconstruction*. Proceedings of the ACM International Conference on Web Search and Data Mining (**WSDM**), 2024.
- Yi Yang, Han Xie, Hejie Cui, **Carl Yang**: *FedBrain: Federated Training of Graph Neural Networks for Connectome-based Brain Imaging Analysis*. Proceedings of the Pacific Symposium on Biocomputing (**PSB**), 2024.
- Alexis Li, Yi Yang, Hejie Cui, **Carl Yang**: *BrainSTEAM: A Practical Pipeline for Connectome-based fMRI Analysis towards Subject Classification*. Proceedings of the Pacific Symposium on Biocomputing (**PSB**), 2024.
- Yanchao Tan, Zihao Zhou, Hang Lv, Weiming Liu, **Carl Yang**: *WalkLM: A Uniform Language Model Fine-tuning Framework for Attributed Graph Embedding*. Proceedings of the Conference on Neural Information Processing Systems (**NeurIPS**), 2023.
- Hejie Cui, Xinyu Fang, Zihan Zhang, Ran Xu, Xuan Kan, Xin Liu, Yue Yu, Manling Li, Yangqiu Song, **Carl Yang**: *Open Visual Knowledge Extraction via Relation-Oriented Multimodality Model Prompting*. Proceedings of the Conference on Neural Information Processing Systems (**NeurIPS**), 2023.
- Jiarong Xu, Renhong Huang, Xin Jiang, Yuxuan Cao, **Carl Yang**, Chungping Wang, Yang Yang: *Better with Less: A Data-Centric Perspective on Pre-Training Graph Neural Networks*. Proceedings of the Conference on Neural Information Processing Systems (**NeurIPS**), 2023.
- Jiaying Lu, Yongchen Qian, Shifan Zhao, Yuanzhe Xi, **Carl Yang**: *MuG: A Multimodal Classification Benchmark on Game Data with Tabular, Textual, and Visual Fields*. Findings of the Association for Computational Linguistics: EMNLP (**EMNLP-Findings**), 2023.
- Yanchao Tan, Zihao Zhou, Leisheng Yu, Weiming Liu, Chaochao Chen, Guofang Ma, Xiao Hu, Vicki Hertzberg, **Carl Yang**: *Enhancing Personalized Healthcare via Capturing Disease Severity, Interaction, and Progression*. Proceedings of the IEEE International Conference on Data Mining (**ICDM**), 2023.
- Dong Chen, Siliang Tang, Zijin Shen, Guoming Wang, Jun Xiao, Yueting Zhuang, **Carl Yang**: *FedAA: Using Non-sensitive Modalities to Improve Federated Learning while Preserving Image Privacy*. Proceedings of the ACM International Conference on Multimedia (**MM**), 2023.
- Zhenghong Lin, Yanchao Tan, Yunfei Zhan, Weiming Liu, Fan Wang, Chaochao Chen, Shiping Wang, **Carl Yang**: *Contrastive Intra- and Inter-Modality Generation for Enhancing Incomplete Multimedia Recommendation*. Proceedings of the ACM International Conference on Multimedia (**MM**), 2023.
- Xuan Kan, Antonio Aodong Chen Gu, Hejie Cui, Ying Guo, **Carl Yang**: *Dynamic Brain Transformer with Multi-level Attention for Brain Network Analysis*. Proceedings of the IEEE International Conference on Biomedical and Health Informatics (**BHI**), 2023.
- Han Xie, Da Zheng, Jun Ma, Houyu Zhang, Vassilis N. Ioannidis, Xiang Song, Qing Ping, Sheng Wang, **Carl Yang**, Yi Xu, Belinda Zeng, Trishul Chilimbi: *Graph-Aware Language Model Pre-Training on a Large Graph Corpus Can Help Multiple Graph Applications*. Proceedings of the ACM International Conference on Knowledge Discovery and Data Mining (**KDD**), 2023.
- Xuan Kan, Zimu Li, Hejie Cui, Yue Yu, Ran Xu, Shaojun Yu, Zilong Zhang, Ying Guo, **Carl Yang**: *R-Mixup: Riemannian Mixup for Biological Networks*. Proceedings of the ACM International Conference on Knowledge Discovery and Data Mining (**KDD**), 2023.
- Yuxuan Cao, Jiarong Xu, **Carl Yang**, Jiaan Wang, Yunchao Zhang, Chunping Wang, Lei Chen, Yang Yang: *When to Pre-Train Graph Neural Networks? An Answer from Data Generation Perspective!*.

Proceedings of the ACM International Conference on Knowledge Discovery and Data Mining (**KDD**), 2023.

