Yue (Daniel) Zhang

Ph.D. Candidate (2016-2020 Expected) · University of Notre Dame

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Research Interest

- I have strong research background in both machine learning and systems. I'm experienced in AI/ML and have led many projects that design and implement new techniques (reinforcement learning, online learning, neural networks, Bayesian networks, multi-view learning, etc) to address critical social issues such as misinformation detection, crisis response, traffic monitoring, water quality monitoring, personalized recommendation, and health monitoring. I'm also fascinated about designing novel edge computing systems that can combine the sensing and computing power of billions of heterogeneous mobile devices to support privacy-aware and delay-sensitive AI applications.
- I have published **41** peer-reviewed conference/journal papers, including **19** first-authored ones. These papers were published in top venues such as AAAI, RTSS, INFOCOM, SEC, ICDCS, RTAS, IoTDI, KBS, BigData, ASONAM, etc. My H-Index is **10**. I'm the recipient of two of the most prestigious awards - **Outstanding Graduate Research Award** and **Outstanding Graduate Teaching Award** at University of Notre Dame. **[My Google Scholar Link] [My Website (dyzhang.net)]**

Education

University of Notre Dame — *Notre Dame, IN, USA*
Ph.D. in Computer Science & Engineering (Advisor: Prof. Dong Wang) — *Jun. 2016 - PRESENT*

Purdue University — *West Lafayette, IN, USA*
M.S. in Information Security (Advisor: Prof. Melissa Dark) — *Aug. 2012 - Aug. 2014*

Shanghai Jiao Tong University — *Shanghai, China*
B.S. in Information Security Engineering — *Sep. 2008 - Jun. 2012*

Professional Experience

Graduate Research Assistant (Current) — *Notre Dame, IN, USA*
Department of Computer Science & Engineering, University of Notre Dame — *May. 2016 - PRESENT*

Systems Engineer (1.5 years) — *Columbia, MO, USA*
Carfax, Inc. — *Nov. 2014 - May. 2016*

Honors & Awards

2019 **Outstanding Graduate Research Assistant Award**, CSE Department, University of Notre Dame — *Notre Dame, IN, USA*
2018 **Outstanding Graduate Student Teaching Award**, University of Notre Dame — *Notre Dame, IN, USA*
2017-2019 **Travel Awards**, ICDCS '19, BigData '17,'18, SEC '18, SECON '18 ($4,000+)

Projects

Content-free and Explainable Fauxtography Detection (Leader) — *Aug. 2018 - present*
CSE in University of Notre Dame — *Notre Dame, IN*

- Collaboration with Google Research on detecting misleading images on social media.
- Designed the first non-commercial fauxtography detector by mining the semantics and topological structure of user comments.
- Developing co-training framework and graph neural network to extract explainable evidence for the fauxtography detection results.
- **Techniques: NLP, Network Embedding, Computer Vision**
- **Publications: IEEE BigData'18, KDD'20 (In preparation)**

Scalable and Robust Truth Analysis on Social Media (Leader) — *May 2016 - present*
CSE in University of Notre Dame — *Notre Dame, IN*

- Developing new Truth Discovery algorithms to jointly estimate the reliability of social media users as well as identifying truthful information on social media platforms during critical disaster events.
- Building scalable and efficient distributed system platforms to process massive social media streams.
- **Techniques: Truth Discovery, Expectation Maximization (EM), Bayesian Networks, Distributed System, Cloud Computing**
- **Publications: IEEE ICDCS'17, IEEE BigData'16, IEEE TBD, IEEE BigData'17, ACM/IEEE ASONAM'18**

Federated Learning for Personalized Privacy-aware Smart Health (Leader) *Aug. 2018 - present*

CSE in University of Notre Dame *Notre Dame, IN*

- Developing a privacy-aware federated learning framework allowing participants to use edge devices to continuously monitor and detect abnormal psychological states such as drowsiness in driving and suicidal thoughts.
- Proposing a new federated learning framework to allow the best trade-off between the resource constraints of edge devices and the quality of each user's sensing data.
- **Techniques: Federated Learning, Computer Vision, LSTM, Edge Computing**
- **Publications: Mobihoc'20 (In preparation)**

