Zikang Leng

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Education

Georgia Institute of Technology Atlanta, GA

B.S. in Computer Science (Theory & AI), B.S. in Physics | GPA: 4.0 *Aug. 2021 - Exp. May. 2024*

- Research Areas: Human Activity Recogniton, Data Generation, Computer Vision
- Advised by Prof. Thomas Plötz and Hyeokhyen Kwon

Experience

Undergraduate Research Assistant (Computational Behavior Analysis Lab) Aug. 2022 - Present

Georgia Institute of Technology *Atlanta, GA*

- Working on diabetic foot ulcer image segmentation and 3d foot reconstruction from videos
- Created a system that can generate virtual IMU data from virtual textual descriptions of activities by combining ChatGPT, motion synthesis, and signal processing method
- Created FingerSpeller, an innovative text entry system that accurately recognizes American Sign Language fingerspelling words using smart rings
- Introduced a novel method for measuring the subtlety of motion involved in activities in videos using optical flow and 2D pose estimation to evaluate the benefit of virtual IMU data for fine-grained Human Activity Recognition.
- Enhanced modules of IMUTube, a computer vision-based pipeline for extracting virtual IMU data from videos.

Machine Learning Research Intern - SULI (Advised by Dr. Xiaodong Yu) May. 2023 - Aug. 2023

Argonne National Laboratory *Lemont, IL*

- Accelerated the training of graph neural network (GNN) for ocean simulation 213 times using 256 GPU
- Augmented GNN training data by performing IDW interpolation on existing data, enabling training at a larger scale
- Showcased findings in a poster presentation to the students and staff of Argonne National Laboratory

Undergraduate Research Assistant (Dr. Glen Evenbly's Group) Nov. 2021 - Jul. 2022

Georgia Institute of Technology *Atlanta, GA*

- Conducted research on using quantum-inspired tensor network as classifiers for supervised learning
- Implemented a training algorithm for the Matrix Product States (MPS)
- Tested and compared the performance of MPS, deep neural network (DNN), and convolutional neural network (CNN) on several bitstring rules, MNIST dataset, and Fashion-MNIST datset
- Benchmarked how well MPS, DNN, and CNN can learn random instances of each other

Publications

FingerSpeller: Camera-Free Text Entry Using Smart Rings for American Sign Language Fingerspelling Recognition ASSETS '23 *[paper]*

David Martin, **Zikang Leng***, Tan Gemicioglu, Jon Womack, Jocelyn Heath, Bill Neubauer, Hyeokhyen Kwon, Thomas Plötz, Thad Starner*

Generating Virtual On-body Accelerometer Data from Virtual Textual Descriptions for Human Activity Recognition (Best Paper Honorable Mention) UbiComp/ISWC '23 *[paper] [code] [news]*

***Zikang Leng**, Hyeokhyen Kwon, Thomas Plötz*

On the Utility of Virtual On-body Acceleration Data for Fine-grained Human Activity Recognition UbiComp/ISWC '23 *[paper]*

***Zikang Leng**, Yash Jain, Hyeokhyen Kwon, Thomas Plötz*

On the Benefit of Generative Foundational Models for Human Activity Recognition GenAI4PC Symposium *[page][paper]*

***Zikang Leng**, Hyeokhyen Kwon, Thomas Plötz*

Awards

Best Paper Honorable Mention ACM ISWC 2023
President's Undergraduate Research Awards (Sarlary and Travel) 2023

Projects

American Sign Language Recogniton Mar. 2023 - Apr. 2023

- Processed and visualized Google's Isolated Sign Langauge Recogniton dataset (GISLR) from Kaggle
- Implemented deep learning models such as DNN, LSTM, ConvLSTM, and Transformer to predict signs from 3d poses
- Benchmarked and analyzed the models performance on GISLR

Movie Box Office Prediction [page] Jan. 2022 - Apr. 2022

- Cleaned, preprocessed, and analyzed the Movie Industry dataset from Kaggle using pandas and seaborn
- Built multiple models including lasso/ridge regression, random forest, and DNN to predict movie revenue
- Finetuned models' hyperparameters and analyzed model performances to determine the optimal model

Food Analyzer-HackGT 8 [page] Oct. 2021

- Utilized Google's Vision API to allow software determine the food type within user-inputted images
- Extracted data of over 400,000 foods from FoodData Central database to allow software to calculate food nutrients
- Utilized Qt Designer and PyQt5 to create an user interface for easy data input and visualization

Relevent Courseworks

CS 4644: Deep Learning
CS 4641: Machine Learning
CS 4540: Advanced Algorithm
CS 4510: Automata and Complexity Theory
CS 3630: Introduction to Perception and Robotics
CS 3600: Introduction to Artificial Intelligence

Technical Skills

Languages: Python, Java/JavaFX, C/C++, LC3 Assembly, LaTeX, UML, Bash, Matlab
Developer Tools: Git, Docker, VS Code, IntelliJ, Eclipse
Libraries: PyTorch, OpenCV, scikit-learn, NumPy, Keras, TensorFlow

Mentored Students

Masters Students: Amitrajit Bhattacharjee, Hrudhai Rajasekhar, Shoibolina Kaushik
Undergraduate Students: Jocelyn Heath, Lizhe Zhang, William (Bill) C Neubauer, Ruijia Peng, Yaqi Liu

References

Dr. Thomas Plötz Associate Professor, School of Interactive Computing, Georgia Institute of Technology
Dr. Hyeokhyen Kwon Assistant Professor, Department of Biomedical Informatics, Emory University
Dr. Thad Starner Professor, School of Interactive Computing, Georgia Institute of Technology