Mahsa Bazzaz

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mahsa-bazzaz | Mahsa Bazzaz | MahsaBazzaz

Boston, MA, US

Objective

I am a PhD candidate at Northeastern University's Khoury College of Computer Sciences. I work on machine learning, deep learning, and generative AI for games.
My research combines traditional constraint-based models with modern machine learning techniques. Constraint-based models are reliable and guarantee playable outputs, while machine learning approaches are fast and scalable. By combining both, I build hybrid systems that generate diverse, high-quality game levels efficiently.
I also run quantitative and qualitative user studies and use statistical analysis to understand how players perceive AI-generated content. These studies help me design generative systems that match player expectations.

Education

- **Northeastern University** *Jan 2023 - Dec 2027*
  PhD in Computer Science Boston, US
  - **Advisor**: Professor Seth Cooper
- **Northeastern University** *Jan 2023 - April 2025*
  MS in Computer Science Boston, US
  - **GPA**: 4.00/4.0
  - **Selected Coursework**: Statistical Methods for Computer Science, Procedural Content Generation via Machine Learning, Foundations and Applications of Information Theory
- **Amirkabir University of Technology (Tehran Polytechnic)** *Sep 2017 Dec 2022*
  BS in Computer Engineering Tehran, Iran
  - **GPA**: 3.4/4.0
  - **Selected Coursework**: Principles and Applications of Artificial Intelligence, Principles of Computational Intelligence, Introduction to Machine Learning

Experience

- **Northeastern University** *Jan 2023 - present*
  Graduate Research/Teaching Assistant Boston, US
  - CS 3540 Game Programming × 4
  - CS 5340 Human-Computer Interaction
  - CS3520: Programming in C++ × 2
  - CS5800: Algorithms
- **Limoome** *Jul 2020 Feb 2021*
  Internship Tehran, Iran
  - Node.js, Nest.js, TypeScript
  - PostgreSQL, Jest.js
  - Azure DevOps, Agile Development
- **Amirkabir University of Technology (Tehran Polytechnic)** *Feb 2020 - Jul 2020*
  Teaching Assistant Tehran, Iran
  - Algorithm Design course

Publications

C=Conference, J=Journal, P=Patent, S=In Submission, T=Thesis

[C.1] Seth Cooper and Mahsa Bazzaz. (2025). **A Constraint-Based Graph Grammar Approach Unifying Level and Playthrough Generation**. In *Proceedings of the Twelfth Experimental Artificial Intelligence in Games Workshop (EXAG)*. 2025.

[C.2] Mahsa Bazzaz and Seth Cooper. (2025). **Analysis of Robustness of a Large Game Corpus**. In *Proceedings of the 20th International Conference on the Foundations of Digital Games (FDG)*. 2025. ***Early Career Best Paper Award**

[C.3] Mahsa Bazzaz and Seth Cooper. (2025). **Analysis of Uncertainty in Procedural Maps in Slay the Spire**. In *Proceedings of the 20th International Conference on the Foundations of Digital Games (FDG)*. 2025.

[C.4] Seth Cooper and Mahsa Bazzaz. (2025). **Stuck in the Middle: Generating Levels without (or with) Softlocks**. In *Proceedings of the 20th International Conference on the Foundations of Digital Games (FDG)*. 2025.

[C.5] Mahsa Bazzaz and Seth Cooper. (2025). **Level Generation with Constrained Expressive Range**. In *Proceedings of the 20th International Conference on the Foundations of Digital Games (FDG)*. 2025.

[C.6] Mahsa Bazzaz and Seth Cooper. (2024). **Guided Game Level Repair via Explainable AI**. In *The 20th AAAI Conference on Artificial Intelligence and Interactive Digital Entertainment (AIIDE)*. PKP. 2024.[]

[C.7] Seth Cooper and Mahsa Bazzaz. (2024). **Sturgeon-MKIV: Constraint-Based Level and Playthrough Generation with Graph Label Rewrite Rules**. In *The 20th AAAI Conference on Artificial Intelligence and Interactive Digital Entertainment (AIIDE)*, PKP. 2024.

[C.8] Mahsa Bazzaz and Seth Cooper. (2024). **Controllable Game Level Generation: Assessing the Effect of Negative Examples in GAN Models** . In *The 20th AAAI Conference on Artificial Intelligence and Interactive Digital Entertainment (AIIDE)*. PKP. 2024.[]

[C.9] Seth Cooper and Mahsa Bazzaz. (2024). **Literally Unplayable: On Constraint-Based Generation of Uncompletable Levels**. In *Proceedings of the 19th International Conference on the Foundations of Digital Games (FDG)*, pp. 1-8. ACM. 2024. DOI: 10.1145/3649921.3659844.

[C.10] Lincroft, Gwenyth and Cho, Minsung and Hough, Katherine and Bazzaz, Mahsa and Bell, Jonathan. (2024). **Thirty-Three Years of Mathematicians and Software Engineers: A Case Study of Domain Expertise and Participation in Proof Assistant Ecosystems**. In *2024 IEEE/ACM 21st International Conference on Mining Software Repositories (MSR)*, pp. 1-13. Association for Computing Machinery. 2024. DOI: 10.1145/3643991.3644908.

[C.11] Mahsa Bazzaz and Seth Cooper. (2023). **Active learning for classifying 2d grid-based level completability**. In *2023 IEEE Conference on Games (CoG)*, pp. 1-4. IEEE. 2023. DOI: 10.1109/CoG57401.2023.10333212. []

Skills

- **Programming Languages:** Python, TypeScript, JavaScript, Java, C, C++
- **Game Development:** Unity2d, Unity3d, Godot, Babylon.js, Blender, Game mechanics, Game Design
- **Web Technologies:** JavaScript, TypeScript, Node.js, Nest.js, Express.js, Angular, Vue.js, HTML, CSS, SASS, jQuery, Bootstrap, PHP
- **Database Systems:** MySQL, PostgreSQL
- **Data Science & Machine Learning:** PyTorch, pandas, NumPy, scikit-learn, LaTeX, SLURM
- **DevOps & Version Control:** Git, Azure DevOps

Honors and Awards

- **Early Career Best Paper Award** *Apr 2025*
  Conference on the Foundations of Digital Games (FDG)

Volunteer Experience

- **Conference Reviewer** *Dec 2025*
  IEEE Transactions on Games
- **Conference Reviewer** *July 2025*
  AAAI Conference on Artificial Intelligence and Interactive Digital Entertainment (AIIDE)
- **Summer School Organizer** *May 2025*
  Machine Learning for Mathematicians and Physicists Summer School - Northeastern University
- **Conference Reviewer** *Feb 2025*
  Conference on Human Factors in Computing Systems (CHI2025)
- **Conference Reviewer** *Feb 2025*
  The 16TH Workshop on Procedural Content Generation (PCG2025)
- **Conference Program Committee** *Aug 2024*
  AAAI Conference on Artificial Intelligence and Interactive Digital Entertainment (AIIDE)
- **Conference Reviewer** *Mar 2024*
  IEEE Conference on Games (CoG)
- **Conference Reviewer** *Jan 2024*
  IEEE Transactions on Games

Certifications

- **Coursera:** Experimental Design Basics *Sep 2025*
- **Coursera:** Designing, Running, and Analyzing Experiments *Jul 2025*
- **CITI Program:** Social and Behavioral Research *Jan 2023*
- **CITI Program:** Social and Behavioral Responsible Conduct of Research *Jan 2023*
- **Coursera:** Game Design *Aug 2021*
- **Coursera:** Gamification *Jul 2021*

Additional Information

Languages: Persian (Native), English (Proficiency level)