Prithviraj Ammanabrolu

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Education

PhD Computer Science
2018 - 2021

Georgia Institute of Technology

Advisor: Professor Mark O. Riedl

Thesis: Language Learning in Interactive Environments

Research Areas: Natural Language Processing, Reinforcement Learning, Interactive Narrative, Knowledge Graphs, and Computational Creativity

B.S. Computer Science
2015 - 2018

Georgia Institute of Technology

Threads: Intelligence and Theory, Overall GPA 3.9, Dean's List 2015-2018

Publications

Under Review

How to Avoid Being Eaten by a Grue: Structured Exploration Strategies for Textual Worlds
P Ammanabrolu, E Tien, M Hausknecht, and MO Riedl
Preprint. Under Review.
Code, VentureBeat Article, Recorded Talk

Conferences

How to Motivate Your Dragon: Teaching Goal-Driven Agents to Speak and Act in Fantasy Worlds
P Ammanabrolu, J Urbanek, M Li, A Szlam, T Rocktäschel, J Weston
Proceedings of The North American Chapter of the Association for Computational Linguistics (NAACL-HLT) 2021
Project Page, Tech Review Article, Tech Xplore Article

Bringing Stories Alive: Generating Interactive Fiction Worlds
P Ammanabrolu*, W Cheung*, D Tu, W Broniec, and MO Riedl
The 16th AAAI Conference on Artificial Intelligence and Interactive Digital Entertainment (AIIDE-20)
Code, Demo, Recorded Talk

Automated Storytelling via Causal, Commonsense Plot Ordering
P Ammanabrolu, W Cheung, W Broniec, and MO Riedl
Thirty-fifth AAAI Conference on Artificial Intelligence (AAAI-21),
Code

Toward Automated Quest Generation in Text-Adventure Games
P Ammanabrolu, W Broniec, A Mueller, J Paul, and MO Riedl
International Conference on Computational Creativity (ICCC-20)

Graph Constrained Reinforcement Learning for Natural Language Action Spaces
P Ammanabrolu, M Hausknecht
International Conference on Learning Representations (ICLR-20), Addis Ababa, Ethiopia.
Code, Video Presentation, Conference Site

Story Realization: Expanding Plot Events into Sentences
P Ammanabrolu, E Tien, W Cheung, Z Luo, W Ma, LJ Martin, and MO Riedl
Thirty-forth AAAI Conference on Artificial Intelligence (AAAI-20), New York City, NY.
Code, Slides

Interactive Fiction Games: A Colossal Adventure
M Hausknecht, **P Ammanabrolu**, MA Cote, and X Yuan
Thirty-forth AAAI Conference on Artificial Intelligence (AAAI-20), New York City, NY.
Code, Blog

Playing Text-Adventure Games with Graph-Based Deep Reinforcement Learning
P Ammanabrolu and MO Riedl
Proceedings of The North American Chapter of the Association for Computational Linguistics 2019, Minneapolis, MN.
Code, Slides, Blog

Event Representations for Automated Story Generation with Deep Neural Nets
LJ Martin, **P Ammanabrolu**, X Wang, W Hancock, S Singh, B Harrison, and MO Riedl
Thirty-Second AAAI Conference on Artificial Intelligence (AAAI-18), New Orleans, LA.

Code

Peer-Reviewed Workshops

Transfer in Deep Reinforcement Learning using Knowledge Graphs
P Ammanabrolu and MO Riedl
Text Graphs @ Empirical Methods in Natural Language Processing (EMNLP) 2019. Hong Kong.
Code

Playing Text-Based Games with Commonsense

S Dambekodi, S Frazier, **P Ammanabrolu,** MO Riedl
Wordplay: When Language Meets Games @ NeurIPS 2020

Guided Neural Language Generation for Automated Storytelling
P Ammanabrolu, E Tien, W Cheung, Z Luo, W Ma, LJ Martin, and MO Riedl
Proceedings of StoryTelling at the Association of Computational Linguistics 2019, Florence, Italy.
Code, Slides

Bringing Stories Alive: Generating Interactive Fiction Worlds
P Ammanabrolu*, W Cheung*, D Tu, W Broniec, and MO Riedl
Narrative Understanding, Storylines, and Events (NUSE) @ ACL 2020
Code, Demo, Recorded Talk

How To Avoid Being Eaten By a Grue: Exploration Strategies for Text-Adventure Agents
P Ammanabrolu, E Tien, Z Luo, and MO Riedl
Knowledge-based Reinforcement Learning Workshop @ International Joint Conference on Artificial Intelligence (IJCAI-20).

