

ANURAG SARKAR

CONTACT INFORMATION Northeastern University
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<https://riffsircar.github.io>

RESEARCH INTERESTS My research focuses on using machine learning for procedural content generation in games and for informing game design. I'm broadly interested in procedural content generation and computational creativity and in exploring applications of AI and ML in creative domains such as games, music and visual art.

EDUCATION **Northeastern University**
Ph.D. (in progress), Computer Science 2016-present
Adviser: Seth Cooper

MS, Computer Science 2016-2018
GPA: 3.8/4.0

St. Xavier's College (Autonomous), Kolkata
M.Sc., Computer Science 2014-2016
GPA: 9.11/10

NSHM College of Management and Technology
(under West Bengal University of Technology)
Bachelor of Computer Applications (BCA) 2011-2014
GPA: 9.06/10

WORK EXPERIENCE **Zynga Inc.**
Data Science Intern, Applied AI 5/2021-8/2021

Northeastern University
Research Assistant 9/2016-5/2021
• Apply machine learning, specifically variational autoencoders, for procedural content generation in games and exploring game design techniques such as controllable level generation and blending.

• Apply rating systems and skill chains for player skill modeling, dynamic difficulty adjustment and crafting difficulty progressions in human computation games.

- CONFERENCE PUBLICATIONS
- [1] Dungeon and Platformer Level Blending and Generation using Conditional VAEs
Anurag Sarkar, Seth Cooper
IEEE Conference on Games (CoG), 2021 (*to appear*)
 - [2] Generating and Blending Game Levels via Quality-Diversity in the Latent Space of a Variational Autoencoder
Anurag Sarkar, Seth Cooper
International Conference on the Foundations of Digital Games (FDG), 2021 (*to appear*)
 - [3] 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
 - [4] 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
 - [5] 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
 - [6] Towards Game Design via Creative Machine Learning (GDCML)
Anurag Sarkar, Seth Cooper
IEEE Conference on Games (CoG), 2020

Best Paper Nomination

- [7] Multi-Domain Level Generation and Blending with Sketches using Example-Driven BSP and Variational Autoencoders
Sam Snodgrass, **Anurag Sarkar**
International Conference on the Foundations of Digital Games (FDG), 2020
- [8] 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
- [9] Using Rating Arrays to Estimate Score Distributions for Player-versus-Level Matchmaking
Anurag Sarkar, Seth Cooper
International Conference on the Foundations of Digital Games (FDG), 2019
- [10] Inferring and Comparing Game Difficulty Curves using Player-versus-Level Match Data
Anurag Sarkar, Seth Cooper
IEEE Conference on Games (CoG), 2019
- [11] Transforming Game Difficulty Curves using Function Composition
Anurag Sarkar, Seth Cooper
ACM SIGCHI Conference on Human Factors in Computing Systems (CHI), 2019
- [12] Comparing Paid and Volunteer Recruitment in Human Computation Games
Anurag Sarkar, Seth Cooper
International Conference on the Foundations of Digital Games (FDG), 2018
- [13] Meet your Match Rating: Providing Skill Information and Choice in Player-versus-Level Matchmaking
Anurag Sarkar, Seth Cooper
International Conference on the Foundations of Digital Games (FDG), 2018
- [14] 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
- [15] Predicting Human Computation Game Scores with Player Rating Systems
Michael Williams, **Anurag Sarkar**, Seth Cooper
International Conference on Entertainment Computing (ICEC), 2017
- [16] Engagement Effects of Player Rating System-based Matchmaking for Level Ordering in Human Computation Games
Anurag Sarkar, Michael Williams, Sebastien Deterding, Seth Cooper
International Conference on the Foundations of Digital Games (FDG), 2017
Best Paper Honorable Mention

WORKSHOP PUBLICATIONS

- [1] Applying Rapid Crowdsourced Playtesting to a Human Computation Game
Pratheep Kumar Paranthaman, **Anurag Sarkar**, Seth Cooper
Game Analytics Workshop (GAW) at FDG, 2021 (*to appear*)
- [2] Conditional Level Generation and Game Blending
Anurag Sarkar, Zhihan Yang, Seth Cooper
AAAI AIIDE Workshop on Experimental AI in Games (EXAG), 2020
- [3] Pathfinding Agents for Platformer Level Repair
Seth Cooper, **Anurag Sarkar**
AAAI AIIDE Workshop on Experimental AI in Games (EXAG), 2020
- [4] 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
- [5] Sequential Segment-based Level Generation and Blending using Variational Autoencoders
Anurag Sarkar, Seth Cooper
FDG Workshop on Procedural Content Generation in Games (PCG), 2020

- [6] Game Design using Creative AI
Anurag Sarkar
NeurIPS Workshop on Machine Learning for Creativity and Design, 2019
- [7] Controllable Level Blending between Games using Variational Autoencoders
Anurag Sarkar, Zhihan Yang, Seth Cooper
AAAI AIIDE Workshop on Experimental AI in Games (EXAG), 2019
- [8] Blending Levels from Different Games using LSTMs
Anurag Sarkar, Seth Cooper
AAAI AIIDE Workshop on Experimental AI in Games (EXAG), 2018
- [9] 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

SERVICE

Organization

Co-Organizer, FDG Workshop on Procedural Content Generation (PCG) 2021

Program Committee Membership and Reviewing

AAAI AIIDE Workshop on Experimental AI in Games (EXAG)	2019, 2021
IEEE Conference on Games (CoG)	2021
IEEE Transactions on Games (TOG)	2020-2021
International Conference on the Foundations of Digital Games (FDG)	2018-2021
ACM SIGCHI Conference on Human Factors in Computing Systems (CHI)	2021
AAAI Conference on Artificial Intelligence (AAAI)	2021
ACM SIGCHI Annual Symposium on Computer-Human Interaction in Play (CHI Play)	2019
FDG Workshop on Procedural Content Generation (PCG)	2019

HONORS AND AWARDS

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 (CoG) 2020

PhD Network Travel Grant

Northeastern University 2019

IEEE Computational Intelligence Society (CIS) Travel Grant

IEEE Conference on Games (CoG) 2019

Game Narrative Review Gold Award

Game Developers Conference (GDC) 2018

Best Paper Honorable Mention

International Conference on the Foundations of Digital Games (FDG) 2017

Graduate Fellow

Northeastern University 2016-17

Father Jacques de Bonhome S.J. Memorial Gold Award

M.Sc. Computer Science Class of 2016 Valedictorian, St. Xavier's College 2016

NSHM Medal of Merit

BCA Class of 2014 Valedictorian, NSHM College of Management Technology 2014