

ANURAG SARKAR

✉ sarkar.an@northeastern.edu | 🌐 Personal Site | 🎓 Google Scholar | 🐙 Github | 🔗 LinkedIn

Education

Northeastern University

Ph.D., Computer Science 9/2016-8/2023

Thesis: Learning Latent Representations for Controllable Combinational Creativity and Game Design

Committee: Seth Cooper (adviser), Casper Hartevelde, David Bau, Michael Cook

MS, Computer Science 9/2016-5/2018

St. Xavier's College (Autonomous), Kolkata

2014-16

M.Sc., Computer Science

West Bengal University of Technology

2011-14

Bachelor of Computer Applications (BCA)

Experience

Microsoft Research, Research Intern, MSR New York City

5/2023-8/2023

Reference: Siddhartha Sen

- Worked on a vision transformer-based architecture for learning player style representations and style-based generative models of player actions in chess

Technologies: Python, Pytorch, Tensorflow/Keras, AzureML

Electronic Arts, Gameplay Software Engineer Intern, EA Tiburon

9/2022-12/2022

- Trained supervised ML models (XGBoost/neural networks) for accelerating AI QB decision-making/passing in *Madden NFL*

- Built interactive tools for visualization of model predictions based on user inputs

Technologies: C++, Python, Scikit-Learn, Pytorch, Streamlit, Bokeh, Perforce

Northeastern University, Teaching Assistant

DS4400: Machine Learning 1

1/2023-4/2023

Instructor: John Rachlin

- Intro ML course covering regression, classification, clustering, decision trees, ensemble methods and neural networks
- Answered student questions online, held office hours and graded assignments

DS3000: Foundations of Data Science

5/2022-6/2022

Instructor: Sophie Clachar

- Intro data science course in Python covering `pandas`, `numpy`, `matplotlib` and `scikit-learn`

- Performed code walkthroughs for assignments, helped students during office hours and graded assignments

Technologies: Python, Jupyter Notebook

Zynga, Data Science Intern, Applied AI

5/2021-8/2021

- Extended existing game description language to support new mechanics for puzzle game *Spell Forest*

- Worked on refactoring simulation framework codebase, focusing on interfacing with different gameplay agents

Technologies: Unity/C#, JSON, Python

Northeastern University, Research Assistant

9/2016-5/2021, 8/2021-4/2022

Reference: Seth Cooper

- Procedural content generation and generative game design tasks via ML, primarily using variational autoencoders
- Dynamic difficulty adjustment via matchmaking using PVP rating systems and skill chains, under NSF Grant

No. 1652537 [link]

Technologies: Python, Unity/C#, R, Pytorch, Jupyter, Google Cloud Platform, Amazon MTurk, AWS DynamoDB, Javascript, HTML/CSS, SQL

Journal Publications

- [J2] Latent Combinational Game Design
Anurag Sarkar, Seth Cooper
IEEE Transactions on Games (ToG), 2023
- [J1] Procedural Content Generation via Knowledge Transformation (PCG-KT)
Anurag Sarkar, Matthew Guzdial, Sam Snodgrass, Adam Summerville, Tiago Machado, Gillian Smith
IEEE Transactions on Games (ToG), 2023

Conference Publications

- [C19] tile2tile: Learning Game Filters for Platformer Style Transfer
Anurag Sarkar, Seth Cooper
AAAI Conference on Artificial Intelligence and Digital Entertainment (AIIDE), 2022
- [C18] Ordering Levels in Human Computation Games using Playtraces and Level Structure
Anurag Sarkar, Seth Cooper
IEEE Conference on Games (CoG), 2022
- [C17] Dungeon and Platformer Level Blending and Generation using Conditional VAEs
Anurag Sarkar, Seth Cooper
IEEE Conference on Games (CoG), 2021
- [C16] An Online System for Player-vs-Level Matchmaking in Human Computation Games
Anurag Sarkar, Seth Cooper
IEEE Conference on Games (CoG), 2021
- [C15] Generating and Blending Game Levels via Quality-Diversity in the Latent Space of a VAE
Anurag Sarkar, Seth Cooper
ACM Conference on the Foundations of Digital Games (FDG), 2021
- [C14] Exploring Level Blending across Platformers via Paths and Affordances
Anurag Sarkar, Adam Summerville, Sam Snodgrass, Gerard Bentley, Joseph Osborn
AAAI Conference on Artificial Intelligence and Interactive Digital Entertainment (AIIDE), 2020
- [C13] Game Level Clustering and Generation using Gaussian Mixture VAEs
Zhihan Yang, **Anurag Sarkar**, Seth Cooper
AAAI Conference on Artificial Intelligence and Interactive Digital Entertainment (AIIDE), 2020
- [C12] Evaluating and Comparing Skill Chains and Rating Systems for Dynamic Difficulty Adjustment
Anurag Sarkar, Seth Cooper
AAAI Conference on Artificial Intelligence and Interactive Digital Entertainment (AIIDE), 2020
- [C11] Towards Game Design via Creative Machine Learning (GDCML)
Anurag Sarkar, Seth Cooper
IEEE Conference on Games (CoG), 2020 (*Best Paper Nomination*)
- [C10] Multi-Domain Level Generation and Blending with Sketches using Example-Driven BSP and VAEs
Sam Snodgrass, **Anurag Sarkar**
ACM Conference on the Foundations of Digital Games (FDG), 2020
- [C9] Using a Disjoint Skill Model for Game and Task Difficulty in Human Computation Games
Anurag Sarkar, Seth Cooper
ACM SIGCHI Annual Symposium on Computer-Human Interaction in Play (CHI Play), 2019