Toward Automated Quest Generation in Text-Adventure Games
P Ammanabrolu, W Broniec, A Mueller, J Paul, and MO Riedl

Computational Creativity in Natural Language Generation @ International Conference on Natural Language Generation 2019. Tokyo, Japan.

Interactive Fiction Games: A Colossal Adventure
M Hausknecht, **P Ammanabrolu**, MA Cote, and X Yuan

Deep Reinforcement Learning Workshop at Neural Information Processing Systems (NeurIPS) 2019. Vancouver, CA.

Playing Text-Adventure Games with Graph-Based Deep Reinforcement Learning

P Ammanabrolu and MO Riedl

Neural Information Processing Systems (NeurIPS) 2018 Wordplay: Reinforcement and Language Learning in Text-based Games Workshop, Montreal, QC.

Improvisational Storytelling Agents

LJ Martin, **P Ammanabrolu**, X Wang, S Singh, B Harrison, M Dhuliawala, P Tambwekar, A Mehta, R Arora, N Dass, C Purdy, and MO Ried

Neural Information Processing Systems (NeurIPS) 2017 Workshop on Machine Learning for Creativity and Design, Long Beach, CA.

Event Representations for Automated Story Generation with Deep Neural Nets

LJ Martin, **P Ammanabrolu**, X Wang, W Hancock, S Singh, B Harrison, and MO Riedl

Conference Knowledge Discovery and Datamining (KDD) 2017 Workshop on Machine Learning for Creativity, Halifax, NS.

Patent Publications

Techniques for Building a Knowledge Graph in Limited Knowledge Domains

G Singaraju, **P Ammanabrolu**

US Patent US20200057946A1, Priority to US16/542.017

Teaching Experience

Teaching Assistant

Aug 2017 - Dec 2019

CS-3600: Intro to Artificial Intelligence, Georgia Tech - Atlanta, GA

Student Research Mentorship

Aug 2018 - Present

- Wesley Cheung, MS Computer Science
- Ethan Tien, MS Computer Science
- Wai Man Si, MS Computer Science
- Ran (Renee) Jia, MS Computer Science
- William Broniec, MS Computer Science
- Alejandro Escontrela, BS Computer Science
  - Now Research Engineer at Google Brain
- Dan Tu, MS Computer Science
  - Now Software Engineer at Microsoft Azure AI
- William Ma, MS Computer Science
  - Now Software Development Engineer at Amazon
- Jeffery Luo, BS Computer Science
  - Now Research Analyst at Goldman Sachs
- Anush Mattapalli, BS Computer Science
  - Now Software Engineer at NCR Corporation

Work Experience

Research Assistant

Jan 2017 - Present

Entertainment Intelligence Lab, Georgia Tech - Atlanta, GA

- Exploring the use of deep reinforcement learning with natural language state and action spaces
- Using knowledge graphs to inject domain knowledge into language-based tasks
- Finding effective data representations and evaluation metrics for training neural networks in automated story generation and procedural world & quest generation for text-games
- **Mentored 10 Bachelor's and Master's students** on their research theses

Research Intern
May 2020 - Aug 2020

Facebook AI Research - New York City, NY

- Worked with Jason Weston, Arthur Szlam, Tim Rocktäschel on the ParlAI team and LIGHT, a large-scale crowdsourced text-game
- Collected and released datasets crowdsourced by **over 14,000 players** of natural language quests in LIGHT and a commonsense knowledge graph ATOMIC-LIGHT
- Developed goal-driven questing agents with reinforcement learning that act and speak in LIGHT

Research Intern
May 2019 - Aug 2019

Microsoft Research - Redmond, WA

- Worked with Matthew Hausknecht in the Reinforcement Learning team
- Aided in development of baseline text-game playing agents for Jericho, a text-game playing platform
- Developed SOTA RL algorithm that is able to dynamically generate language in text-games

Software Engineering Intern
May 2018 - Aug 2018

Oracle Intelligent Bots Service - Redwood City, CA

- Developed a patented algorithm to create knowledge graphs for low resource natural language datasets
- Created a method that improves the natural language understanding capabilities by over 10% (classification rate) of the chatbot platform using the generated graph and graph embedding techniques