Intelligent Collaborative Edge Computing Ecosystem (Leader) *Aug. 2017 - present*

CSE in University of Notre Dame *Notre Dame, IN*

- Proposing a new Social Sensing based Edge Computing (SSEC) paradigm that leverages billions of privately owned, heterogeneous, and resource constrained edge devices to perform delay-sensitive and large scale AI applications.
- Building a SSEC system platform using AWS + Kubernetes + heterogeneous embedded systems (Nvidial TK1,TX1, TX2, Raspberry Pi).
- Developing novel optimal batching scheme and game-theoretic resource management algorithms to fully leverage the computing resources on edge devices to support AI applications.
- **Techniques: Constrained Optimization, Edge+AI, Game Theory, Deep Learning, Container Technology (Docker)**
- **Publications: ACM/IEEE SEC'18 (CoGTA), IEEE RTAS'18 (BGTA), ACM/IEEE IoTDI'19 (HeteroEdge), IEEE INFOCOM'19 (TDBU), IEEE RTSS'19 (EdgeBatch)**

Human-AI Hybrid Systems for Disaster Damage Assessment (Leader) *Dec. 2018 - present*

CSE in University of Notre Dame *Notre Dame, IN*

- Developing novel technique using CNN and attention mechanism to automatically assess the severity of damages of disaster scene images collected from remote sensing and social media.
- Proposing a human-AI hybrid system that combines active learning and reinforcement learning techniques to acquire human intelligence from crowdsourcing platforms to interpret and further improve the pure CNN-based damage assessment.
- **Techniques: Computer Vision, Reinforcement Learning, Explainable AI**
- **Publications: IEEE ICDCS'19 (CrowdLearn), AAAI'20 (iDSA)**

Visual Inspired Poetry Recommendation System (Leader) *Aug. 2018 - present*

CSE in University of Notre Dame *Notre Dame, IN*

- Proposing a novel recommender system that recommends a classical poetry given on a photo.
- Designed a novel knowledge graph-based approach to bridge the artistic conception (sentiments, themes, metaphors) expressed by the images with the classical poems.
- **Techniques: Knowledge Graph, Network Embedding, NLP, Computer Vision**
- **Publications: ACM/IEEE ASOANM'19, TKDE (In preparation)**

Copyright Infringement Detection in Live Video Streams (Leader) *Aug. 2017 - present*

CSE in University of Notre Dame *Notre Dame, IN*

- Designing a novel approach to detect copyright infringements in live video streams by leveraging the linguistic cues from live chat messages of the audience.
- Developing an end2end copyright detection system that outperforms existing commercial solution.
- **Techniques: NLP, Machine Learning, Network Embedding, Bayesian Networks**
- **Publications: ACM/IEEE ASONAM'18, IEEE BigData'18**

Spatio-temporal Prediction with Noisy and Incomplete Data (Leader) *May 2017 - present*

CSE in University of Notre Dame *Notre Dame, IN*

- Developing new predictive models using Probabilistic Latent Semantic Analysis and Ngram to infer user mobility pattern.
- Developing novel context-aware spatiotemporal inference scheme using Dynamic Topic Modeling and Bayesian Estimation to predict states of physical variables (air quality index, traffic congestion) given noisy and sparse data.
- **Techniques: Spatiotemporal Modeling, Regression and Autoregression, Bayesian Networks, Topic Modeling, Ngram**
- **Publications: IEEE MASS'18, IEEE BigData'17, ACM/IEEE ASONAM'18**

Migrating Vehicle Receipt system (Systems Engineer) *May 2015 - May 2016*

Carfax, Inc *Missouri, MO*

- Full-stack web development for a new Carfax internal website for vehicle identification number (VIN) decoding.
- Migrated Carfax's vehicle record receipt system architecture from VMS +Oracle to Docker + GridFS + RabbitMQ + CrushFtp.
- **Techniques: AMQP Messaging, NoSQL Database, CSS, HTML5, JavaScript, Jenkins**