- Hejie Cui, Rongmei Lin, Nasser Zalmout, Chenwei Zhang, Jingbo Shang, **Carl Yang**, Xian Li: *PV2TEA: Patching Visual Modality to Textual-Established Product Attribute Extraction*. Findings of the Association for Computational Linguistics: ACL (**ACL-Findings**), 2023.
- **Carl Yang**, Xiaoxiao Li, Jundong Li, Lichao Sun, Nathalie Baracaldo, Lingjuan Lyu, Bolin Ding, Salman Avestimehr: *The 2nd International Workshop on Federated Learning with Graph Data (Fed-Graph2023)*. Proceedings of the IEEE International Conference on Data Mining (**ICDM**), 2023.
- Hejie Cui, Xuan Kan, Xiaoxiao Li, Lifang He, Liang Zhan, Ying Guo, **Carl Yang**: *Brain Network Analysis with Graph Neural Network*. Tutorial at the International Conference on Intelligent Biology and Medicine (**ICIBM**), 2023.
- Yi Yang, Hejie Cui, **Carl Yang**: *PTGB: Pre-Train Graph Neural Networks for Brain Network Analysis*. The Conference on Health, Inference, and Learning (**CHIL**), *Oral*, 2023.
- Mingyue Tang, Jiechao Gao, Guimin Dong, **Carl Yang**, Brad Campbell, Brendan Bowman, Jamie Marie Zoellner, Emaad Abdel-Rahman, Mehdi Boukhechba: *SRDA: Mobile Sensing based Fluid Overload Detection for End Stage Kidney Disease Patients using Sensor Relation Dual Autoencoder*. The Conference on Health, Inference, and Learning (**CHIL**), 2023.
- Jiaying Lu, Jiaming Shen, Bo Xiong, Wenjing Ma, Steffen Staab, **Carl Yang**: *HiPrompt: Few-Shot Biomedical Knowledge Fusion via Hierarchy-Oriented Prompting*. Proceedings of the ACM International Conference on Research and Development in Information Retrieval (**SIGIR**), 2023.
- Ran Xu, Yue Yu, Joyce Ho, **Carl Yang**: *Weakly-supervised Scientific Document Classification via Retrieval-based Multi-stage Training*. Proceedings of the ACM International Conference on Research and Development in Information Retrieval (**SIGIR**), 2023.
- Chen Lin, Jianghong Zhou, Jing Zhang, **Carl Yang**, Eugene Agichtein: *Graph Neural Network Modeling of Web Search Activity for Real-time Pandemic Forecasting*. Proceedings of the IEEE International Conference on Healthcare Informatics (**ICHI**), 2023.
- Jiaying Lu, Xiangjue Dong, **Carl Yang**: *Weakly Supervised Concept Map Generation through Task-Guided Graph Translation*. IEEE Transactions on Knowledge and Data Engineering (**TKDE**), 2023.
- Cheng Ling, **Carl Yang**, Liang Zhao: *Motif-guided Heterogeneous Graph Deep Generation*. Knowledge and Information Systems (**KAIS**), 2023.
- Han Xie, Li Xiong, **Carl Yang**: *Federated Node Classification over Graphs with Latent Link-type Heterogeneity*. Proceedings of the International World Wide Web Conference (**WWW**), 2023.
- Yue Yu, Xuan Kan, Hejie Cui, Ran Xu, Yujia Zheng, Xiangchen Song, Kun Zhang, Razieh Nabi, Ying Guo, Chao Zhang, **Carl Yang**: *Deep DAG Learning towards Effective Brain Connectivity for fMRI Analysis*. Proceedings of the IEEE International Symposium on Biomedical Imaging (**ISBI**), 2023.
- Wei Dai, Hejie Cui, Xuan Kan, Ying Guo, Sanne van Rooij, **Carl Yang**: *Transformer Based Hierarchical Clustering On Brain Networks*. Proceedings of the IEEE International Symposium on Biomedical Imaging (**ISBI**), 2023.
- Ran Xu, Mohammed K Ali, Joyce Ho, **Carl Yang**: *Hypergraph Transformers for EHR-based Clinical Predictions*. Proceedings of the American Medical Informatics Association Informatics Summit (**AMIA**), 2023.
- Ran Xu, Yue Yu, Hejie Cui, Xuan Kan, Yanqiao Zhu, Chao Zhang, Joyce Ho, **Carl Yang**: *Neighborhood-Regularized Self-Training for Label-Efficient Learning*. Proceedings of the AAAI International Conference on Artificial Intelligence (**AAAI**), 2023.
- Zishan Gu, Ke Zhang, Guangji Bai, Liang Chen, Liang Zhao, **Carl Yang**: *Dynamic Activation of Clients and Parameters for Federated Learning over Heterogeneous Graphs*. Proceedings of the IEEE International Conference on Data Engineering (**ICDE**), 2023.
- **Carl Yang**, Jiawei Han: *Revisiting Citation Prediction with Cluster-Aware Text-Enhanced Heterogeneous Graph Neural Networks*. Proceedings of the IEEE International Conference on Data Engineering (**ICDE**), 2023.

