Yuetian Chen

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EDUCATION

Rensselaer Polytechnic Institute   Troy, New York
- *Bachelor of Computer Science*   *July '20 - December '23*
  GPA: 3.81 / 4.0; Junior & Senior GPA: 3.93 / 4.0
  Courses: *Machine Learning from Data, Intelligent Virtual Agent, Computational Creativity, Machine Learning Seminar, Machine Learning & Optimization, Intro to Deep Learning, Rensselaer Center for Open Source, Biostatistics, etc*

RESEARCH INSTERESTS

My research area is natural language processing, with a focus on developing and deploying controllable and interactive content generation based on language models. This involves understanding open-world, complex, and multi-modal data, and establishing a further application for deep learning in computational creativity. Recently, I have been dedicated to researching security issues of foundational models, including: (1) examining various Membership Inference Attack methods in computer vision tasks, such as Likelihood Ratio Attack and Threshold Attack, dynamically and from the perspective of individual data samples; (2) Adversarial Attacks against Large Language Models (LLMs), like Prompt-level Jail Break and Data Poisoning. Additionally, I utilize artificial intelligence to deploy human-centric multimodal agent robots, enhancing their interactivity and multi-functionality in diverse environments.

PUBLICATIONS

- **Yuetian Chen**, Zhiqi Wang, & Lei Yu. "Understanding the Dynamics of Membership Privacy in Deep Learning", *IEEE/CVF Conference on Computer Vision and Pattern Recognition 2024 (CVPR'24)*; Under Review

- **Yuetian Chen**, & Mei Si. "Reflections & Resonance: Two-Agent Partnership for Advanced LLM-based Story Annotation", *2024 Joint International Conference on Computational Linguistics, Language Resources and Evaluation (LREC-COLING'24)*; Under Review

- **Yuetian Chen**, & Mei Si. "Enhancing Sentiment Analysis Results through Outlier Detection Optimization", *38th Annual AAAI Conference on Artificial Intelligence (IAAI'24)*; Under Review

- **Yuetian Chen**, & Mei Si. "Prompt to GPT-3: Step-by-Step Thinking Instructions for Humor Generation", *14th International Conference on Computational Creativity (ICCC'23)*; View Paper

- **Yuetian Chen**, Ruohua Li, Bowen Shi, Peiru Liu, & Mei Si. "Automated Visual Story Synthesis with Character Trait Control", *15th International Conference on Applied Human Factors and Ergonomics (AHFE'23)*; View Paper

- **Yuetian Chen**, Ruohua Li, Bowen Shi, Peiru Liu, & Mei Si. "Visual Story Generation Based on Emotional and Keyword Scheme", *19th AAAI Conference on Artificial Intelligence and Interactive Digital Entertainment (AIIDE'23)*; View Paper

- Chengqi Xu, **Yuetian Chen**, & Yiyang Cao. "Automated Cell Recognition Using Single-cell RNA sequencing with Machine Learning", *5th International Conference on Computational Biology and Bioinformatics (ICCBB'21)*; View Paper

- **Yuetian Chen**. "A review of self-encoding language models for bidirectional representation", *2nd International Conference on Computer Vision, Image, and Deep Learning (CVIDL'21)*; View Paper

ACADEMIC EXPERIENCE: RESEARCH AND INSTRUCTION

- **Research Assistant - Intelligent System Lab**   Troy, New York
  Advisor: Professor Qiang Ji, Department of Electrical, Computer, and Systems Engineering   *May '23 - Present*
  - **Research topic:** Deep Learning for Computer Vision and Robotics - Open World Object Detection   *August '23*
    * Contributed to the development of a State-of-the-Art (SOTA) methodology for Open World Object Detection, optimizing the class-agnostic object detection algorithm's backbone model, which significantly improved object recognition precision performance.
  - **Research topic:** Integration of Computer Vision for Human Behavior Analysis in Pepper Robot   *May '23*
    * Enhanced Pepper robot's interactivity as an multi-modal Agent by developing and integrating advanced computer vision algorithms for nuanced human behavior analysis, resulting in the robot's deployment at the Jonsson Engineering Center for improved visitor digital orientation.
    * **Tools**: Pytorch, Tensorflow, OpenAI API(Whisper, ChatGPT), Choregraphe, QiSDK

- **Research Assistant - Data Security and Privacy Lab**   Troy, New York
  Advisor: Tenure track Assistant Professor Lei Yu, Department of Computer Science   *May '23 - Present*
  - **Research topic:** Membership Inference Attacks and Data Privacy in Deep Learning   *May '23*
    * Explored the relationship between membership inference attacks (MIAs) and data privacy, examining the assumption of data point uniqueness and its impact on privacy leakage.
    * Developed an evaluation methodology for membership inference attacks and introduced new considerations about data privacy.

