

Ming Li

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Education

Colorado School of Mines

GOLDEN, USA

Ph.D. in Computer Science

GPA: 3.98

Sep. 2015 - Dec. 2020 (Expected)

Colorado School of Mines

GOLDEN, USA

M.S. in Computer Science

GPA: 3.94

Jan. 2014 - May. 2015

Peking University

BEIJING, CHINA

B.S. in Geochemistry

GPA: 3.57

Sep. 2009 - Jul. 2013

Research Interests

SECURITY AND PRIVACY IN MOBILE IoT SENSING, DIGITAL SIGNAL PROCESSING, MACHINE LEARNING, ALGORITHMIC GAME THEORY, INCENTIVE MECHANISM DESIGN, CROWDSOURCING, NETWORKS, COMPUTER VISION, ROBOTICS.

Skills

Languages

Java, C++, Bash, Matlab, C, Python, R.

Techniques

Digital Signal Processing, Android Programming, Machine Learning, Algorithm Design, Speech Recognition, Computer Vision, Object-Oriented Programming, ROS Robot Programming, Arduino Programming, Game Theory, Git Version Control, LaTeX Writing.

Projects

2018-2019 SpyPhone : EAVESDROPPING ON SMARTPHONE SPEAKERS WITH MOTION SENSORS

- Identified a security issue on smartphones that motion sensors (access granted to any app) can eavesdropping on speakers.
- Developed an Android app to collect motion sensor (accelerometer and gyroscope) data while playing sounds through speakers.
- Reconstructed the high frequency (16,000 Hz) sound information from low frequency (400 Hz) motion data by building K-SVD dictionaries and recognized the speech using Bi-LSTM networks.
- Utilized: Recurrent Neural Networks, Compressed Sensing, Android Programming.

2018-2019 MotionVoice : A SPOOF-PROOF VOICE AUTHENTICATION SYSTEM FOR SMARTPHONES

- Proposed a new voice authentication system that is immune to replay attacks by leveraging the self demodulation and acoustic attenuation effect when sound signals transmitted through human body.
- Designed an Android app to collect the body-borne vibration and sound data simultaneously.
- Applied signal processing techniques such as syllable separation to sound data and using sequence-to-sequence LSTM network on vibration data to identify users.
- Utilized: Machine learning, Digital Signal Processing, Android Programming.

2018 DriverDetect : USING ATMOSPHERIC PRESSURE SENSORS TO DETERMINE WHETHER THE USER IS THE DRIVER OR A PASSENGER

- Proposed a new driver detection system based on the fact that each seat in the vehicle is expected to experience differences in atmospheric pressure for each vehicle acceleration dynamic.
- Designed a circuit with Arduino to test the system.
- Utilized: Arduino programming, Digital Signal Processing.

2016-2017 QUAC : QUALITY-AWARE CONTRACT-BASED INCENTIVE MECHANISMS FOR CROWDSENSING

- Design two quality-aware contract-based incentive mechanisms for crowdsensing, named QUAC-F and QUAC-I, under full information model and incomplete information model, respectively, which differ in the level of users' information known to the system.
- Mathematically proved that both QUAC-F and QUAC-I are guaranteed to maximize the platform utility while satisfying individual rationality and incentive compatibility.
- Utilized: Algorithm Design, Contract Theory.

2016 TurtleBot : USING RTAB-MAP AND A TURTLEBOT TO CREATE A FLOOR MAP

- Used a TurtleBot to perform graph-based simultaneous localization and mapping (SLAM) by using RTAB-Map.
- Programmed speech control and voice feedback on the TurtleBot.
- Utilized: ROS Robot Programming, Computer Vision.

2015-2017 SpecWatch : SOLVING ADVERSASIAL SPECTRUM USAGE MONITORING PROBLEM WITH UNKNOWN STATISTICS IN CRNS.