Publications

Paper Code: *[C] - Conference paper; [J] - Journal paper; [W] - Workshop paper; [D] - Demo; [P] - Poster; [T] - Thesis*

Under Review

1. [J] **D.Y. Zhang**, Y. Zhang, Q. Li, and D. Wang. "Sparse User Check-in Venue Prediction By Exploring Latent Decision Contexts From Location-Based Social Networks.", submitted to IEEE Transactions on BigData.
2. [J] **D.Y. Zhang**, Y. Ma, X.S. Hu, and D. Wang. "Towards Privacy-aware Task Allocation in Social Sensing based Edge Computing Systems.", submitted to IEEE Transactions on Computers.

Published/Accepted (* for Co-First Authorship)

1. [C] **D.Y. Zhang**, Y. Huang, Y. Zhang, and D. Wang. "Crowd-assisted Disaster Scene Assessment with Human-AI Interactive Attention." In The Thirty-Fourth AAAI Conference on Artificial Intelligence (AAAI), 2020. Oral Presentation, New York City, USA. [Top Conference in AI (Acceptance rate: 20.6%)].
2. [C] **D.Y. Zhang**, N. Vance, Y. Zhang, M.T. Rashid, and D. Wang. "EdgeBatch: Towards AI-empowered Optimal Task Batching in Intelligent Edge Systems.", In 40th IEEE Real-Time Systems Symposium (RTSS),2019. [Top Conference in Real-time Systems].
3. [C] **D.Y. Zhang**, B. Ni, Q. Zhi, T. Plummer, Q. Li, H. Zheng, Q. Zeng, Y. Zhang and D. Wang. "Through The Eyes of A Poet: Classical Poetry Recommendation with Visual Input on Social Media.", In Advances in Social Networks Analysis and Mining (ASONAM),2019. (Acceptance Rate: 14%) .
4. [C] **D.Y. Zhang**, N. Vance, and D. Wang. "When Social Sensing Meets Edge Computing: Vision and Challenges.", In IEEE ICCCN, 2019. [Invited Paper].
5. [C] **D.Y. Zhang**, Y. Zhang, Q. Li, T. Plummer, and D. Wang. "CrowdLearn: A Crowd-AI Hybrid System for Deep Learning-based Damage Assessment Applications.", In IEEE ICDCS, 2019. [Top Conference in Systems (Acceptance Rate: 19.6%)].
6. [C] **D.Y. Zhang**, Y. Zhang, M.T. Rashid, X. Li, N. Vance, and D. Wang. "HeteroEdge: Taming The Heterogeneity of Edge Computing System in Social Sensing." In ACM/IEEE IoTDI 2019. [Top IoT conference (Acceptance Rate: 28%)]
7. [C] **D.Y. Zhang**, and D. Wang. "An Integrated Top-down and Bottom-up Task Allocation Approach in Social Sensing based Edge Computing Systems", In IEEE INFOCOM, 2019. [Top Conference in Networking and Systems (Acceptance Rate: 19.7%)].
8. [C] **D.Y. Zhang***, L. Shang*, B. Geng, S. Lai, Ke Li, H. Zhu, M.T. Amin, and D. Wang. "FauxBuster: A Content-free Fauxtography Detector Using Social Media Comments." In 2018 IEEE International Conference on BigData. IEEE, 2018. (Acceptance Rate: 18.9%)
9. [C] **D.Y. Zhang**, L. Song, Q. Li, Y. Zhang, and D. Wang. "StreamGuard: A Bayesian Network Approach to Copyright Infringement Detection Problem in Large-scale Live Video Sharing Systems." In 2018 IEEE International Conference on Big Data, 2018. (Acceptance Rate: 18.9%)
10. [C] **D.Y. Zhang**, Y. Ma, CH. Zheng, Y. Zhang, X.S. Hu, and D. Wang. "Cooperative-Competitive Task Allocation in Edge Computing for Delay-Sensitive Social Sensing." In Proceedings of the Third ACM/IEEE Symposium on Edge Computing (SEC 2018), 2018. [Top Conference in Edge Computing]
11. [C] **D.Y. Zhang**, Q. Li, H. Tong, J. Bandila, Y. Zhang, and D. Wang. "Crowdsourcing-based Copyright Infringement Detection in Live Video Streams." In IEEE/ACM International Conference on Advances in Social Networks Analysis and Mining (ASONAM), Barcelona, Spain, 2018. (Acceptance Rate: 15%)
12. [C] **D.Y. Zhang**, J. Bandila, Y. Zhang, and D. Wang. "Towards Reliable Missing Truth Discovery in Online Social Media Sensing Applications." In IEEE/ACM International Conference on Advances in Social Networks Analysis and Mining (ASONAM), Barcelona, Spain, 2018. (Acceptance Rate: 15%)
13. [C] **D.Y. Zhang**, Y. Zhang, Q. Li, N. Vance, and D. Wang. "Robust State Prediction with Incomplete and Noisy Measurements in Collaborative Sensing." In IEEE MASS 2018, Chengdu, China, 2018.
14. [J] **D.Y. Zhang**, D. Wang, Y. Zhang, N. Vance, and S. Mike. "On Scalable and Robust Truth Discovery in Big Data Social Media Sensing Applications", IEEE Transactions on BigData, 2018, In press. [Top IEEE Journal in Big Data Analytics]
15. [C] **D.Y. Zhang**, Yue Ma, Y. Zhang, S. Lin, X.S. Hu, and D. Wang. "A Real-Time and Non-Cooperative Task Allocation Framework for Social Sensing Applications in Edge Computing Systems." In 24th IEEE Real-Time and Embedded Technology and Applications Symposium (RTAS 2018) Portugal, 2018. [Top Conference in Real-Time Systems]
16. [C] **D.Y. Zhang**, D. Wang, H. Zheng, X. Mu, Q. Li, and Y. Zhang. "Large-scale Point-of-Interest Category Prediction Using Natural Language Processing Models." In 2017 IEEE International Conference on Big Data (BigData), 2017. (Acceptance Rate: 20%)
17. [C] **D.Y. Zhang**, D. Wang, and Y. Zhang. "Constraint-Aware Dynamic Truth Discovery in Big Data Social Media Sensing." In 2017 IEEE International Conference on Big Data (BigData), 2017 (Acceptance Rate: 18%)