- Dong Chen, Yueting Zhuang, Zijin Shen, **Carl Yang**, Guoming Wang, Siliang Tang, Yi Yang: *Cross-modal Data Augmentation for Tasks of Different Modalities*. IEEE Transactions on Multimedia (**TMM**), 2022.
- **Carl Yang**, Xiaoxiao Li, Qingyu Zhao: *The 1st International Workshop on Neural Network Models for Brain Connectome Analysis (BrainNN2022)*. Proceedings of the IEEE International Conference on Big Data (**BigData**), 2022.
- Ran Xu, Yue Yu, Chao Zhang, Mohammed K Ali, Joyce Ho, **Carl Yang**: *Counterfactual and Factual Reasoning over Hypergraphs for Interpretable Clinical Predictions on EHR*. Proceedings of the Machine Learning for Health Symposium (**ML4H**), **Best Paper Award**, 2022.
- Xuan Kan, Wei Dai, Hejie Cui, Zilong Zhang, Ying Guo, **Carl Yang**: *Brain Network Transformer*. Proceedings of the Conference on Neural Information Processing Systems (**NeurIPS**), 2022.
- Qi Zhu, Chao Zhang, Chanyoung Park, **Carl Yang**, Jiawei Han: *Shift-Robust Node Classification via Graph Clustering Co-training*. Workshop on New Frontiers in Graph Learning: The Conference on Neural Information Processing Systems (**NeurIPS-GLFrontiers**), 2022.
- Hejie Cui, Wei Dai, Yanqiao Zhu, Xuan Kan, Antonio Aodong Chen Gu, Joshua Lukemire, Liang Zhan, Lifang He, Ying Guo, **Carl Yang**: *BrainGB: A Benchmark for Brain Network Analysis with Graph Neural Networks*. IEEE Transactions on Medical Imaging (**TMI**), 2022.
- Gongxu Luo, Chenyang Li, Hejie Cui, Lichao Sun, Lifang He, **Carl Yang**: *Multi-View Brain Network Analysis with Cross-View Missing Network Generation*. Proceedings of the IEEE International Conference on Bioinformatics and Biomedicine (**BIBM**), 2022.
- Kai Zhang, Yu Wang, Hongyi Wang, Lifu Huang, **Carl Yang**, Xun Chen, Lichao Sun: *Efficient Federated Learning on Knowledge Graphs via Privacy-preserving Relation Embedding Aggregation*. Findings of the Association for Computational Linguistics: EMNLP (**EMNLP-Findings**), 2022.
- Jiaying Lu, **Carl Yang**: *Open-World Taxonomy and Knowledge Graph Co-Learning*. Proceedings of the Conference on Automated Knowledge Base Construction (**AKBC**), 2022.
- Xiaolin Zheng, Yanchao Tan, Yan Wang, Xiangyu Wei, Shengjia Zhang, Chaochao Chen, Longfei Li, **Carl Yang**: *Finding High-quality Item Attributes for Recommendation*. IEEE Transactions on Knowledge and Data Engineering (**TKDE**), 2022.
- Hejie Cui, Zijie Lu, Pan Li, **Carl Yang**: *On Positional and Structural Node Features for Graph Neural Networks on Non-Attributed Graphs*. Proceedings of the ACM International Conference on Information and Knowledge Management (**CIKM**), 2022.
- **Carl Yang**, Xiaoxiao Li, Nathalie Baracaldo, Neil Shah, Chaoyang He, Lingjuan Lyu, Lichao Sun, Salman Avestimehr: *The 1st International Workshop on Federated Learning with Graph Data (Fed-Graph)*. Proceedings of the ACM International Conference on Information and Knowledge Management (**CIKM**), 2022.
- Ke Zhang, Han Xie, Zishan Gu, Xiaoxiao Li, Lichao Sun, Siu Ming Yiu, Yuan Yao, **Carl Yang**: *Sub-graph Federated Learning over Heterogeneous Graphs*. Workshop on Federated Learning with Graph Data: The ACM International Conference on Information and Knowledge Management (**CIKM-FedGraph**), 2022.
- Shuang Wu, Mingxuan Zhang, Yuantong Li, **Carl Yang**, Pan Li: *Graph Federated Learning with Hidden Representation Sharing*. Workshop on Federated Learning with Graph Data: The ACM International Conference on Information and Knowledge Management (**CIKM-FedGraph**), 2022.
- Yanchao Tan, **Carl Yang**, Xiangyu Wei, Ziyue Wu, Weiming Liu, Xiaolin Zheng: *Partial Relaxed Optimal Transport for Denoised Recommendation*. Workshop on Deep Learning for Search and Recommendation: The ACM International Conference on Information and Knowledge Management (**CIKM-DL4SR**), 2022.
- Hejie Cui, Wei Dai, Yanqiao Zhu, Xiaoxiao Li, Lifang He, **Carl Yang**: *Interpretable Graph Neural Networks for Connectome-Based Brain Disorder Analysis*. Proceedings of the International Conference on Medical Image Computing and Computer Assisted Intervention (**MICCAI**), 2022.