- Modeled the monitoring problem as an adversarial multi-armed bandit problem with switching cost.
- Designed an asymptotically optimal online algorithm, termed SPECWATCH, and prove its normalized expected weak regret is $O(1/\sqrt[3]{T})$, which converges to 0 as time horizon T approaches to ∞ .
- Utilized: Algorithm Design, Game Theory.

2014-2015 IntelliSample : SELF-TUNING PROGRAM TO OUTPUT THE SHORTEST PATHS EFFICIENTLY ON VERY LARGE GRAPHS

- Implemented three shortest path algorithms (Bellman Ford's, Dijkstra's, and Gabow's) and two sampling methods based on Forest Fire Algorithm.
- Provided a framework which predicts the best shortest path algorithm by pre-running on the sample graph.
- Utilized: Algorithm Selection, Graph Sampling.

2014 PaperSelect : PROGRAM TO AUTOMATICALLY SELECT ACADEMIC PAPERS FOR RESEARCHERS

- Provided two greedy approaches to solve the problem, one is heuristic and the other is $(1-1/e)$ -approximate.
- Utilized: Algorithm Design.

Publications

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| 2019 | Yuhui Zhang, Ming Li , Dejun Yang, and Guoliang Xue. A budget feasible mechanism for k-topic influence maximization in social networks. In <i>IEEE Global Communications Conference (GLOBECOM)</i> . IEEE, 2019 |
| 2018 | <p>Ming Li, Dejun Yang, Jian Lin, and Jian Tang. SpecWatch: A framework for adversarial spectrum monitoring with unknown statistics. <i>Computer Networks (COMNET)</i>, 143:176–190, 2018</p> <p>Jian Lin, Ming Li, Dejun Yang, and Guoliang Xue. Sybil-proof online incentive mechanisms for crowdsensing. In <i>IEEE Conference on Computer Communications (INFOCOM)</i>, pages 2438–2446. IEEE, 2018</p> <p>Jian Lin, Dejun Yang, Ming Li, Jia Xu, and Guoliang Xue. Frameworks for privacy-preserving mobile crowdsensing incentive mechanisms. <i>IEEE Transactions on Mobile Computing (TMC)</i>, 17(8):1851–1864, 2018</p> |
| 2017 | <p>Jian Lin, Ming Li, Dejun Yang, Guoliang Xue, and Jian Tang. Sybil-proof incentive mechanisms for crowdsensing. In <i>IEEE Conference on Computer Communications (INFOCOM)</i>. IEEE, 2017</p> <p>Michael Brown, Colin Marshall, Dejun Yang, Ming Li, Jian Lin, and Guoliang Xue. Maximizing capacity in cognitive radio networks under physical interference model. <i>IEEE/ACM Transactions on Networking (TON)</i>, 25(5):3003–3015, 2017</p> <p>Ming Li, Jian Lin, Dejun Yang, Guoliang Xue, and Jian Tang. QUAC: quality-aware contract-based incentive mechanisms for crowdsensing. In <i>2017 IEEE 14th International Conference on Mobile Ad Hoc and Sensor Systems (MASS)</i>, pages 72–80. IEEE, 2017</p> <p>Yuhui Zhang, Dejun Yang, Jian Lin, Ming Li, Guoliang Xue, Jian Tang, and Lei Xie. Spectrum auctions under physical interference model. <i>IEEE Transactions on Cognitive Communications and Networking (TCCN)</i>, 3(4):719–728, 2017</p> |
| 2016 | <p>Ming Li, Dejun Yang, Jian Lin, and Jian Tang. SpecWatch: Adversarial spectrum usage monitoring in crns with unknown statistics. In <i>The 35th Annual IEEE International Conference on Computer Communications (INFOCOM)</i>. IEEE, 2016</p> <p>Jian Lin, Dejun Yang, Ming Li, Jia Xu, and Guoliang Xue. BidGuard: A framework for privacy-preserving crowdsensing incentive mechanisms. In <i>2016 IEEE Conference on Communications and Network Security (CNS)</i>, pages 145–153. IEEE, 2016</p> |