Qi (Leo) Yu

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Research Interests

Data mining, machine learning and deep learning on graph data with applications in social networks, e-commerce and bioinformatics

Education

- **University of Illinois at Urbana-Champaign** — Champaign, U.S.
  Master of Computer Science; GPA: 3.94/4.0 — *Aug. 2022 - May. 2024*
  Courses: *CS446 Machine Learning(A), CS543 Computer Vision(A), CS508 Manycore Parallel Algorithms(A)*
- **Dalian University of Technology** — Dalian, China
  Bachelor of Engineering - Computer Science; GPA: 90.4/100, 4.04/5.0 — *Sept. 2018 - Jul. 2022*
  Courses: *Machine Learning, Artificial Intelligence, Numerical Analysis, Information Retrieval*
- **University of California, Los Angeles** — Los Angeles, U.S.
  Summer Session - Algorithm and Complexity; GPA: 4.0/4.0 — *Jun. 2020 - Sept. 2020*

Skills Summary

- **Programming**: Python, C++, Java, MATLAB, JavaScript
- **ML Dev & HPC**: PyTorch, OpenCV, PyG, CUDA, scikit-learn
- **Miscellaneous**: Git, Bash, Z3-solver, Gurobi, LaTeX

Projects

- **GNN for Network Alignment (Data Mining, Network Alignment, GNN)**: Unified consistency based and random walk based network alignment methods and reveals their limitations compared to deep graph models. Developed a shared position-aware GNN model that samples ground-truth anchor nodes as anchor-sets to encode nodes in both networks into a unified embedding space. Project is still in progress. **Tech**: PyTorch, PyG, MATLAB *(Feb. 2024)*
- **Parallelization over forward-pass of LeNet-5 (Parallel Algorithms, DNN)**: Implemented and optimized the forward pass of convolution layers of a modified LeNet-5 through multiple parallelization techniques including input matrix unrolling, fixed point arithmetic, and joint register & shared memory tiling SGEMM. Optimizations achieved up to 10x speed up compared to the baseline. **Tech**: CUDA, C++, Profiling, NVIDIA Nsight Compute *(Oct. 2022)*
- **Intelligent Handling Robot (Deep Learning, Computer Vision, Robotics)**: Led a team of five students to program an intelligent robot capable of detecting and carrying the pillar with the correct facial image to the designated area automatically; Developed a Java mobile application used for controlling robots in a robots boxing competition. Project scores highest in class. **Tech**: Android Development, PyTorch, OpenCV, Raspberry Pi, Socket. *(Jul. 2021)*
- **Anomalous Behavior Detection under UAV Scenarios (Object Detection, Deep Learning, Drone Platform)**: Led a team of four to develop a derivatives of YOLOv3 for detecting abnormal human behavior under an UAV perspective; Boosted the model's performance to 0.76 mAP and 0.85 mAR through a customized game-based dataset. **Tech**: PyTorch, OpenCV. *(Feb. 2020)*

Experience

- **Minimum WCRT under Prioritized List Scheduling** — Dalian University of Technology
  Undergraduate Research Assistant — *Feb. 2022 - Jul. 2022*
  - **ILP**: Encoded the priority assignment problem for DAG tasks into an Integer Linear Programming (ILP) formulation.
  - **WCRT**: Designed an iterative algorithm to derive the minimum WCRT under PLS algorithm.
  - **Result**: Proposed algorithm solved the ILP formulation optimally by involving only 12.67% variables on average.
  - **Responsibilities**: Implementation of proposed algorithms, Conducting experiments under various settings
- **Drug-drug Interaction Detection in Drug Knowledge Graph** — Dalian University of Technology
  Undergraduate Project — *Jan.2022 - June.2022*
  - **Drug KG**: Constructed a large-scale drug knowledge graph by joining multiple pharmaceutical databases (DrugBank, PharmGKB, etc.) based on drug-related entity alignment.
  - **Model**: Implemented and compared multiple embedding algorithms on the constructed KG, and proposed a lightweight Conv-LSTM model to predict drug-drug interaction based on drug embeddings.
  - **Result**: Proposed model outperformed existing end-to-end GNN models by up to 6% on MCC and 2% on AUPR.
- **UCInspire Summer Research - Personalized ML for Edge Computing** — University of California, Irvine
  Undergraduate Research Project — *Jun. 2021 - Oct. 2021*
  - **ML for Edge**: Proposed a specialized machine learning schema for resource-constrained edge computing systems by exploiting temporal correlations among stream data.
  - **Model**: Proposed a two-stage classifier model for client-side training and intelligent task-offloading.
  - **Result**: Prototype model significantly improved network congestion and resource utilization on the client side.

Publications

- **Journal**: Chang, S., Bi, R., Sun, J., Liu, W., **Yu, Q.**, Deng, Q., & Gu, Z. (2022). Toward minimum WCRT bound for DAG tasks under prioritized list scheduling algorithms. IEEE Transactions on Computer-Aided Design of Integrated Circuits and Systems, 41(11), 3874-3885.