Jinxuan **Xu**

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Education

Rutgers, The State University of New Jersey   *New Jersey, USA*
PH.D. IN ELECTRICAL AND COMPUTER ENGINEERING ADVISED BY PROF. YUQIAN ZHANG   *Sep. 2020 - Present*

Rutgers, The State University of New Jersey   *New Jersey, USA*
M.S. IN ELECTRICAL AND COMPUTER ENGINEERING   *Sep. 2018 - May. 2020*

Tianjin University   *Tianjin, China*
B.S. IN ELECTRONIC INFORMATION ENGINEERING   *Sep. 2014 - May. 2018*

Experience

Kunlun [web]   *Beijing, China*
RESEARCH INTERN WORKING ON MULTI-MODAL LLMS FOR VIDEO UNDERSTANDING.   *Jun. 2024 - Aug. 2024*

Baidu Research USA [web]   *California, USA*
RESEARCH INTERN WORKING ON COMPUTER VISION, ROBOTICS, AND LLMS.   *Jun. 2022 - Dec. 2023*

Publications

[1] **Jinxuan X.**, Shiyu J., Yutian L., Yuqian Z., & Liangjun Z. *Reasoning Tuning Grasp: Adapting Multi-Modal Large Language Models for Robotic Grasping.* (**Accepted to CoRL-W 2023, IROS 2024**)[web][paper]

[2] Shiyu J., **Jinxuan X.**, Yutian L., & Liangjun Z. *Reasoning Grasping via Multimodal Large Language Model.* (**Accepted to CoRL 2024**) [paper]

[3] **Jinxuan X.**, Hong-you C., Wei-lun C., & Yuqian Z. *Jigsaw Game: Federated Clustering.* (**Accepted to TMLR**) [paper]

[4] **Jinxuan X.**, & Liangjun Z. *A Behavior-Augmented System for Pedestrian Intention Prediction with Environment Understanding.* (In Progress)

[5] Zhipeng Z., Asim Z., **Jinxuan X.**, & Xiang L. *Artificial intelligence-aided railroad trespassing detection and data analytics: Methodology and a case study.* Accident Analysis & Prevention 168 (2022): 106594. [paper]

Research Experience

Adapting Multi-Modal LLMs for Embodied AI [1]   *Core Researcher*
ADVISED BY DR. LIANGJUN ZHANG AND PROF. YUQIAN ZHANG   *Baidu Research, Sunnyvale, CA, U.S.*
- Focused on enhancing robotic object grasping capabilities by fine-tuning multi-modal LLMs.
- Developed a *Reasoning Tuning* approach for fine-tuning LLaVA, leveraging LLMs' inherent knowledge to generate precise, context-aware numerical grasp poses for robotic arms.

Reasoning Grasping via Multimodal Large Language Model [2]   *Algorithm Designer and Developer*
ADVISED BY DR. LIANGJUN ZHANG   *Baidu Research, Sunnyvale, CA, U.S.*
- Utilized multi-modal LLMs to improve robotic grasping in cluttered environments via indirect user instructions.
- Introduced (1) *Reasoning Grasping*, a novel paradigm enabling robots to interpret indirect language commands for generating grasp poses and (2) a vision-based robotic grasping prediction framework based on LLaVA and demonstrate its effectiveness in complex scenarios.

Jigsaw Game: Federated Clustering [3]   *Core Researcher*
ADVISED BY PROF. WEI-LUN CHAO AND PROF. YUQIAN ZHANG   *Rutgers University, New Brunswick, NJ, U.S.*
- Explored unsupervised learning methods, specifically image clustering, within federated settings.
- Proposed a federated k-means algorithm to derive global clustering solutions from localized data, which utilizes the properties of traditional k-means geometry and federated learning principles.