- **Carl Yang**, Hongwen Song, Mingyue Tang, Leon Danon, Ymir Vigfusson: *Dynamic Network Anomaly Modeling of Cell-Phone Call Detail Records for Infectious Disease Surveillance*. Proceedings of the ACM International Conference on Knowledge Discovery and Data Mining (**KDD**), *Best Paper Award of Health Day*, 2022.
- Yanchao Tan, Chengjun Kong, Leisheng Yu, Pan Li, Chaochao Chen, Xiaolin Zheng, Vicki Hertzberg, **Carl Yang**: *4SDrug: Symptom-based Set-to-set Small and Safe Drug Recommendation*. Proceedings of the ACM International Conference on Knowledge Discovery and Data Mining (**KDD**), 2022.
- Yi Yang, Yanqiao Zhu, Hejie Cui, Xuan Kan, Lifang He, **Carl Yang**: *Data-Efficient Brain Connectome Analysis via Multi-Task Meta-Learning*. Proceedings of the ACM International Conference on Knowledge Discovery and Data Mining (**KDD**), 2022.
- Junru Chen, Yang Yang, Tao Yu, Yingying Fan, Xiaolong Mo, **Carl Yang**: *BrainNet: Epileptic Wave Detection from SEEG with Hierarchical Graph Diffusion Learning*. Proceedings of the ACM International Conference on Knowledge Discovery and Data Mining (**KDD**), 2022.
- Yu Shi, Fangqiu Han, Xinwei He, Xinran He, **Carl Yang**, Jie Luo, Jiawei Han: *mvn2vec: Preservation and Collaboration in Multi-View Network Embedding*. Workshop on Mining and Learning with Graphs: The ACM International Conference on Knowledge Discovery and Data Mining (**KDD-MLG**), 2022 (arXiv, 2018).
- Lichao Sun, Yingtong Dou, **Carl Yang**, Ji Wang, Philip Yu, Lifang He, Bo Li: *Adversarial Attack and Defense on Graph Data: A Survey*. IEEE Transactions on Knowledge and Data Engineering (**TKDE**), 2022 (arXiv, 2018).
- Yuanxin Zhuang, Lingjuan Lyu, Chuan Shi, **Carl Yang**, Lichao Sun: *Data-Free Adversarial Knowledge Distillation for Graph Neural Networks*. Proceedings of the International Joint Conference on Artificial Intelligence (**IJCAI**), 2022.
- Yuxin Xiao, Zecheng Zhang, Yuning Mao, **Carl Yang**, Jiawei Han: *SAIS: Supervising and Augmenting Intermediate Steps for Document-Level Relation Extraction*. Proceedings of the Annual Conference of the North American Chapter of the Association for Computational Linguistics (**NAACL**), *Oral*, 2022.
- Yanqiao Zhu, Hejie Cui, Lifang He, Lichao Sun, **Carl Yang**: *Joint Embedding of Structural and Functional Brain Networks with Graph Neural Networks for Mental Illness Diagnosis*. Proceedings of the Annual International Conference of the IEEE Engineering in Medicine and Biology Society (**EMBC**), 2022.
- Yanchao Tan, **Carl Yang**, Xiangyu Wei, Chaochao Chen, Weiming Liu, Longfei Li, Jun Zhou and Xiaolin Zheng: *MetaCare++: Meta-Learning with Hierarchical Subtyping for Cold-Start Diagnosis Prediction in Healthcare Data*, Proceedings of the ACM International Conference on Research and Development in Information Retrieval (**SIGIR**), 2022.
- Xuan Kan, Hejie Cui, Ying Guo, **Carl Yang**: *FBNetGen: Task-aware GNN-based fMRI Analysis via Functional Brain Network Generation*. Proceedings of the International Conference on Medical Imaging with Deep Learning (**MIDL**), 2022.
- **Carl Yang**, Mingyue Tang, Pan Li: *Graph Auto-Encoder via Neighborhood Wasserstein Reconstruction*. Proceedings of the International Conference on Learning Representations (**ICLR**), 2022.
- Yiqing Xie, Zhen Wang, **Carl Yang**, Yaliang Li, Bolin Ding, Hongbo Deng, Jiawei Han: *KoMen: Domain Knowledge Guided Interaction Recommendation for Emerging Scenarios*. Proceedings of the International World Wide Web Conference (**WWW**), 2022.
- Zhaoming Kong, Aditya Kendre, Jun Yu, Hao Peng, **Carl Yang**, Lichao Sun, Alex Leow, Lifang He: *Structure-Preserving Graph Kernel for Brain Network Classification*. Proceedings of the the IEEE International Symposium on Biomedical Imaging (**ISBI**), 2022.
- Yanqiao Zhu, Yichen Xu, Hejie Cui, **Carl Yang**, Qiang Liu, Shu Wu: *Structure-Enhanced Heterogeneous Graph Contrastive Learning*. Proceedings of the SIAM International Conference on Data Mining (**SDM**), 2022.
- Hejie Cui, Jiaying Lu, Yao Ge, **Carl Yang**: *How Can Graph Neural Networks Help Document Retrieval: A Case Study on CORD19 with Concept Map Generation*. Proceedings of the European Conference on

- Information Retrieval (**ECIR**), 2022.
- Yanchao Tan, **Carl Yang**, Xiangyu Wei, Chaochao Chen, Longfei Li, Xiaolin Zheng: *Enhancing Recommendation with Automated Tag Taxonomy Construction in Hyperbolic Space*. Proceedings of the IEEE International Conference on Data Engineering (**ICDE**), 2022.
  - Ke Zhang, **Carl Yang**, Xiaoxiao Li, Lichao Sun, Siu Ming Yiu: *Subgraph Federated Learning with Missing Neighbor Generation*. Proceedings of the Conference on Neural Information Processing Systems (**NeurIPS**), *Spotlight*, 2021.
  - Han Xie, Jing Ma, Li Xiong, **Carl Yang**: *Federated Graph Classification over Non-IID Graphs*, Proceedings of the Conference on Neural Information Processing Systems (**NeurIPS**), 2021.
  - **Carl Yang**, Qi Zhu, Yidan Xu, Haonan Wang, Chao Zhang, Jiawei Han: *Transfer Learning of Graph Neural Networks with Ego-graph Information Maximization*. Proceedings of the Conference on Neural Information Processing Systems (**NeurIPS**), 2021.
  - Jamie Cui, Chaochao Chen, Lingjuan Lyu, **Carl Yang**, Wang Li: *Exploiting Data Sparsity in Secure Cross-Platform Social Recommendation*. Proceedings of the Conference on Neural Information Processing Systems (**NeurIPS**), 2021.
  - Chaoyang He, Keshav Balasubramanian, Emir Ceyani, **Carl Yang**, Han Xie, Lichao Sun, Lifang He, Liangwei Yang, Philip S. Yu, Yu Rong, Peilin Zhao, Junzhou Huang, Murali Annavaram, Salman Avestimehr: *FedGraphNN: A Federated Learning System and Benchmark for Graph Neural Networks*. Workshop on Distributed and Private Machine Learning: The International Conference on Learning Representations (**ICLR-DPML**); Workshop on Graph Neural Networks and Systems: The Conference on Machine Learning and Systems (**MLSys-GNNSys**), 2021.
  - Di Jin, Zhizhi Yu, Dongxiao He, Carl Yang, Philip S. Yu, Jiawei Han: *GCN for HIN via Implicit Utilization of Attention and Meta-paths*. IEEE Transactions on Knowledge and Data Engineering (**TKDE**), 2021.
  - Chen Ling, **Carl Yang**, Liang Zhao: *Deep Generation of Heterogeneous Networks*. Proceedings of the IEEE International Conference on Data Mining (**ICDM**), 2021.
  - Sai Vidharanya Nuthalapati, Ramraj Chandradevan, Eleonora Giunchiglia, Bowen Li, Maxime Kayser, Thomas Lukasiewicz, **Carl Yang**: *Lightweight Visual Question Answering using Scene Graphs*. Proceedings of the ACM International Conference on Information and Knowledge Management (**CIKM**), 2021.
  - Xuan Kan, Hejie Cui, **Carl Yang**: *Zero-Shot Scene Graph Relation Prediction through Commonsense Knowledge Integration*. Proceedings of the European Conference on Machine Learning and Principles and Practice of Knowledge Discovery in Databases (**ECML-PKDD**), 2021.
  - **Carl Yang**, Haonan Wang, Ke Zhang, Liang Chen, Lichao Sun: *Secure Deep Graph Generation with Link Differential Privacy*. Proceedings of the International Joint Conference on Artificial Intelligence (**IJCAI**), 2021.
  - Gongxu Luo, Hao Peng, Jianxin Li, Lichao Sun, **Carl Yang**, Philip Yu, Lifang He: *Graph Entropy Guided Node Embedding Dimension Selection for Graph Neural Networks*. Proceedings of the International Joint Conference on Artificial Intelligence (**IJCAI**), 2021.
  - Liang Chen, Jintang Li, Qibiao Peng, Yang Liu, Zibin Zheng, **Carl Yang**: *Understanding Structural Vulnerability in Graph Convolutional Networks*. Proceedings of the International Joint Conference on Artificial Intelligence (**IJCAI**), 2021.
  - Haonan Wang, Chang Zhou, **Carl Yang**, Hongxia Yang, Jingrui He: *Controllable Gradient Item Retrieval*. Proceedings of the International World Wide Web Conference (**WWW**), 2021.
  - Wenjie Hu, Yang Yang, Ziqiang Cheng, **Carl Yang**, Xiang Ren: *Time-Series Event Prediction with Evolutionary State Graph*. Proceedings of the ACM International Conference on Web Search and Data Mining (**WSDM**), 2021.
  - Yuanzhen Xie, Zijing Ou, Liang Chen, Yang Liu, Kun Xu, **Carl Yang**, Zibin Zheng: *Learning and Updating Node Embedding on Dynamic Heterogeneous Information Network*. Proceedings of the ACM International Conference on Web Search and Data Mining (**WSDM**), 2021.