- **Research Assistant - Cognitive and Immersive Systems Lab** — Troy, New York
  Advisor: Associate Professor Mei Si, Department of Cognitive Science — *March '22 - Present*
  - **Research topic:** Story Comprehension & Generation using Large Language Models — *March '22*
    - ∗ Explored the limits of story generation tasks in natural language processing and optimized generation logic with prompting learning.
    - ∗ Developed an innovative end-to-end framework that fosters interactive narrative experiences through keyword control and image generation.
  - **Research topic:** Prompt Engineering for Domain Specialization — *April '23*
    - ∗ Developed a specialized prompt engineering process for crafting monologue jokes with ChatGPT, focusing on late-night TV show formats.
    - ∗ Optimized joke creation by segmenting the process into structured sections, improving ChatGPT's efficiency in generating punchlines.
    - ∗ Assessed the performance and adjusted the prompts to refine ChatGPT's output, leading to a more nuanced and audience-tailored humor.
  - **Research topic:** Data Analytic Research for Speech-based Emotion Detection — *August '23*
    - ∗ Engaged in cutting-edge research aimed at elevating the accuracy and reliability of emotion detection using speech data by reviewing existing deep learning techniques and developing new methodologies for outlier detection.

TEACHING EXPERIENCE

- **Head Teaching Assistant, Rensselaer Polytechnic Institute**
  Instructor: Lecturer Konstantin Kuzmin, Department of Computer Science
  - **CSCI 2500: Computer Organization - Fall '23**:
    - ∗ Orchestrated the coordination of 29 teaching assistants as the lead TA, ensuring the smooth execution of teaching strategies for a large-scale 4-credit Computer Organization course with 400 students.
    - ∗ Spearheaded the creation of innovative instructional materials and engaged in strategic faculty collaborations to elevate the academic experience.
  - **CSCI 2600: Principle of Software - Spring '23, Summer '23**:
    - ∗ Directed a team of 17 teaching assistants in the Principles of Software course, facilitating the delivery of high-quality support and instruction to 350 students.
    - ∗ Pioneered the implementation of interactive learning sessions and grading tasks assignment, significantly enhancing student satisfaction and educational outcomes.
- **Undergraduate Mentor, Rensselaer Polytechnic Institute**
  Instructor: Lecturer Konstantin Kuzmin, Department of Computer Science
  - **CSCI 2500: Computer Organization - Fall '22**:
    - ∗ Acted as a mentor to students, imparting knowledge on fundamental computer organization and guiding them through the concepts of MIPS assembly language and digital logic, including gates and Boolean algebra. Provided personalized attention and support to enhance their understanding and Technical skills.
  - **CSCI 2600: Principle of Software - Summer '22, Fall '22**:
    - ∗ Guided a group of students as a mentor, teaching critical software design, implementation, and testing concepts, including specification, class abstraction, design principles, and Java-based patterns. Provided individualized support and encouragement to help students master these important topics.
- **Part-time Undergraduate Mentor, Rensselaer Polytechnic Institute**
  Instructor: Lecturer & Program Coordinator Bram Van Heuveln, Department of Cognitive Science
  - **COGS 2140: Introduction to Logic - Fall '22**:
    - ∗ Served as a mentor to students, introducing them to first-order logic as a useful tool in fields such as engineering, computer science, and philosophy, as well as its application in puzzle-solving environments like standardized tests. Led hands-on laboratory sessions to reinforce learning and deepen understanding.

PROJECTS

- **Kaggle - LLM Science Exam**
  Self-Guided Project — *October '23*
  - Attained a top 19% ranking (491 out of 2,664) in Kaggle's LLM Science Exam competition by fine-tuning large language model with prompt engineering to answer complex science questions created by GPT-3.5, showcasing effective model performance under resource constraints.
  - **Tools**: Pytorch, LangChain, BitsAndBytes, PEFT