A Behavior-Augmented System for Pedestrian Intention Prediction [4]   *Core Researcher*
ADVISED BY DR. LIANGJUN ZHANG   *Baidu Research, Sunnyvale, CA, U.S.*
- Aimed to predict pedestrian crossing intentions by integrating analysis of environmental cues from video footage.
- Devised a multi-modal, behavior-augmented system that leverages video, vehicle dynamics, and human posture data for early prediction of pedestrian actions, demonstrating superior accuracy across benchmark datasets.

Railroad Trespassing Detection System [5] *Algorithm Designer and Developer*

Advised by Prof. Xiang Liu *Rutgers University, New Brunswick, NJ, U.S.*

- Designed a computer vision based system for detecting trespassing incidents on railroad properties using surveillance video analysis.
- Developed a specialized algorithm for railroad area identification and extraction with customized object detection in different railroad environments. The trespassing detection system was deployed in a real-world environment and tested on railroad tracks in New Jersey, U.S.

Personal Projects

Structures of Local Solution in Non-Negative Matrix Factorization *Sep. 2020 - Mar. 2021*

Advised by Prof. Yuqian Zhang and Prof. Yudong Chen *Rutgers University, New Brunswick, NJ, U.S.*

- This project focuses on the properties of local solutions in non-convex problems, especially the Non-Negative Matrix Factorization (NMF) problem. Our investigation centers on exploring the geometric landscape of NMF problems, where we endeavor to theoretically characterize local solutions and saddle points.

Human health condition monitoring from pose estimation sequence *Sep. 2019 - Jan. 2020*

Advised by Prof. Jorge Ortiz *Rutgers University, New Brunswick, NJ, U.S.*

- The primary objective of this project is to monitor the human physical condition, with a specific focus on joint health, utilizing analysis of short videos alongside corresponding pose estimation sequences. To achieve this, we employ state-of-the-art pose estimation methods and collect video data for model training purposes.

Image Colorization using Auto-encoder *Jan. 2019 - May. 2019*

Course Project advised by Prof. Bo Yuan *Rutgers University, New Brunswick, NJ, U.S.*

- In this project, we employed an auto-encoder network for the task of image colorization. Leveraging a CNN-based framework, we trained the model on the Landscape classification dataset. The model demonstrates strong performance, effectively restoring color to grayscale images.

Brain Tumor Segmentation based on SLIC Algorithm *Dec. 2017 - May. 2018*

Advised by Dr. Jing Zhang *Chinese Academy of Science, Beijing, China.*

- This project focuses on developing an auxiliary diagnostic method in brain medicine by identifying and extracting brain tumor segments from MRI images. Our approach involves implementing an SLIC superpixels algorithm from scratch, tailored specifically to the tumor scenario and lesion detection within MRI scans.

Smart Farm Control System using MODBUS Protocol *Dec. 2016 - Feb. 2017*

Advised by Dr. Fei Xu *Chinese Academy of Science, Beijing, China.*

- This project implements a robust two-layer communication network employing MODBUS/TCP and MODBUS/RTU communication protocols using C++ and is seamlessly integrated into an intelligent farm's remote-controlling system. Additionally, we crafted a user interaction interface facilitating monitoring and control of farm facilities via the established two-layer communication network.

Teaching Experience

Teaching Assistant for Course: Introduction to Computers for Engineers *Sep. 2022 - May. 2024*

Instructed by Prof. Brown Philip *Rutgers University, New Brunswick, NJ, U.S.*

Teaching Assistant for Course: Principles of Electrical Engineering II *Jan. 2021 - May. 2022*

Instructed by Prof. John J. McGarvey *Rutgers University, New Brunswick, NJ, U.S.*

Skills

Coding Python, C/C++, Matlab, Bash, PyTorch, Tensorflow, Git, Slurm, Linux

Techniques Foundation Models Fine-Tuning, Low-Rank Adaptation, Transfer Learning

Research Fields Large Language Models, Vision-Language Models, Computer Vision, Federated Learning, Optimization, Robotics