- Yanchao Tan, **Carl Yang**, Xiangyu Wei, Yun Ma, Xiaolin Zheng: *Multi-Facet Recommender Networks with Spherical Optimization*. Proceedings of the IEEE International Conference on Data Engineering (**ICDE**), 2021.

#### Before 2021 (Ph.D. Graduation):

- **Carl Yang**: *Multi-Facet Graph Mining with Contextualized Projections*. Graduate Dissertations and Theses at Illinois, 2020.
- **Carl Yang**, Jieyu Zhang, Jiawei Han: *Co-Embedding Network Nodes and Hierarchical Labels with Taxonomy Based Generative Adversarial Nets*. Proceedings of the IEEE International Conference on Data Mining (**ICDM**), **Best Paper Award**, 2020.
- **Carl Yang**, Yuxin Xiao, Yu Zhang, Yizhou Sun, Jiawei Han: *Heterogeneous Network Representation Learning: A Unified Framework with Survey and Benchmark*. IEEE Transactions on Knowledge and Data Engineering (**TKDE**), 2020.
- **Carl Yang**, Aditya Pal, Andrew Zhai, Nickil Pancha, Jure Leskovec, Jiawei Han: *MultiSage: Empowering GCN with Contextualized Multi-Embeddings on Web-Scale Multipartite Networks*. Proceedings of the ACM International Conference on Knowledge Discovery and Data Mining (**KDD**), **Best Paper Award Runner-Up of Applied Data Science**, 2020.
- **Carl Yang**, Jieyu Zhang, Haonan Wang, Bangzheng Li, Jiawei Han: *Neural Concept Map Generation for Effective Document Classification with Interpretable Structured Summarization*. Proceedings of the ACM International Conference on Research and Development in Information Retrieval (**SIGIR**), 2020.
- **Carl Yang**, Jieyu Zhang, Haonan Wang, Sha Li, Myunghwan Kim, Matthew Walker, Yiyou Xiao, Jiawei Han: *Relation Learning on Social Networks with Multi-Modal Graph Edge Variational Autoencoders*. Proceedings of the ACM International Conference on Web Search and Data Mining (**WSDM**), 2020.
- **Carl Yang**, Liyuan Liu, Mengxiong Liu, Zongyi Wang, Chao Zhang, Jiawei Han: *Graph Clustering with Embedding Propagation*. Proceedings of the IEEE International Conference on Big Data (**BigData**), 2020 (arXiv, 2017).
- **Carl Yang**, Peiye Zhuang, Wenhan Shi, Alan Luu, Pan Li: *Conditional Structure Generation through Graph Variational Generative Adversarial Nets*. Proceedings of the (**NeurIPS**), 2019.
- **Carl Yang**, Mengxiong Liu, Frank He, Jian Peng, Jiawei Han: *cube2net: Efficient Quality Network Construction with Data Cube Organization*. PhD forum of the IEEE International Conference on Data Mining (**ICDM**), 2019.
- **Carl Yang**, Jieyu Zhang, Jiawei Han: *Neural Embedding Propagation on Heterogeneous Networks*. Proceedings of the IEEE International Conference on Data Mining (**ICDM**), 2019.
- **Carl Yang**, Lingrui Gan, Zongyi Wang, Jiaming Shen, Jinfeng Xiao, Jiawei Han: *Query-Specific Knowledge Summarization with Entity Evolutionary Networks*. Proceedings of the ACM International Conference on Information and Knowledge Management (**CIKM**), 2019.
- **Carl Yang**, Dai Teng, Siyang Liu, Sayantani Basu, Jieyu Zhang, Jiaming Shen, Chao Zhang, Jingbo Shang, Lance Kaplan, Timothy Harratty, Jiawei Han: *CubeNet: Multi-Facet Hierarchical Heterogeneous Network Construction, Analysis, and Mining*. Demo in the ACM International Conference on Knowledge Discovery and Data Mining (**KDD**), 2019.
- **Carl Yang**, Do Huy Hoang, Tomas Mikolov, Jiawei Han: *Place Deduplication with Embeddings*. Proceedings of the International World Wide Web Conference (**WWW**), 2019.
- **Carl Yang**, Kevin Chang: *Relationship Profiling over Social Networks: Reverse Smoothness from Similarity to Closeness*. Proceedings of the SIAM International Conference on Data Mining (**SDM**), 2019.
- **Carl Yang**, Yichen Feng, Pan Li, Yu Shi, Jiawei Han: *Meta-Graph Based HIN Spectral Embedding: Methods, Analyses and Insights*. Proceedings of the IEEE International Conference on Data Mining (**ICDM**), 2018.
- **Carl Yang**, Mengxiong Liu, Frank He, Xikun Zhang, Jian Peng, Jiawei Han: *Similarity Modeling on Heterogeneous Networks via Automatic Path Discovery*. Proceedings of the European Conference on

