

Yue (Daniel) Zhang

PH.D. CANDIDATE (2016-2020 EXPECTED) · UNIVERSITY OF NOTRE DAME

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Research Interest

- My research area lies in the intersection of machine learning/artificial intelligence, edge computing, and human-in-the-loop systems. My research topics include: Machine Learning, Artificial Intelligence, Recommender Systems, Edge Computing, Federated Learning, Privacy/Security, Mobile Sensing, IoT, Human-AI Systems, Explainable AI, and Crowdsourcing.
- I have published **45+** peer-reviewed conference/journal papers, including **20** first-authored ones. These papers were published in top venues such as AAI, RTSS, INFOCOM, SEC, ICDCS, RTAS, IoTDI, KBS, BigData, ASONAM, etc. My H-Index is **12**. I'm the recipient of two of the most prestigious awards - **Outstanding Graduate Research Award** and **Outstanding Graduate Teaching Award** from University of Notre Dame.

Education

University of Notre Dame

PH.D. IN COMPUTER SCIENCE & ENGINEERING (ADVISOR: PROF. DONG WANG)

Notre Dame, IN, USA

June 27th, 2016 - PRESENT

Purdue University

M.S. IN INFORMATION SECURITY (ADVISOR: PROF. MELISSA DARK)

West Lafayette, IN, USA

August 20th, 2012 - August 15th,

2014

Shanghai Jiao Tong University

B.S. IN INFORMATION SECURITY ENGINEERING

Shanghai, China

September 15th, 2008 - June 15th,

2012

Professional Experience

Graduate Assistant (Current)

DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING, UNIVERSITY OF NOTRE DAME

Notre Dame, IN, USA

June 27th 2016 - PRESENT

Systems Developer (1.5 years)

CARFAX, INC.

Columbia, MO, USA

October 27th, 2014 - May 6th, 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

Federated Learning for Personalized Privacy-aware Smart Health (Leader)

Aug. 2018 - present

CSE IN UNIVERSITY OF NOTRE DAME

Notre Dame, IN

- Leveraging reinforcement learning for dynamic client selection to address the critical class imbalance issue in federated learning.
- 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, Reinforcement Learning, Privacy, Distributed AI, Edge Computing**
- **Publications: Mobihoc'20 (Under Review), Sensys'20 (In progress)**

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 system platform using AWS + Kubernetes + heterogeneous embedded systems (Nvidia 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)**

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**

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, Topic Modeling, Ngram**
- **Publications: IEEE MASS'18, IEEE BigData'17, ACM/IEEE ASONAM'18, IEEE TBD**

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

[J] **D.Y. Zhang**, Y. Ma, X.S. Hu, and D. Wang. "Towards Privacy-aware Task Allocation in Social Sensing based Edge Computing Systems.", under revision, IEEE Internet of Things Journal.

[C] **D.Y. Zhang**, and D. Wang. "FedSense: Federated Learning for Smart Health with Class Imbalance in Resource Constrained Edge Computing.", submitted to ACM MobiHoc.

Published/Accepted (* for Co-First Authorship)

[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." In IEEE Transactions on BigData, 2020, in press.

[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%)].

[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].

[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%).

[C] **D.Y. Zhang**, N. Vance, and D. Wang. "When Social Sensing Meets Edge Computing: Vision and Challenges.", In IEEE ICCCN, 2019. [Invited Paper].

[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%)].

[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%)]

[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%)].

[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%)

[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%)

[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]

[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%)

[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%)

[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.

[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]

[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]

[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%)

[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%)

[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%)]

[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%)

[C] M.T. Rashid, Y. Zhang, **D.Y. Zhang**, and D. Wang. "CompDrone: Towards Integrated Computational Model and Social Drone Based Wildfire Monitoring." In DCOSS, 2020.

[C] Y. Zhang, X. Dong, L. Shang, **D.Y. Zhang**, Y. Lu, and D. Wang. "A Multi-modal Graph Neural Network Approach to Traffic Risk Forecasting in Smart Urban Sensing.", In SECON, 2020.

[C] Y. Zhang, R. Zhong, J. Han, **D.Y. Zhang**, M.T. Rashid, and D. Wang. "A Deep Transfer Learning Approach to Migratable Image Super-Resolution in Remote Urban Sensing.", In SECON, 2020.

[C] M.T. Rashid, **D.Y. Zhang**, and D. Wang. "SocialDrone: An Integrated Social Media and Drone Sensing System for Reliable Disaster Response." In IEEE INFOCOM, 2020.

[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.

[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.

[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.

[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.

[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.

[C] M.T. Rashid, **D.Y. Zhang**, L. Shang, and D. Wang. "SEAD: Towards A Social-Media-Driven Energy-Aware Drone Sensing Framework." In IEEE ICPADS, Tianjin, China, 2019.

[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.

[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]

[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.

[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.

[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.

[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.

[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.

[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%)

[C] D. Wang, **D.Y. Zhang**, Y. Zhang, M.T. Rashid, L. Shang, and N. Wei. "Social Edge Intelligence: Integrating Human and Artificial Intelligence at the Edge." In IEEE International Conference on Collaboration and Internet Computing (CIC), 2019.

[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%)

- [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.
- [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.
- [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%)
- [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.
- [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%)
- [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.
- [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

- [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.
- [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.
- [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.
- [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.
- [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.
- [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, Springer SNAM, ACM TOSN, Elsevier PMC, Elsevier JPDC, IEEE TBD, IEEE OJCOMS, IEEE ACCESS
- 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 Learning, Reinforcement Learning, Online Learning, Active Learning, Game Theory, Federated Learning
Systems and Networking	Edge Computing, HTCondor, Hadoop, MongoDB, RabbitMQ, Docker, Kubernetes, Embedded Systems
Programming	Python, C/C++, Tensorflow, PyTorch, Groovy, MATLAB, R, SQL