18. [C] **D.Y. Zhang**, CH. Zheng, D. Wang, D. Thain, C. Huang, X. Mu, and G. Madey. "Towards Scalable and Dynamic Social Sensing Using A Distributed Computing Framework." In 37th IEEE International Conference on Distributed Computing Systems (ICDCS 2017), Atlanta, GA, USA, 2017. [Top Conference in Systems. (Acceptance Rate: 16.9%)]
19. [C] **D.Y. Zhang***, R. Han*, D. Wang, and C. Huang. "On robust truth discovery in sparse social media sensing." In 2016 IEEE International Conference on Big Data, pp. 1076-1081. IEEE, 2016.(Acceptance Rate: 20%)
20. [C] M.T. Rashid, **D.Y. Zhang**, and D. Wang. "SocialCar: A Task Allocation Framework for Social Media Driven Vehicular Network Sensing Systems.", In The 15th International Conference on Mobile Ad-hoc and Sensor Networks, 2019.
21. [C] L. Shang, **D.Y. Zhang**, M. Wang, and D. Wang: "VulnerCheck: A Content-Agnostic Detector for Online Hatred-Vulnerable Videos." In IEEE International Conference on Big Data (BigData), 2019.
22. [C] Y. Zhang, R. Zong, J. Han, H. Zheng, Q. Lou, **D.Y. Zhang**, and D. Wang: "TransLand: An Adversarial Transfer Learning Approach for Migratable Urban Land Usage Classification using Remote Sensing." In IEEE International Conference on Big Data (BigData), 2019.
23. [J] Y. Zhang, **D.Y. Zhang**, and D. Wang. "An Online Reinforcement Learning Approach to Quality-Cost-Aware Task Allocation for Multi-Attribute Social Sensing .", In Pervasive Mobile Computing (PMC), 2019, in press.
24. [J] L. Shang, **D.Y. Zhang**, Michael Wang, and D. Wang. "Towards Reliable Online Clickbait Video Detection:A Content-Agnostic Approach.", In Knowledge-Based Systems (KBS), 2019, in press.
25. [C] M.T. Rashid, **D.Y. Zhang**, L. Shang, and D. Wang. "SEAD: Towards A Social-Media-DrivenEnergy-Aware Drone Sensing Framework." In IEEE ICPADS, Tianjin, China, 2019.
26. [C] Y. Zhang, H. Wang, **D.Y. Zhang**, Y. Lu, and D. Wang. "RiskCast: Social Sensing based Traffic Risk Forecasting via Inductive Multi-View Learning.", In Advances in Social Networks Analysis and Mining (ASONAM), 2019.
27. [C] Y. Zhang, X. Dong, **D.Y. Zhang**, and D. Wang. "A Syntax-based Learning Approach to Geo-locating Abnormal Traffic Events using Social Sensing.", In Advances in Social Networks Analysis and Mining (ASONAM), 2019. [Invited Industrial Track]
28. [C] M.T. Rashid*, **D.Y. Zhang***, Zhiyu Liu, Hai Lin, and D. Wang. "CollabDrone: A Collaborative Spatiotemporal-Aware Drone Sensing System Driven by Social Sensing Signals." In IEEE ICCCN, 2019.