Machine Learning and Principles and Practice of Knowledge Discovery in Databases (**ECML-PKDD**), 2018.

- **Carl Yang**, Mengxiong Liu, Vincent Zheng, Jiawei Han: *Node, Motif and Subgraph: Leveraging Network Functional Blocks Through Structural Convolution*. Proceedings of the IEEE/ACM International Conference on Advances in Social Networks Analysis and Mining (**ASONAM**), 2018.
- **Carl Yang**, Xiaolin Shi, Jie Luo, Jiawei Han: *I Know You'll Be Back: Interpretable New User Clustering and Churn Prediction on a Mobile Social Application*. Proceedings of the ACM International Conference on Knowledge Discovery and Data Mining (**KDD**), 2018.
- **Carl Yang**, Chao Zhang, Xuewen Chen, Jieping Ye, Jiawei Han: *Did You Enjoy the Ride: Understanding Passenger Experience via Heterogeneous Network Embedding*. Proceedings of the IEEE International Conference on Data Engineering (**ICDE**), 2018.
- **Carl Yang**, Hanqing Lu, Kevin Chang: *CONE: Community Oriented Network Embedding*. Proceedings of the International Joint Conference on Neural Networks (**IJCNN**), 2018 (arXiv, 2017).
- **Carl Yang**, Lanxiao Bai, Chao Zhang, Quan Yuan, Jiawei Han: *Bridging Collaborative Filtering and Semi-Supervised Learning: A Neural Approach for POI Recommendation*. Proceedings of the ACM International Conference on Knowledge Discovery and Data Mining (**KDD**), 2017.
- **Carl Yang**, Zhong Lin, Li-Jia Li, Jie Luo: *Bi-directional Joint Inference for User Links and Attributes on Large Social Graphs*. Proceedings of the International World Wide Web Conference (**WWW**), 2017.
- **Ji Yang**, Bin Xu, Binbin Lin, Xiaofei He: *Multi-Query Parallel Field Ranking for Image Retrieval*. Neurocomputing, 2014.
- Yingkui Wang, Di Jin, **Carl Yang**, Jianwu Dang: *Integrating Group Homophily and Individual Personality of Topics Can Better Model Network Communities*. Proceedings of the IEEE International Conference on Data Mining (**ICDM**) 2020.
- Chanyoung Park, **Carl Yang**, Qi Zhu, Donghyun Kim, Hwanjo Yu, Jiawei Han: *Unsupervised Differentiable Multi-aspect Node Representation Learning*. Proceedings of the ACM International Conference on Knowledge Discovery and Data Mining (**KDD**), 2020.
- Yang Liu, Xianzhuo Xia, Liang Chen, Xiangnan He, **Carl Yang**, Zibin Zheng: *Certifiable Robustness to Discrete Adversarial Perturbations for Factorization Machines*. Proceedings of the ACM International Conference on Research and Development in Information Retrieval (**SIGIR**), 2020.
- Yiqing Xie, Sha Li, **Carl Yang**, Raymond Chi-Wing Wong, Jiawei Han: *When Do GNNs Work: Understanding and Improving Neighborhood Aggregation*. Proceedings of the International Joint Conference on Artificial Intelligence (**IJCAI**), 2020.
- Jiayi Liu, Quan Yuan, **Carl Yang**, He Huang, Chao Zhang, Philip Yu: *DAPred: Dynamic Attention Location Prediction with Long-Short Term Movement Regularity*. Proceedings of the AAAI International Conference on Innovative Applications of Artificial Intelligence (**IAAI**), 2020.
- Yuxin Xiao, Zecheng Zhang, **Carl Yang**, ChengXiang Zhai: *Non-local Attention Learning on Large Heterogeneous Information Networks*. Proceedings of the IEEE International Conference on Big Data (**BigData**), 2019.
- Aravind Sankar, Adit Krishnan, Zongjian He, **Carl Yang**: *RASE: Relationship Aware Social Embedding*. Proceedings of the International Joint Conference on Neural Networks (**IJCNN**), 2019.
- Yu Shi, Xinwei He, Naijing Zhang, **Carl Yang**, Jiawei Han: *User-Guided Clustering in Heterogeneous Information Networks via Motif-Based Comprehensive Transcription*. Proceedings of the European Conference on Machine Learning and Principles and Practice of Knowledge Discovery in Databases (**ECML-PKDD**), 2019.
- Jiaming Shen, Jinfeng Xiao, Yu Zhang, **Carl Yang**, Jingbo Shang, Jinda Han, Saurabh Sinha, Peipei Ping, Richard Weinshilboum, Zhiyong Lu, Jiawei Han: *SetSearch+: Entity-Set-Aware Search and Mining for Scientific Literature*. Demo in the ACM International Conference on Knowledge Discovery and Data Mining (**KDD**), 2018.



