Anurag Sarkar

Contact Information

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Research Interests

My current research focuses on using machine learning for procedural content generation in games and for informing game design. I'm broadly interested in computational creativity and exploring the use of AI and ML for applications in creative domains such as games, music and visual art. Through my research, I hope to build automated and co-creative design tools that leverage the affordances of creative ML techniques, particularly those that utilize latent variable modeling.

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

Research Experience

Northeastern University
Research Assistant — 9/2016-present

• Explore the use of machine learning, specifically variational autoencoders, for procedural content generation in games including game design techniques such as controllable level generation and blending.

• Apply rating systems and skill chains for player skill modeling and dynamic difficulty adjustment in human computation games as well as studying difficulty progressions.

Conference Publications

[1] 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

[2] 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

[3] 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

[4] Towards Game Design via Creative Machine Learning (GDCML)
Anurag Sarkar, Seth Cooper
IEEE Conference on Games (CoG), 2020
Best Paper Nomination

[5] 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

[6] 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

[7] 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

[8] Inferring and Comparing Game Difficulty Curves using Player-versus-Level Match Data
Anurag Sarkar, Seth Cooper
IEEE Conference on Games (CoG), 2019

[9] Transforming Game Difficulty Curves using Function Composition
Anurag Sarkar, Seth Cooper
ACM SIGCHI Conference on Human Factors in Computing Systems (CHI), 2019

[10] Comparing Paid and Volunteer Recruitment in Human Computation Games
Anurag Sarkar, Seth Cooper
International Conference on the Foundations of Digital Games (FDG), 2018

[11] 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

[12] 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

[13] Predicting Human Computation Game Scores with Player Rating Systems
Michael Williams, **Anurag Sarkar**, Seth Cooper
International Conference on Entertainment Computing (ICEC), 2017

[14] 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] Conditional Level Generation and Game Blending
Anurag Sarkar, Zhihan Yang, Seth Cooper
AAAI AIIDE Workshop on Experimental AI in Games (EXAG), 2020

[2] Pathfinding Agents for Platformer Level Repair
Seth Cooper, **Anurag Sarkar**
AAAI AIIDE Workshop on Experimental AI in Games (EXAG), 2020

[3] 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

[4] Sequential Segment-based Level Generation and Blending using Variational Autoencoders
Anurag Sarkar, Seth Cooper
FDG Workshop on Procedural Content Generation in Games (EXAG), 2020

[5] Game Design using Creative AI
Anurag Sarkar
NeurIPS Workshop on Machine Learning and Creativity, 2019

[6] Controllable Level Blending between Games using Variational Autoencoders
Anurag Sarkar, Zhihan Yang, Seth Cooper
AAAI AIIDE Workshop on Experimental AI in Games (EXAG), 2019

[7] Blending Levels from Different Games using LSTMs
Anurag Sarkar, Seth Cooper
AAAI AIIDE Workshop on Experimental AI in Games (EXAG), 2018

[8] 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

Peer Reviewing

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

Honors and Awards

Best Paper Nomination 2020
IEEE Conference on Games (CoG)

IEEE Computational Intelligence Society (CIS) Grant 2020
IEEE Conference on Games (CoG)

PhD Network Travel Grant 2019
Northeastern University

IEEE Computational Intelligence Society (CIS) Travel Grant 2019
IEEE Conference on Games (CoG)

Game Narrative Review Gold Award 2018
Game Developers Conference (GDC)

Best Paper Honorable Mention 2017
International Conference on the Foundations of Digital Games (FDG)

Graduate Fellow 2016
Northeastern University

Father Jacques de Bonhome S.J. Memorial Gold Award 2016
M.Sc.Computer Science Class of 2016 Valedictorian, St. Xavier's College

All-State Rank 7th (out of 2261) 2014
West Bengal Joint Entrance Exam for Computer Applications

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

Technical Skills

Programming Languages
Python, C# (experienced, active use)
R, Javascript (experienced but use less frequently)
Java, Actionscript (familiar, used in the recent past)
C, C++, MATLAB, SQL (familiar but used less recently)

Software/Applications/Technologies
Unity, PyTorch, TensorFlow, Keras, Jupyter Notebook, Amazon Mechanical Turk, Amazon DynamoDB, Google Cloud Platform, Google Colab