- **Membership Inference Attacks and Evaluation - MIAE**
  Advisor: Tenure track Assistant Professor Lei Yu, Department of Computer Science — *Ausust '23*
  - Developed a systematical and comprehensive toolbox for multiple Membership Inference Attacks (MIA) methods as well as evaluation metrics, integrating multiple attack algorithms for benchmarking, in collaboration with IBM on addressing privacy issues in Watsonx Generative AI. This tool is set to enhance privacy-preserving measures by providing robust evaluation metrics.
  - **Tools**: Pytorch, LangChain, BitsAndBytes, PEFT

- **Stock AI**
  Self-Guided Project — *July '23*

- Predicted stock prices from Google news feeds using Natural Language Processing and Reinforcement Learning, with the help of multiple combinations of SOTA methodology.
- **Tools**: Pytorch, HuggingFace

Our Body - Introduction to Machine Learning
Advisor: Professor Ziv Bar-Joseph, Machine Learning Department, Carnegie Mellon University   *August '21*
- Spearheaded pre-processing and classification of 20,499-dimensional sc-RNA data, introducing innovative dimension reduction operations for improved accuracy and efficiency.
- **Tools**: Python, Matplotlib, Huawei Cloud, TensorFlow, and Pandas

Speech and Text Processing Topics
Advisor: Associate Professor Lei Wang, School of Foreign Languages, Peking University   *March '21*
- Delivered a comprehensive presentation on the current state of language model development, including an in-depth exploration of BERT-based models and their practical applications in various industries..
- **Tools**: Python, Tensorboard

Computer Graphics and 3D Modeling: A Case Study on Honkai Impact 3rd
Professor Brian A. Barsky, Graduate School, University of California, Berkeley   *September '20*
- Analyzed and classified the elements of the cartoon rendering pipeline based on subjective styles for scenes rendered in real time (e.g., mobile games).
- **Tools**: Unity

CIS Summer - Machine Learning in Genomics
Professor Manolis Kellis, Department of Computer Science, Massachusetts Institute of Technology   *August '19*
- Explored interdisciplinary applications of artificial intelligence with Professor Manolis Kellis of MIT and completed a project on identifying breast cancer using deep learning.
- **Tools**: Python, Pandas, Keras

EXTRACURRICULAR ACTIVITIES

Invited Poster Talk: 2023 RHC Academic Showcase   New York, United States
Presenter   *October 15, '23*
- Presented on "Understanding the Dynamics of Membership Privacy in Deep Learning," discussing the risks and evaluation methods for privacy in AI..
- Showcased ongoing research at RPI-DSP Lab on enhancing privacy through selective data point analysis and the potential of MIAE framework to extend privacy assessments to Large Language Models.

Invited Talk: CCAT - 4th Canada China International Film Festival (CCIFF)   Montreal, Canada
Presenter   *July 19, '23*
- Presented advancements in story and joke generation pipelines using theory-guided Language Learning Models (LLM), emphasizing film art applications.

Invited Poster Talk: School of Science Undergraduate Research Fair 2023   New York, United States
Presenter   *April 15, '23*
- Showcased a novel system for visual story generation harnessing the capabilities of large language and diffusion models, allowing for the co-creation of stories with users.
- Demonstrated the application of Plutchik's Wheel of Emotions for narrative development, and how keyword extraction from the ROCStories dataset enhances story coherence and commonsense reasoning.

Video producing, Stream channel maintenance   Remote
Video editor @BiliBili (Part-time)   *Oct. 2018 - Present*
- **Video channel - realJohnson**: Introduced the basics of computer science (e.g. object-oriented programming) to the general public in the context of classical operating systems in the early years. Utilize *Adobe After Effects* and *Cinema 4D* to achieve an effective audio-visual experience.
- **Video channel - KaleidoscopeSub**: Localized translation channel for videos related to Technology news. Proficiency in the pipeline of subtitle group operations from translation and editing to rendering and publishing.
- The channels have received over 800,000 views and influenced many younger generations interested in the field of computer science.

HONORS AND AWARDS

- Rensselaer Polytechnic Institute Dean's Honor List - Fall '20, Spring '21, Spring '22, Summer '22, Spring '23, & Fall '23
- Rensselaer Polytechnic Institute Academic Recognition Letter - issued by Charles V. Stewart - Spring '22
- Rensselaer Polytechnic Institute Academic Recognition Letter - issued by Mohammed J. Zaki - Summer '22

SKILLS SUMMARY

- **Languages:**   Python, Java, C++, C, MIPS, LaTeX, R, Erlang, Verilog
- **Frameworks:**   PyTorch, TensorFlow, Keras
- **Tools:**   Matlab, matplotlib, numpy, pandas, sklearn