- Chao Zhang, Mengxiong Liu, Zhengchao, Liu, **Carl Yang**, Luming Zhang, Jiawei Han: Spatiotemporal Activity Modeling Under Data Scarcity: A Graph-Regularized Cross-Modal Embedding Approach. Proceedings of the AAAI International Conference on Artificial Intelligence (**AAAI**), 2018.
- Binbin Lin, **Ji Yang**, Xiaofei He, Jieping Ye: *Geodesic Distance Function Learning via Heat Flows on Vector Fields*. Proceedings of the International Conference on Machine Learning (**ICML**), 2014.
- Haifeng Liu, Zheng Yang, **Ji Yang**, Zhaohui Wu, Xuelong Li: *Local Coordinate Concept Factorization for Image Representation*. IEEE Transactions on Neural Networks and Learning Systems (**TNNLS**), 2014.

## TEACHING EXPERIENCES

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- **Instructor**, CS253 Data Structures and Algorithms, Emory University, 2023 Fall.
- **Instructor**, CS570 Data Mining, Emory University, 2023 Spring.
- **Instructor**, CS253 Data Structures and Algorithms, Emory University, 2022 Fall.
- **Instructor**, CS570 Data Mining, Emory University, 2022 Spring.
- **Instructor**, CS253 Data Structures and Algorithms, Emory University, 2021 Fall.
- **Instructor**, CS253 Data Structures and Algorithms, Emory University, 2021 Spring.
- **Instructor**, CS584 Topics: Graph Data Mining, Emory University, 2020 Fall.
- **Teaching Assistant**, CS412: Introduction to Data Mining, UIUC/Coursera, 2020 Spring.
- **Lead Teaching Assistant**, CS512: Data Mining: Principles and Algorithms, UIUC, 2019 Spring.
- **Lead Teaching Assistant**, CS512: Data Mining: Principles and Algorithms, UIUC, 2018 Spring.
- **Lead Teaching Assistant**, CS412: Introduction to Data Mining, UIUC, 2017 Spring.
- **Teaching Assistant**, CS511: Advanced Data Management, UIUC, 2016 Spring.
- **Teaching Assistant**, CS412: Introduction to Data Mining, UIUC, 2015 Fall.

## INDUSTRIAL EXPERIENCES

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### **Research Lab, Pinterest Inc**

*Research Intern, Supervisors: Dr. Aditya Pal, Prof. Jure Leskovec*

*May. 2019 - Aug. 2019*

*San Francisco, CA, US*

- Empowered GraphSage for web-scale Pinterest graph embedding through efficient graph down-sampling and context-aware conditional aggregation on heterogeneous pin-board networks.

### **Places Data & AI Research, Facebook Inc.**

*Research Intern, Supervisors: Dr. Do Huy Hoang, Dr. Tomas Mikolov*

*May. 2018 - Aug. 2018*

*New York, NY, US*

- Developed a two-step data-driven pipeline of feature generation and metric learning for place embedding to leverage ad-hoc place attributes and noisy training data towards efficient place deduplication.

### **Economic Graph Research, LinkedIn Co.**

*Remote Research Contractor, Supervisors: Dr. Myungwan Kim, Dr. Shipeng Yu*

*Aug. 2018 - Jul. 2019*

*Sunnyvale, CA, US*

- Developed a relation profiling algorithm based on multiple signals including user attributes, link structures and diffusive messages in the social network with novel multi-modal graph autoencoders.

### **Big Data Research, Didichuxing Inc.**

*Research Intern, Supervisors: Prof. Xuwen Chen, Prof. Jieping Ye*

*Jun. 2017 - Aug. 2017*

*Beijing, China*

- Constructed the transportation HIN (heterogeneous information network) based on DiDi's unique travel data and developed a pattern-aware HIN embedding algorithm for passenger experience prediction.

### **Research Lab, Snap Inc.**

*Research Intern, Supervisors: Dr. Jie Luo, Dr. Xiaolin Shi, Dr. Li-Jia Li*

*May. 2016 - Aug. 2016*

*Los Angeles, CA, US*

- Developed a joint learning framework of user links and attributes for friend recommendation and interest targeting. Implemented a Spark pipeline and scaled up to millions of nodes and billions of edges.

### **Demographics ads serving, Google LLC**

*May. 2015 - Aug. 2015*

*Software Engineer Intern, Supervisor: Dr. Tianyi Wu*

*Seattle, WA, US*

- Implemented data extraction and inventory analysis pipeline using flume C++. Implemented an online simulation of ads serving and an offline optimal algorithm based on max flow to analyze the inventory.

## **SERVICES AND ACTIVITIES**

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### **Editorial Boards**

- Associate Editor, IEEE Transactions on Neural Networks and Learning Systems, since 2022.
- Associate Editor, IEEE Transactions on Big Data, since 2021.
- Associate Editor, Big Data Journal, Mary Ann Liebert, Inc., since 2021.
- Guest Editor, Frontiers in Big Data and Artificial Intelligence, since 2021.