Machine Learning Intern
May 2017 - May 2018

Radix Health - Atlanta, GA

- Used machine learning and predictive analytics techniques to model patients' no-show risks for healthcare clinics
- Used natural language processing to design a chatbot to improve patient access
- Built and deployed machine learning systems for these cases from scratch to production, currently utilized by **over 40 clinics and over a 1,000 doctors** across America

Skills

Technical: Natural Language Processing, Reinforcement Learning, Machine Learning, Knowledge Graphs, Semantic Web Technologies, Computer Vision, Predictive Analytics, Agile Methodologies, NoSQL

Programming Languages: Python, R, Java, C/C++, C#, SQL, SPARQL

Frameworks and Tools: pyTorch, scikit-learn, Tensorflow, nltk, AutoML, Couchbase, MongoDB, Spring Boot

Languages: English, Telugu, Sanskrit

Professional Activities

Organizer

Wordplay: When Language Meets Games Workshop at NeurIPS 2020

Program Committee

- Neural Information Processing Systems (NeurIPS) 2019, 2020
- Meeting of the Association for Computational Linguistics (ACL) main and demo tracks 2020
- North American Chapter of the Meeting of the Association for Computational Linguistics (NAACL) 2019, 2021

- AAAI Conference on Artificial Intelligence (AAAI) 2019, 2020
- International Conference on Machine Learning (ICML) 2020
- International Conference on Learning Representations (ICLR) 2020
- Empirical Methods in Natural Language Processing (EMNLP) 2020
- ACM CSUR Computing Surveys
- TextGraphs Workshop at EMNLP 2020
- Language and Reinforcement Learning Workshop (LaReL) at ICML2020
- Workshop on Learning in Artificial Open Worlds (LAOW) at ICML 2020

Institutional Service

Georgia Institute of Technology

- Reviewer for President's Undergraduate Research Awards (PURA) 2019
- Co-founder of the MCV PhD Student Support Group 2018-2020
- School of Computer Science's Prospective Student Visit Week, Coordinator 2019
- School of Interactive Computing's Prospective Student Visit Week, Volunteer 2019, 2020

Hackathons and Video Game Development 2015 - 2017

- HackIllinois: Health Desk - Desktop app that checks posture using computer vision
- SwampHacks: Labyrinth - 3D survival maze game built with Unity engine and C#; top 10 overall
- HackGT: CorCal - App to sync multiple calendars; built with Java and the Swing library
- Video Game Development Club (VG Dev) at Georgia Tech: HowRogue a Roguelike built in C++

Selected Media Coverage

How role-playing a dragon can teach an AI to manipulate and persuade
MIT Tech Review. Will Douglas Heaven. November 20, 2020.

How to Train Your AI: Researchers Teach AI How to Move Around Fantasy Worlds

Science Times. Mark B. November 5, 2020.

AI can make your favourite game characters speak to each other

INDIAai National AI Portal of India. November 5, 2020.

Teaching AI agents to communicate and act in fantasy worlds

Tech Xplore. Ingrid Fadelli, November 3, 2020

Researchers combine reinforcement learning and NLP to escape a Grue monster

Venture Beat. Khari Johnson, June 30, 2020

Sztuczna inteligencja jako pisarz: Generowanie fabuły
(Translation from Polish: Artificial Intelligence as a Writer: Story Generation)
Zeszyty Maryny. Patrycja Świeczkowska, Oct 4, 2019.

Georgia Tech Artificial Intelligence Research Includes Collaborative Approaches with Humans, Automating Content, and More
Georgia Tech GVU Center. Joshua Preston, Feb 2, 2018.

Changing the Conversation: Georgia Tech Researchers Provide New Approach to Automated Story Generation
Georgia Tech School of Interactive Computing. David Mitchell, Feb 4, 2020.

References

1. Mark O. Riedl (PhD Advisor), Associate Professor Georgia Institute of Technology, riedl@cc.gatech.edu
2. Devi Parikh, Associate Professor Georgia Institute of Technology, parikh@gatech.edu
3. Charles Lee Isbell Jr., Professor and Dean Georgia Institute of Technology, isbell@cc.gatech.edu
4. Matthew Hausknecht, Senior Research Scientist, Microsoft Research, matthew.hausknecht@microsoft.com
5. Jason Weston, Research Scientist Facebook AI Research, jase@fb.com