

Xudong(Nick) Zhang

PhD Candidate

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Research Interest

- Machine learning, deep learning, artificial intelligence.
- Computer vision: multi-object tracking (MOT), and segmentation and reconstruction of 2D/3D medical images.
- Modeling (Ordinary/Partial differential equations and Stochastics), sequential *Monte Carlo* methods, and parallel computing.

Education

Ph.D. | 2021 (expected) | City University of New York, New York, USA

Major: Computer Science (GPA: 3.9)

M.PHIL | 2018 | City University of New York, New York, USA

Major: Computer Science (GPA: 3.91)

M. PHIL | 2014 | City University of New York, New York, USA

Major: Mechatronics Engineering (GPA: 3.74)

B. ENG | 2008 | Jilin University, Changchun, China

Major: Mechatronics Engineering (GPA: 3.4)

Skills

- Programming platforms: C++, Python, MATLAB, Java.
- Packages: Scikit-learn, PyTorch, Pandas, OpenCV, OpenMPI.
- Engineering software: COMSOL, Ansys, SOLIDWORKS, Labview.

Academic Experience

09/2016 – Present

PhD Candidate and Research Assistant, Dept. of Computer Science, City University of New York, NY, USA.

- Proposed a one-stage ReID-based tracking model to improve the tracking speed from 22 *fps* to 38 *fps* on public MOT dataset with tracking accuracy (MOPA: 72.2), which is **better than the top-one** public tracking-by-detection model ([vc_tracker](#), 68.2). Due to the high tracking speed and accuracy, the proposed multi-object tracking model enabled the real-time (multi-object) tracking (≥ 30 *fps*).
- Solved the missing data problems for 20-year electronic health records (EHRs) of NYC by using the maximum likelihood estimation. The proposed algorithm improved the disease prediction accuracy from 0.8943 to 0.9621 on an SVM model [3, 6].
- Analyzed, identified, and forecasted the crime victims and behaviors by using the SVM, random forest classifiers, and the pre-defined rules to improve the prediction accuracy [1].
- Segmented and reconstructed the fine structures (0.5mm) from limited 2D/3D biomedical images by using arithmetic topology, Discrete Morse theory, and an SVM classification model.

- Used simultaneous perturbation stochastic approximation (SPSA) in the Gaussian mixture model (GMM) to improve the performance for data clustering problems [2].
- Propose a novel heuristic function for A* searching algorithm to identify the topological priors and the shortest topological cycles to lower the consumption of searching time and memory [4].
- Propose a novel resampling algorithm and parallelize the simulated annealing (SA) for searching the global optima in resampling stages to improve the filtering accuracy and performance for parallel/distributed particle filters on CUNY high-performance clusters [9, 13].

09/2011 – 12/2014

Research Assistant, Dept. of Mechanical Engineering, City University of New York, NY, USA.

- Developed mathematical ordinary/partial differential equations models to analyze the potential field distribution in impedance sensing and optimize the sensor design [15].
- Designed and fabricated 200 um microfluidic chips and biosensors, including impedance, quartz crystal microbalance (QCM), and nitric oxide (NO) biosensors for cell activity analysis [10, 11, 14].
- Wrote C++ code and Labview code for data acquisition from biosensors [15].

09/2004 – 09/2008

Research Assistant, Jilin University, Changchun, China.

- Identified the critical features related to the electric spot welding (ESW) and used a backpropagation neural network to analyze and predict the quality of welding [17].

Work Experience

05/2018 – 08/2018, Data Scientist Intern, BMT Biosystems., Branford, CT, USA.

- Analyzed the data imputation of medical data by using maximum likelihood estimation. The imputed data improved the classification accuracy.
- Extracted the critical features of medical data by applying the machine learning classifiers. The extracted features improved the (random forest) model stability and prediction accuracy from 82.22% to 92.13%.

05/2014 – 08/2015, Research Assistant, CUNY Advanced Science Research Center, NY USA.

- Designed and fabricated stretchable biosensors with 250 nm sensing zones.

05/2014 – 05/2016, Research Assistant, Nanofabrication Lab, City College of New York, NY USA.

- Built experimental platform for cyclically stretching cells and signal acquisition, including software programming, printed circuit board (PCB), and circuit design for step motors [14, 16].

09/2017 – 05/2020, Adjunct Lecturer, Computer Science Dept. Queens College, NY USA.

- Taught C++, Java, and Inter Networks.

Honors & Awards

- Best Paper Award, Symposium on Theory of Modeling and Simulation '18, Apr 15, 2018 - Apr 18, 2018, Baltimore, Maryland, USA.
- Graduate Center 5-year fellowship, City University of New York, NY, USA.
- Doctoral Student Research Grant, City University of New York, NY, USA.

Publications

Conferences articles:

1. Hu, Xiaochen, Xudong Zhang, and Nicholas P. Lovrich. " Forecasting identity theft victims: Analyzing characteristics and preventive actions through machine learning approaches." Victims & Offenders (2020): 1-30.

