

# Yi-Chun(Rimi) Chen

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My research topics are about Visual Narrative Comprehension and Generation—the intersection of Computer Vision, Language Processing, Machine Learning, Multi-media, and Generative AI.

## Summary

**Research Interests**, Multi-media Comprehension and Generation, Computer Vision, Machine Learning, Generative AI  
**Skilled in**, Programming (Python, Java, C, C++, javascript), Numeric computing (Matlab), Deep learning tools (Tensorflow, Keras, Sklearn), Graphical tool (WebGL), Web tool (Html5, Python flask)  
**Language**, English—professional, Mandarin—native, Japanese-- limited working proficiency

## Education

*Doctor of Philosophy in Computer Science* August 2015 – August 2023  
North Carolina State University (NCU), Raleigh, NC GPA: 3.56/4.0

*Master of Science in Computer Science* September 2011 – July 2013  
National Tsing Hua University (NTHU), Hsinchu, Taiwan GPA: 4.17/4.3

*Bachelor of Science in Computer Science* September 2007 – June 2011  
National Tsing Hua University (NTHU), Hsinchu, Taiwan GPA: 80.9/100

## Research Projects & Work Experiences

**Ph.D. Student & Research Assistant** September 2015 – Present

ARNAV Lab—North Carolina State University, US; Advisor: Dr. Arnav Jhala

Knowledge management: “A knowledge management framework for accessing and encoding visual narrative data.”

- Proposed a framework to combine a hierarchical LSTM with knowledge representations of comics to understand and encode visual storytelling data.
  - Provided program interfaces--portals, for accessing knowledge representations of comic data.
  - Demonstrated the framework's usability with two applications—narrative analysis model, comic content generation.
  - Implemented knowledge graphs and pre-processing scripts for visual narrative information retrieval and analysis.
- Dissertation title: “A Framework with Hierarchical Models for Visual Narrative Sequence Encoding and Its Applications.”

Computational Model: “A computational model that understands and encodes visual narrative sequences.”

- Simulated the cognitive process of how humans comprehend visual narratives using hierarchical machine learning models, image and text feature encoders, and filters to achieve comic sequence understanding.
- Released the analytical results, annotations of comic data, and the trained model to support future application developments.

Document Analysis: “An automatically comic panel transition labeling model for genre analysis.”

- Applied a two-layer CNN learning model with a feedback-in-loop process for labeling panels based on visual grammar.
- Analyzed the reliability of the labeled results and the labels' distribution on genres to achieve the classification of data.

Neural Style Transfer: “A neural style transfer framework for comic image processing.”

- Built a neural style transfer model with a multi-channel pipeline to decompose comics' multi-modality features.
- Transferred Japanese manga into other art styles, including western comic style, by the computational model.

Image Sequence Generation: “A comic generation model that creates image sequences through iterative editing processes.”

- Proposed a model with multiple refinement layers to create comic sequences through the customizable editing process.
- Equipped the model with functions for customizing and adapting the editing layers to bring a variety of generated comics.
- Produced a sample dataset as the basic materials for comic generations.

Reading comprehension model: “A planning-based pipeline to infer the missing part in story text.”

- Conducted experiments on natural language processing tools to decompose story text.
- Transformed the verb predicates in Verbnet--the subject-object triples of actions into logical literals for the planning.
- Implemented a model with planning concepts to make the system capable of inferring the missing content of stories through preconditions and postconditions.

Large Scale Text Visualization: “A web interface to display the large-scale novel text and provides indexes of story content.”

- ♦ Designed a web interface to visualize story text and let readers jump between story focuses interactively.
- ♦ Implemented functions to support the switching between story focuses.
- ♦ Analyzed the sentiment that showed in novels' text through natural language processing tools

Interactive Story Content Authoring Tool: “V-SET: an authoring tool for generating Narrative Adventure Game.”