29. [C] N. Vance, **D.Y. Zhang**, and D. Wang. "EdgeCache: A Game-theoretic Edge-based Content Caching System for Crowd Video Sharing." In IEEE HPCC, 2019.
30. [C] N. Vance, **D.Y. Zhang**, Y. Zhang, and D. Wang. "Towards Optimal Incentive-driven Verification in Social Sensing based Smart City Applications." In IEEE Smart-City, 2019.
31. [C] M.T. Rashid, **D.Y. Zhang**, and D. Wang. "EdgeStore: Towards an Edge-based Distributed Storage System for Emergency Response." In IEEE Smart-City, 2019.
32. [C] N. Vance, M.T. Rashid, **D.Y. Zhang**, and D. Wang. "Towards Reliability in Online High-Churn Edge Computing: A Deviceless Pipelining Approach." In SmartComp, Washington D.C., USA, June, 2019.
33. [C] Y. Zhang, H. Wang, **D.Y. Zhang**, and D. Wang. "DeepRisk: A Deep Transfer Learning Approach to Migratable Traffic Risk Estimation in Intelligent Transportation using Social Sensing." In DCOSS, 2019. (Acceptance Rate: 25%)
34. [C] Y. Zhang, Y. Lu, **D.Y. Zhang**, L. Shang, and D. Wang: "RiskSens: A Multi-view Learning Approach to Identifying Risky Traffic Locations in Intelligent Transportation Systems Using Social and Remote Sensing." In IEEE International Conference on Big Data (BigData), 2018. (Acceptance Rate: 18.9%)
35. [C] N. Vance, **D.Y. Zhang**, Y. Zhang, and D. Wang. "Privacy-aware Edge Computing in Social Sensing Applications using Ring Signatures." In IEEE ICPADS, 2018.
36. [C] Y. Zhang, **D.Y. Zhang**, N. Vance, Q. Li, and D. Wang. "A Light-weight and Quality-aware Online Adaptive Sampling Approach for Streaming Social Sensing in Cloud Computing." In IEEE ICPADS, Singapore, 2018.
37. [C] Y. Zhang, **D.Y. Zhang**, Q. Li, and D. Wang. "Towards Optimized Online Task Allocation in Cost-Sensitive Crowdsensing Applications." In IEEE IPCCC, Orlando, Florida, USA, 2018. (Acceptance Rate: 28.8%)
38. [C] Y. Zhang, **D.Y. Zhang**, N. Vance, and D. Wang. "Optimizing Online Task Allocation for Multi-Attribute Social Sensing", In IEEE ICCCN, Hangzhou, China, 2018.
39. [C] D. Wang, **D.Y. Zhang**, and C. Huang. "Towards Reliable Hypothesis Validation in Social Sensing Applications", In IEEE SECON, Hong Kong, China, 2018. (Acceptance Rate: 23.2%)
40. [C] Y. Zhang, N. Vance, **D.Y. Zhang**, and D. Wang. "On Opinion Characterization in Social Sensing: A Multi-View Subspace Learning Approach" International Conference on Distributed Computing in Sensor Systems (DCOSS), New York, USA, 2018.
41. [C] C. Huang, D. Wang, S. Zhu, and **D.Y. Zhang**. "Towards unsupervised home location inference from online social media." In 2016 IEEE International Conference on Big Data, 2016.(Acceptance Rate: 18%)