2. Hu, Xiaochen, Xudong Zhang, and Nicholas Lovrich. "Public perceptions of police behavior during traffic stops: logistic regression and machine learning approaches compared." *Journal of Computational Social Science* (2020): 1-26.
3. Xudong Zhang, Jiehao Xiao, Yifei Gong, Ning Yu, Wei Zhang, Sunghoon Jang, and Feng Gu. ,2020, May. Handling the missing data problem in electronic health records for cancer prediction. In *2020 Spring Simulation Conference (SpringSim)* (pp. 1-9). IEEE Computer Society.
4. Xudong Zhang, Pengxiang Wu, Changhe Yuan, Yusu Wang, Dimitris Metaxas, and Chao Chen. "Heuristic search for homology localization problem and its application in cardiac trabeculae reconstruction." In *Proceedings of the 28th International Joint Conference on Artificial Intelligence (IJCAI 2019)*, pp. 1312-1318. AAAI Press, 2019.
5. Xudong Zhang, and Feng Gu. "Adaptive particle sampling and resampling in parallel/distributed particle filters." In *Proceedings of the High-Performance Computing (HPC 2019)*, p. 12. Society for Computer Simulation International, 2019.
6. Xudong Zhang, Jiehao Xiao, and Feng Gu. "Applying a support vector machine to electronic health records for cancer classification." In *Proceedings of the Modeling and Simulation in Medicine (MSM 2019)*, p. 2. Society for Computer Simulation International, 2019.
7. Xudong Zhang, Mohamed, A., Nguyen, L, and Gu, F. Performance analysis of parallel/distributed particle filters, *Theory of Modeling and Simulation' 18 (TMS 2018)*, Apr 15-18, 2018, Baltimore, Maryland, USA. 2018 Society for Modeling and Simulation (SCS) International. 761-771, 2018 (**Best Paper Award, acceptance rate 4%**).
8. Xudong Zhang and Jang Sang "The application of electric cell-substrate impedance sensing (ECIS) biosensors" *International Journal of Biosensors & Bioelectronics*, 4(6):260–261, vol. 4. 6–2018.
9. Xudong Zhang, Lixin Huang, Evan Ferguson-Hull, Feng Gu. Adaptive particle routing in parallel/distributed particle filters. *High Performance Computing Symposium (HPC 2017)*, April 23-26, Virginia Beach, VA, USA; 2017 Society for Modeling and Simulation (SCS) International. 580-589, 2017.
10. Xudong Zhang, Fang Li, Kun-Lin Lee and Ioana Voiculescu. "Lab-on-chip stretchable impedance spectroscopy device for mammalian cells studies." 2017 19th International Conference on Solid-State Sensors, Actuators and Microsystems (TRANSDUCERS 2017): 1563-1566.
11. Xudong Zhang, Fang Li, Ioana Voiculescu, Stretchable impedance spectroscopy sensor for mammalian cell impedance measurements. *Proceedings of the ASME 2014 International Mechanical Engineering Congress & Exposition. IMECE2014, IMECE2014-37737*, pp. V010T13A005.

Journals articles:

12. Xudong Zhang, Liang Zhao, Wei Zhong, and Feng Gu. "Performance Analysis of Resampling Algorithms of Parallel/Distributed Particle Filters." *IEEE Access* (2020). (**Impact factor: 3.745**)
13. Xudong Zhang, Liang Zhao, Wei Zhong, and Feng Gu. A generic hybrid resampling algorithm in parallel/distributed particle filters and corresponding convergence analysis. *Journal of Parallel and Distributed Computing* (2020). Minor Revision. (**Impact factor: 2.296**)
14. Xudong Zhang, William Wang, Fang Li, Ioana Voiculescu. Stretchable impedance sensor for mammalian cell proliferation measurements. *Lab on a Chip* (2017). Jun 13;17(12):2054-2066. (**Impact factor:6.914**)
15. Xudong Zhang, Anis Nurashikin Nordin, William Wang, Fang Li, Sunghoon Jang, Ioana Voiculescu. The influence of the electrode dimension on the detection sensitivity of electric cell–substrate impedance sensing (ECIS) and its mathematical modeling. *Sensors and Actuators B* 247, pp.780-790. (**Impact factor: 7.1**)
16. Ioana Voiculescu, Fang Li, Fei Liu, Xudong Zhang, Limary M. Cancel, John M. Tarbell, Ali Khademhosseini. Study of long-term viability of endothelial cells for lab-on-a-chip devices, *Sensors and Actuators B* 182 (2013) 696– 705. (**Impact factor: 7.1**)

17. Xudong Zhang, Wen Jing, Xu Guocheng. Qualitative estimation of resistance spot welding for stainless steel based on backpropagation neural network, China Welding. Vol.18, No.3, September, 2009, Pages 32–35.