### **Event Organizations**

- Lead Organizer and General Chair, The 2st IEEE International Workshop on Federated Learning with Graph Data (**FedGraph**), 2023.
- Proceedings Chair, The ACM International Conference on Information and Knowledge Management (**CIKM**), 2023.
- KDD Cup Chair, The ACM International Conference on Knowledge Discovery and Data Mining (**KDD**), 2023.
- Track Chair, The Conference on Health, Inference, and Learning (**CHIL**), 2023.
- Lead Organizer and General Chair, The 1st ACM International Workshop on Federated Learning with Graph Data (**FedGraph**), 2022.
- Lead Organizer and General Chair, The 1st IEEE International Workshop on Neural Network Models for Brain Connectome Analysis (**BrainNN**), 2022.
- Workshop Chair, The ACM International Conference on Information and Knowledge Management (**CIKM**), 2022.
- Web Chair, The ACM International Conference on Knowledge Discovery and Data Mining (**KDD**), 2022.
- Session Chair, The ACM Conference on Knowledge Discovery and Data Mining (**KDD**), 2023.
- Session Chair, The IEEE International Conference on Data Engineering (**ICDE**), 2023.
- Session Chair, The ACM International Conference on Information and Knowledge Management (**CIKM**), 2022.
- Session Chair, The International World Wide Web Conference (**WWW**), 2022.
- Session Chair, The ACM Conference on Knowledge Discovery and Data Mining (**KDD**), 2021.
- Session Chair, The IEEE International Conference on Data Engineering (**ICDE**), 2021.
- Session Chair, The International World Wide Web Conference (**WWW**), 2021.
- Session Chair, The IEEE/ACM International Conference on Advances in Social Networks Analysis and Mining (**ASONAM**), 2018.

### **Conference Reviews**

- The International Conference on Medical Image Computing and Computer Assisted Intervention (**MICCAI**), since 2023.
- The ACM International Conference on Research and Development in Information Retrieval (**SIGIR**), since 2023.
- The International Conference on Learning Representations (**ICLR**), since 2022.
- The IEEE International Conference on Data Engineering (**ICDE**), since 2021.

- The IEEE International Conference on Data Mining (**ICDM**), since 2021.
- The Conference on Neural Information Processing Systems (**NeurIPS**), since 2020.
- The ACM International Conference on Web Search and Data Mining (**WSDM**), since 2020.
- The AAAI Conference on Artificial Intelligence (**AAAI**), since 2019.
- The International Joint Conference on Artificial Intelligence (**IJCAI**), since 2019.
- The ACM Conference on Knowledge Discovery and Data Mining (**KDD**), since 2018.
- The International World Wide Web Conference (**WWW**), since 2018.
- The SIAM International Conference on Data Mining (**SDM**), since 2018.
- The European Conference on Machine Learning and Principles and Practice of Knowledge Discovery in Databases (**ECML-PKDD**), since 2017.
- The ACM International Conference on Information and Knowledge Management (**CIKM**), since 2017.

### Journal Reviews

- Psychiatry Research, Elsevier, since 2023.
- Medical Image Analysis, Elsevier, since 2023.
- The IEEE Journal of Biomedical and Health Informatics (**JBHI**), since 2023.
- Bioinformatics, Oxford Academic, since 2022.
- The IEEE Transactions on Network Science and Engineering (**TNSE**), since 2020.
- The IEEE Transactions on Big Data (**TBD**), since 2019.
- The ACM Transactions on Information Systems (**TOIS**), since 2019.
- The ACM Transactions on Intelligent Systems and Technology (**TIST**), since 2019.
- The IEEE Multidisciplinary Open Access Journal (**Access**), since 2018.
- The IEEE Transactions on Knowledge and Data Engineering (**TKDE**), since 2018.
- The IEEE Transactions on Neural Networks and Learning Systems (**TNNLS**), since 2017.

### Grant Reviews

- Emory University Research Committee (URC), since 2021.
- National Science Foundation (NSF), since 2021.

### Research Seminars

- Department of Computer Science, University of Oxford, UK, Oct 2023.
- School of Informatics, University of Edinburgh, UK, Oct 2023.
- Keynote speech at the International Workshop on Federated Learning for Distributed Data Mining, KDD 2023, California, USA, Aug 2023.
- Digital and Data Science Group, Kaiser Permanente, Georgia, USA, Apr 2023.
- ScAi Lab, University of California, Los Angeles, California, USA, Apr 2023.
- Trustworthy Machine Learning Class, Yale University, Connecticut, USA, Mar 2023.
- Data Science Team, Home Depot Headquarter, Georgia, USA, Mar 2023.
- Natural Language Processing Laboratory, Nara Institute of Science and Technology, Japan, Dec 2022.
- Secchia Center, Michigan State University, Michigan, USA, Nov 2022.
- Rollins School of Public Health, Emory University, Georgia, USA, Oct 2022.
- Nell Hodgson Woodruff School of Nursing, Emory University, Georgia, USA, Sep 2022.
- The Computational Neuroimage Science (CNS) Lab, Stanford University, California, USA, May 2022.
- Data Science for Mental Health Group, Alan Turing Institution, London, UK, Mar 2022.
- Weill Cornell Medical College, Cornell University, New York, USA, Feb 2022.
- Department of Computer Science, Purdue University, Indiana, USA, Nov 2021.
- DGL User Group, California, USA, Nov 2021.
- Amazon ML Tech Talk, Washington, USA, Oct 2021.

- University of South California, California, USA, Jul 2021.
- University of Sydney, New South Wales, Australia, Mar 2020.
- University of North Texas and University of Florida, Florida, USA, Mar 2020.
- Emory University, Georgia, USA, Feb 2020.
- Zhejiang University, Zhejiang, China, Jan 2020.
- University of British Columbia and Simon Fraser University, British Columbia, Canada, Dec 2019.
- Northwestern University, Illinois, USA, Nov 2019.
- Great Lakes Workshop on Data Science in the University of Notre Dame, Indiana, USA, Sep 2019.
- Fudan University and Shanghai Jiao Tong University, Shanghai, China, Nov 2018.
- Snap Inc., California, USA, Mar 2018.
- Tsinghua University and University of Science and Technology, Beijing, China, Aug 2017.