Fubao Wu

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Summary
– Specialize in machine learning and data science algorithms
– Proficient in software design and development
– 10 years of academic and industrial experience in artificial intelligence
– Hands-on experience in building large systems using machine learning and deep neural network techniques

Education
Ph.D. in Electrical and Computer Engineering   08/2021 Expected
University of Massachusetts Amherst, MA

M.S. in Computer Science   02/2021
University of Massachusetts Amherst, MA

M.Eng. in Electrical and Computer Engineering
University of Science and Technology of China (USTC), Hefei, China

B.Eng. in Electrical and Computer Engineering
Northeastern University (NEU), Shenyang, China

Skills
Programming Languages: Python, Java, Scala, C, C++, C#, SQL, Html, CSS, Matlab
Systems/Frameworks: Pytorch, Tensorflow, Spark, Hadoop, HDFS, MySQL
Cloud Services: AWS, Google Cloud Platform
Operating Systems: Ubuntu, Debian, Windows
Quantitative Skills: Machine Learning, Deep Neural Networks, Reinforcement Learning, Statistics, Database Management

Professional Experience
Research Assistant, Computer Engineering, UMass Amherst   09/2014 - Present
Research Area: algorithms on machine learning, graph analytics and video analytics
- Developed a real-time video analytics system of object tracking through movement estimation with classification-based configuration adaptation on Pytorch, achieving accuracy bounds and minimum latency
- Improved the graph query quality and efficiency with hierarchical inheritance relations and developed a distributed algorithm based on Spark GraphX
- Designed a meta path-based personalized query algorithm to find drugs in drug graph databases, improving accuracy by 8% compared with baselines

Applied Research Intern, Bentley Systems, Watertown, CT   05/2018 - 08/2018
- Detected system faults for a mining facility customer by devising statistics and window-based techniques on multi-variate time series data
- Achieved fault detection accuracy of 92% by developing an integration tool with C# and testing on a large dataset with thousands of fields on millions of records

Applied Research Intern, Cisco Systems, San Jose, CA   06/2016 - 09/2016
- Yielded 93% accuracy of database matching for large network management databases through proposed matching algorithms based on Spark over 600GB data
- Assisted engineers for faster troubleshooting by remodeling product questions and solutions to incidents on graph data with clustering techniques in a distributed environment

Software Development Engineer, Huawei, Shanghai, China   07/2011-07/2013
- Enhanced reliability and functionality for large 2.5G/3G unified serving nodes, reducing incidents rate by about 30% through redesigning modules and structures
- Designed new security protocols based on IPSec and authentication for 4G network security, improve reliability performance by about 8%
- Fixed approximately 4 online network service incidents per week through diving deep into code and collaborating with multiple testing departments

Research Assistant, Computer Vision Lab, USTC   09/2009 - 05/2011
- Developed an information hiding algorithm in MP3 by hiding 2 bit information with only 1 bit modification through matrix operations in the compressed domain
- Refined Markov and joint density features in the MDCT domain with SVM classification, improving detection rate on MP3Stego to 89% (on average 83% of baselines)

Selected Projects

Efficient and Accurate Human Pose Estimation for Video Streams   (Python & Pytorch)
- Proposed a scheduling algorithm to dynamically select different DNN models for real time human pose estimation
- Implemented the pose estimation system, reducing computation resources by 48% with 2% accuracy loss compared to the most expensive model

Group Fairness for Learning Representation on Coupled Variational Autoencoder   (Python & Pytorch)
- Investigated the fairness and bias on a representation algorithm based on a variational autoencoder
- Explored the group fairness of the autoencoder on attributes such as gender, age, race on three datasets, showing the different levels of biases on different attributes

Configuration Adaptation for Object Tracking through Movement Prediction   (Python & Tensorflow)
- Explored the dynamics of configuration adaptations in a video processing pipeline
- Proposed a configuration adaptation algorithm to select optimal configurations for object tracking overtime that achieves the minimum delay with bounded accuracy
- Implemented the object tracking system on human, traffic, pose detections with **Tensorflow** and **OpenCV** in large video datasets

Knowledge Graph Query with Hierarchical Inheritance Relations   (Python, Scala & Spark)
- Explored answer query modeled as a subgraph matching in large graph databases
- Designed a graph query algorithm to improve answer quality with hierarchical inheritance relations
- Implemented a distributed algorithm in the **Spark** GraphX system with high quality and efficiency

Facial Emotion Recognition In Images and Videos   (Python & Tensorflow)
- Proposed a **LSTM** model based on a pretrained **CNN** features to recognize 7 types of human facial emotions
- Improved the accuracy by about 10% in different facial emotions compared to w/o pretrained CNN features on two common datasets

Indoor Way-finding Using Bluetooth Low Energy Beacons   (Java)
- Proposed a localization and navigation algorithm for the blind with bluebooth
- Developed an **Android** application with the localization and wayfinding, and tested it in an indoor building with more than 90% accuracy

Teaching Experience

Teaching Fellow, UMass Amherst

Engin 191–Engineering Freshmen Seminar   Fall 2019
- Designed a syllabus and taught a class of 19 students on introduction to engineering and programming
- Led student discussions in class and graded quizzes

Teaching Assistant
- Intro to Programming, Prof. Eric Polizzi, UMass Amherst   Spring 2021
- Artificial Intelligence Based Wireless Network Design , Prof. Beatriz Lorenzo, UMass Amherst   Fall 2020
- Computer Networks & Internet, Prof. Lixin Gao, UMass Amherst   Spring 2016
- Data Structures & Algorithms, Prof. Eric Polizzi, UMass Amherst   Fall 2015, 2017
- Introduction to Electrical & Computer Engineering, Prof. Baird Soules, UMass Amherst   Fall 2018
- Data Structure and Database, Prof. Weibing Gu, USTC   Fall 2010
- Introduction to Electronic Circuit, Prof. Yimin Cheng, USTC   Spring 2010
- Introduction to Database, Prof. Pingbo Yuan, USTC   Fall 2009
- Sensor Theory and Technique, Prof. Jinxu Tao, USTC   Spring 2009

Selected Publications

- **Fubao Wu**, Lixin Gao, Xi Wang, Configuration Adaptation through Movement Estimation for Object Tracking in Video Analytics (Submitting)
- **Fubao Wu**, Lixin Gao. Scalable Top-k Query on Information Networks with Hierarchical Inheritance Relations (In revision Data Mining and Knowledge Discovery)
- **F. Wu**, H. H. Song, J. Yin, L. Gao, M. Baldi and N. Anand, "NEMA: Automatic Integration of Large Network Management Databases," in IEEE Transactions on Network and Service Management, doi: 10.1109/TNSM.2020.3036414
- **Fubao Wu**, Chunhui Xie, Ke Mei. Steganalysis for MP3 based on modified Markov and joint density features. Computer Engineering and Applications.48(10) pp.115-119.2012
- Xie, Chunhui, Yimin Cheng, and **Fubao Wu**. "A new detection scheme for Echo Hiding." In Information Theory and Information Security (ICITIS), IEEE International Conference on, pp. 242-246. IEEE, 2010
- Jinyu Ni, **Fubao Wu**, Chunhui Xie. "A steganalysis method in DCT domain for JPEG images". Microcomputer and its Applications.30(8) pp.39-44.2011