Poster and Demo

1. [D] **D.Y. Zhang**, and D. Wang. "Demo Abstract: Real-time Social Sensing Task Allocation Strategies in Heterogeneous Edge Computing Systems." In IEEE INFOCOM, Paris, France, 2019.
2. [P] **D.Y. Zhang**, Y. Zhang, and D. Wang. "Poster Abstract: A Dynamic Data-Driven Prediction Model for Sparse Collaborative Sensing Applications." In IEEE INFOCOM, Paris, France, 2019.
3. [D] **D.Y. Zhang**, and D. Wang. "Demo Abstract: Heterogeneous Social Sensing Edge Computing System for Deep Learning based Disaster Responses." In ACM/IEEE IoTDI 2019, Montreal, Canada, 2019.
4. [D] **D.Y. Zhang**, J. Bandila, H. Tong, and D. Wang. "An End-to-End Scalable Copyright Detection System for Online Video Sharing Platforms." In ACM/IEEE ASONAM, Barcelona, Spain, 2018.
5. [D] **D.Y. Zhang**, N. Vance, and D. Wang. "Demo Abstract: Real-time Heterogeneous Edge Computing System for Social Sensing Applications." In IEEE RTAS 2018, Porto, Portugal, 2018.
6. [D] N. Vance, R. Mackey, **D.Y. Zhang**, and D. Wang. "Simulating Large-scale Social Sensing based Edge Computing Systems with Heterogeneous Network Configurations.", In IEEE SECON 2018, Hong Kong, China, 2018.

Thesis

[T] **D.Y. Zhang**. "A cross-site study of user behavior and privacy perception in social networks." Thesis. Purdue University, 2014.

Service

2019 **Session Chair**, IEEE/ACM ASONAM'19
2019 **Co-Web Chair**, SOCIALSENS 2019: International Workshop on Social Sensing, Montreal, Canada
2016-2019 **Journal Reviewer**, IEEE TKDE, IEEE ACCESS, ACM TOSN
2016-2019 **Conference Reviewer**, KDD '18 & '19, SocialSens '18, IPSN '18, IoTDI '19
2018 **Graduate Recruitment Week Volunteer**, Department of CSE, University of Notre Dame
2017&2018 **Student Volunteer**, IEEE International Conference on BigData

Skills

Statistical Analytics	Linear Regression, Classification (Decision Tree, SVM, Naive Bayes, etc.), Spatio-temporal Inference, Bayesian Network, Integer Programming, Genetic Algorithms
Machine Learning/AI	Deep Neural Networks (CNN, LSTM, GNN), Reinforcement Learning, Online Learning, Active Learning, Game Theory, Federated Learning
Systems and Networking	HTCondor, Hadoop, MongoDB, RabbitMQ, Docker, Kubernetes, Embedded Systems
Programming	Python, C/C++, Tensorflow, PyTorch, Groovy, MATLAB, R, SQL