Xinyu Lu

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Education

University of Michigan *Ann Arbor, U.S.*
B.S. in Computer Science (Dual Degree) *Sep 2020 - Apr 2022 (expected)*

- **Cumulative GPA:** 4.00/4.00
- **Selected Coursework:** Natural Language Processing, Principles of Machine Learning, Conversational Artificial Intelligence, Intro to Machine Learning(A+), Computer Vision(A), Information Retrieval(A+), Web Systems(A+), Data Structure & Algorithm(A), Foundations of Computer Science(A+), Intro to Computer Organization(A+), Linear Spaces & Matrix Theory(A+)

Shanghai Jiao Tong University *Shanghai, China*
B.S.E. in Electrical and Computer Engineering (Dual Degree) *Sep 2018 - Aug 2022 (expected)*

- **Cumulative GPA:** 3.79/4.00
- **Selected Coursework:** Programming & Elementary Data Structures(A+), Intro to Engineering(A+), Logic Design(A), Discrete Math(A), Honors Calculus II-IV(A, A+, A+)

Publication

Hangrui Cao, **Xinyu Lu**, Zhiman Su, Jing Wu and Chengnian Long. "Simulation of DoS Attack in Networked Control System Using TrueTime." In *Journal of China Automation Congress*, pp. 856-860, 2020.

Research

Situated Language and Embodied Dialogue (SLED) Lab, University of Michigan *Ann Arbor, U.S.*
Advisor: Joyce Chai *Nov 2021 - Present*

Project: Voice Instruction for the Visually Impaired in Situated Dialogue [Grounded Language Processing, Robotics]

- **Goal:** Develop a voice assistant to help the visually impaired people with situated description and task-oriented dialogue.
- Currently reviewing human-computer interaction and psychology studies of accessibility for people with disability
- Plan to collect new situated dialogue data and train an embodied AI to generate instructions

QU Lab, University of Michigan *Ann Arbor, U.S.*
Advisor: Qing Qu *Sep 2021 - Present*

Project: Neural Collapse in Transfer Learning [Machine Learning, Natural Language Processing]

- **Goals:** Study the relationship between neural collapse and model transferability, and design new training objectives and data augmentation methods to prevent the effect of neural collaspe on transferability.
- Reviewed literature that studied the effect of training objectives on transfer learning, and delivered presentation
- Implemented source code of training and validation of transferring learning under fully fune-tuning and fixed features settings
- Developed code of calculating neural collapse metric and angles between hidden layer features and classifiers
- Currently designing new regularizers and data augmentation methods, and running experiments on the language model BERT

LIU Lab, University of Michigan *Ann Arbor, U.S.*
Advisor: Jie Liu *May 2021 - Present*

Project: Knowledge Graph from MEDLINE Corpus [Natural Language Processing, Biomedical Engineering]

- **Goals:** Construct a knowledge graph from biomedical literature by extracting the entities and relations, and create a website for interactive graph visualization and displaying articles based on user-input entities and relations.
- Designed and implemented a data preprocessing pipeline of abbreviation & coreference resolution and sentence simplification
- Implemented code of extracting entities and relations with OpenIE of Stanford CoreNLP
- Improved efficiency of programs dealing with the gigantic dataset by developing a multiprocess program
- Currently developing the website for graph visualization, entity searching and article searching

Automation Department, Shanghai Jiao Tong University *Shanghai, China*
Advisor: Jing Wu *Mar 2020 - Nov 2020*

Project: Simulation of DoS Attack in Networked Control System [Networked Control Systems, Machine Learning]

- **Goals:** Design new components in the networked control system, apply neural network architecture and simulate the system based on TrueTime.
- Implemented and incorporated a neural network trained on National Grid data to the traditional plant component
- Simulated real-time networked control system with TrueTime and MATLAB, and Denial-of-Service attack with pendulum system
- Improved the stability of the system by carefully adjusting the parameters in the controller component
- Wrote the paper *Simulation of DoS Attack in Networked Control System Using TrueTime*

Selected Course Projects

From Game Theory to Machine Learning: Experiments on Reducing Overfitting *Ann Arbor, U.S.*
Machine Learning. Advisor: Qing Qu *Oct 2021 - Present*

- **Goal:** Design a new loss function to reduce the overfitting in image classification tasks.
- Defined a new loss function by incorporating the formula of interactions defined by Harsanyi in the game theory
- Trained VGG16 and AlexNet on the CIFAR-10 dataset under the original and new loss functions

Generating Concise Content: Experiments on Text Summarization *Ann Arbor, U.S.*

Natural Language Processing. Advisor: Joyce Chai *Oct 2021 - Present*

- **Goal:** Use two approaches to improve the quality of text summarization: apply coreference resolution on the original text and generate summarization with BERT, and incorporate BERT model with the pointer generator.
- Run coreference resolution on the CNN/DailyMail dataset
- Implemented the code of the fusion of BERT and pointer generator
- Fine-tuned the pre-trained BERT model with the processed CNN/DailyMail text

VoicEmail: An Intelligent Email Voice Assistant *Ann Arbor, U.S.*

Conversational Artificial Intelligence. Advisor: Jason Mars *Sep 2021 - Present*

- **Goal:** Build an email AI assistant that supports email summarization and management based on conversation.
- Developed a chat box as the user interface on the web with TypeScript and React
- Supported the conversion between text and speech in the web with the SpeechRecognition and SpeechSynthesis interfaces
- Executed email processing commands in the backend with EZGmail, a Python interface to the Gmail API

Work Experience

Research & Development Intern, ByteDance *Shanghai, China*

Mentor: Siyu Chen *May 2021 - Aug 2021*

- **Focus:** Artificial Intelligence, Natural Language Processing, Music Generation, Frontend
- Implemented the source code of incorporating self-attention mechanism into the Bi-LSTM based RNN model
- Filtered and processed hundreds of thousands of music clips to feed into the neural network
- Trained and tested the improved RNN model and a transformer model to generate new music and continue existing music
- Developed the interactive and responsive piano on the web to receive the user-input chord and melody

Selected Honors & Awards

2020, 2021	**University Honors**, University of Michigan	*Ann Arbor, U.S.*
2020, 2021	**Dean's List**, University of Michigan	*Ann Arbor, U.S.*
2020	**Jackson and Muriel Lum Scholarship**, University of Michigan	*Ann Arbor, U.S.*
2020	**Tang Lixin Scholarship**, Shanghai Jiao Tong University	*Shanghai, China*
2019, 2020	**SJTU Undergraduate Excellence Scholarship**, Shanghai Jiao Tong University	*Shanghai, China*
2019	**John Wu & Jane Sun Sunshine Scholarship**, Shanghai Jiao Tong University	*Shanghai, China*

Selected Activities

2020	**UM-SJTU Joint Institute Advising Center**, Student Advisor	*Shanghai, China*
2019	**UM-SJTU Joint Institute Student Union**, Director of Organization Department	*Shanghai, China*

Skills

Programming	**Python, C++, C, TypeScript, JavaScript, Java, MATLAB**
Framework	**PyTorch, Tensorflow, Keras, SpaCy, NLTK, OpenCV, SQLite, Flask, React**