- [C8] Using Rating Arrays to Estimate Score Distributions for Player-versus-Level Matchmaking
Anurag Sarkar, Seth Cooper
ACM Conference on the Foundations of Digital Games (FDG), 2019
- [C7] Inferring and Comparing Game Difficulty Curves using Player-versus-Level Match Data
Anurag Sarkar, Seth Cooper
IEEE Conference on Games (CoG), 2019
- [C6] Transforming Game Difficulty Curves using Function Composition
Anurag Sarkar, Seth Cooper
ACM SIGCHI Conference on Human Factors in Computing Systems (CHI), 2019
- [C5] Comparing Paid and Volunteer Recruitment in Human Computation Games
Anurag Sarkar, Seth Cooper
ACM Conference on the Foundations of Digital Games (FDG), 2018
- [C4] Meet your Match Rating: Providing Skill Information and Choice in Player-vs-Level Matchmaking
Anurag Sarkar, Seth Cooper
ACM Conference on the Foundations of Digital Games (FDG), 2018
- [C3] Level Difficulty and Player Skill Prediction in Human Computation Games
Anurag Sarkar, Seth Cooper
AAAI Conference on Artificial Intelligence and Interactive Digital Entertainment (AIIDE), 2017
- [C2] Predicting Human Computation Game Scores with Player Rating Systems
Michael Williams, **Anurag Sarkar**, Seth Cooper
International Conference on Entertainment Computing (ICEC), 2017
- [C1] Engagement Effects of Player Rating System-based Matchmaking for Level Ordering in Human Computation Games
Anurag Sarkar, Michael Williams, Sebastian Deterding, Seth Cooper
ACM Conference on the Foundations of Digital Games (FDG), 2017
(Best Paper Honorable Mention)

Workshop Publications

- [W10] Procedural Content Generation using Behavior Trees (PCGBT)
Anurag Sarkar, Seth Cooper
AAAI AIIDE Workshop on Experimental AI in Games (EXAG), 2021
- [W9] Applying Rapid Crowdsourced Playtesting to a Human Computation Game
Pratheep Kumar Paranthaman, **Anurag Sarkar**, Seth Cooper
Game Analytics Workshop (GAW) at FDG, 2021
- [W8] Conditional Level Generation and Game Blending
Anurag Sarkar, Zhihan Yang, Seth Cooper
AAAI AIIDE Workshop on Experimental AI in Games (EXAG), 2020
- [W7] Pathfinding Agents for Platformer Level Repair
Seth Cooper, **Anurag Sarkar**
AAAI AIIDE Workshop on Experimental AI in Games (EXAG), 2020
- [W6] Extracting Physics for Blended Platformer Game Levels

Adam Summerville, **Anurag Sarkar**, Sam Snodgrass, Joseph Osborn
AAAI AIIDE Workshop on Experimental AI in Games (EXAG), 2020

- [W5] Sequential Segment-based Level Generation and Blending using Variational Autoencoders
Anurag Sarkar, Seth Cooper
ACM FDG Workshop on Procedural Content Generation in Games (PCG), 2020
- [W4] Game Design using Creative AI
Anurag Sarkar
NeurIPS Workshop on Machine Learning for Creativity and Design, 2019
- [W3] Controllable Level Blending between Games using Variational Autoencoders
Anurag Sarkar, Zhihan Yang, Seth Cooper
AAAI AIIDE Workshop on Experimental AI in Games (EXAG), 2019
- [W2] Blending Levels from Different Games using LSTMs
Anurag Sarkar, Seth Cooper
AAAI AIIDE Workshop on Experimental AI in Games (EXAG), 2018
- [W1] Desire Path-inspired Procedural Placement of Coins in a Platformer Game
Anurag Sarkar, Varun Sriram, Riddhi Padte, Jeffrey Cao, Seth Cooper
AAAI AIIDE Workshop on Experimental AI in Games (EXAG), 2018

Honors & Awards

Program Committee Exceptional Service , ACM Foundations of Digital Games Conference (FDG)	2023
Outstanding Graduate Student Award in Research Nomination , Northeastern University	2022, 2023
Graduate Thesis/Dissertation Research Grant , Northeastern University	2021-23
Best Paper Nomination , IEEE Conference on Games (CoG)	2020
IEEE Computational Intelligence Society (CIS) Grant , IEEE Conference on Games	2019, 2020
PhD Network Travel Grant , Northeastern University	2019
Game Narrative Review Gold Award , Game Developers Conference (GDC)	2018
Best Paper Honorable Mention , ACM Foundations of Digital Games (FDG)	2017
Graduate Fellowship , Northeastern University	2016-17
Father Jacques de Bonhome S.J. Memorial Gold Award , MSc. CS Class of 2016 Valedictorian	2016
NSHM Medal of Merit , BCA Class of 2014 Valedictorian	2014

Academic Service

Co-Organizer , ACM FDG Workshop on Procedural Content Generation (PCG)	2021
Program Committee Membership and Reviewing	
IEEE Transactions on Games (ToG)	2020-24
IEEE Conference on Games (CoG)	2021-23
Elsevier Telematics and Informatics Reports (TELIR)	2023
ACM FDG Workshop on Procedural Content Generation (PCG)	2019, 21-23
ACM Conference on the Foundations of Digital Games (FDG)	2018-23
ACM SIGCHI Conference on Human Factors in Computing Systems (CHI)	2021-22
AAAI Conference on Artificial Intelligence (AAAI)	2021-22
AAAI AIIDE Workshop on Experimental AI in Games (EXAG)	2019, 21-22
IEEE Symposium Series on Computational Intelligence (SSCI)	2021
AAAI Conference on Artificial Intelligence and Interactive Digital Entertainment (AIIDE)	2021
ACM SIGCHI Annual Symposium on Computer-Human Interaction in Play (CHI Play)	2019, 2021