- ♦ Designed a graphic interface that allows authors to modify characters, scenes, event choices, and story content to generate visual content.
- ♦ Provided functions to render story dialogue from scripts to narrative adventure games

**Research Assistant**

May 2014 – June 2015

Institute of Information Science—Academia Sinica, Taiwan; Advisor: Dr. Jane Win-Shih Liu

Data System: “OpenISDM Project: an open framework for disaster information systems.”

- ♦ Developed a distributed, event-triggered, active notification service IASS (Intelligent Active Storage Service) using RDF knowledge representation.
- ♦ Provided program interfaces--portals--for related applications to access disaster scenarios data and captured device records

**Master Student & Research Assistant**

September 2011 – July 2013

Artificial Intelligence Lab—NTHU, Taiwan; Advisor: Dr. Von-Wun Soo

- ♦ Integrated reinforcement learning with task allocations protocol to distribute complex tasks in large-scale networks.
  - ♦ Conducted experiments on hyperparameters to speed up the convergence of the learning model.
- Thesis: “Oracle Learning for Agent Negotiation Based on Rationality in Task Allocation Problem.”

Multi-agents System Project: “National Energy Project: studies of automated coordination and self-healing based on multi-intelligent agent systems in smart-grids.”

- ♦ Designed a task allocation protocol for power restoration problems in multi-agents system through intelligent agents' self-adaptability.

**Undergraduate Researcher**

January 2010 – November 2010

High Performance Computing, New Orleans, LA; Advisor: Dr. Yeh-Ching Chung

- ♦ Analyzed bottlenecks and predicted execution time of the science software--Weather Research & Forecasting Model (WRF).
- ♦ Reduced the execution time for science software by tuning hyperparameters and the high-performance computing clusters.
- ♦ Awarded as the Overall Winner in Supercomputing 2010 (SC10) Conference: Student Cluster Competition (SCC).

**Publications**

- ♦ F Freitas, T Berreth, **YC Chen**, A Jhala.” Characterizing the perception of urban spaces from visual analytics of street-level imagery.” In *AI & society* 38 (4), 1361-1371, 2023.
- ♦ **Chen YC**, Jhala A. “*A Computational Model of Comprehension in Manga Style Visual Narratives*.” In Proceedings of the Annual Meeting of the Cognitive Science Society 2021 (Vol. 43, No. 43).
- ♦ **Chen YC**, Robertson J, Jhala A. “*Abstractions for Narrative Comprehension Tasks*.” In INT/WICED@ AIIDE 2018.
- ♦ Yi-Wei Huang, **Yi-Chun Chen**, Wan-Yu Yu and Von-Wun Soo. “*Stochastic Negotiation with Market Utility for Automated Power Restoration on a Smart Grid*,” The third international workshop on Agent Technologies for Energy Systems (ATES2012), in AAMAS 2012.

**Other Experiences**

**Volunteer**, Recording Books Service Center for the Blind, NTHU, Taiwan

September 2007 – January 2008

**Teaching Assistant**, Foundations of Interactive Game Design, NCSU, Raleigh, NC.

September 2015 – Present

- ♦ Hold workshops and office hours to assist students with game design tools (GameMaker, Twine, Stencyl, PuzzleScript).
- ♦ Assisted lectures and office hours for game design theories (MDA framework, choice poetics, game challenges design, etc.).

**Selected Course Projects**, NCSU, Raleigh, NC

2015 – 2016

- ♦ Computer Graphic:
  - Implemented shadowing and rendering algorithms through C++ and OpenGL.
  - Accomplished the implementation of the Q\*bert game through WebGL 3D rendering functions.
- ♦ Game Engine:
  - Designed a game object model and the infrastructure of the game engine.
  - Provided interfaces to call game engine functions and modify scripts to create new games.
  - Delivered four sample games through the implemented functions.
- ♦ Game AI:
  - Designed a robbers & cops game with limited sighted Non-player characters (NPCs) and implemented the environment.
  - Applied reinforcement learning to multiple intelligent agents to adjust their behaviors to achieve behavior tree learning.