Colan Biemer

Education

w: colan.biemer.us, E: bi3mer93@gmail.com, T: 847-702-0633

Northeastern University
PhD Computer Science, 2019-Present
MS Computer Science, 2019-2021

Drexel University
B.S., Computer Science, with Math Minor, 2017

Experience

Research and Teaching Assistant, Northeastern
Boston, MA — September 2019 - Present

- Built a graph of level segments, and used it as a Markov Decision Process for dynamic difficulty. A director modified the MDP based on player performance, which showed increased exploration over standard optimization approaches (policy iteration). Our director was also able to adapt to player-switching between levels.
- Developed improvement to concatenation for linking level segments using two Markov chains and a tree search. For *Kid Icarus, the* concatenation of two segments results in a completable level 12% of the time. Our method improves this to 100%.
- Created new mutation and crossover operators that use n-grams for level generation. For *Kid Icarus*, these operators with MAP-Elites result in a 65% increase in levels found over standard genetic operators.
- Created a time-series graph layout to minimize the number of nodes needed for duplicate actions while organizing nodes linearly to show how players behave in a game built to teach parallel programming.
- Built an AWS serverless architecture solution for an online game with accounts to handle configurations, logging, and downloading for offline analysis.
- Implemented location-based dataset building for the Cartoscope server with Mapillary and iNaturalist.
- Teaching Assistant for C++, Game Engines, and Graphics.

Applications Programmer, University of California Riverside Brain Game Center
Riverside, CA — August 2017 - June 2019

- Created a submodule used across all Unity game repositories that contains generic tools, generic scripts, and core game functionality to prevent previous issues of out-of-sync code across multiple repositories.
- Developed HIPAA-compliant serverless architecture with AWS used by multiple organizations for managing users, storing logs, producing analytics, delivering configurations, automatically assigning users to configurations, and uploading assets to applications to reduce initial download size.
- To reduce miscommunication between researchers and programmers, implemented configuration-driven games that researchers could easily modify without a programmer's help.

Information Technology Research Center Co-op, BMW
Greenville, SC — April 2016 - September 2016

- Administrator for ELK stack and cluster to provide NHTSA data for analysts.
- Merging NHTSA tables and pushing the result to ELK stack took about a month to run; to reduce time and resource cost, developed a multithreaded algorithm to take advantage of a 50-node cluster which reduced runtime to ~6 hours.

- Created a distributed machine learning algorithm to classify defects of doors which outperformed AlexNet and other architectures by ~35%.
- Developed a flexible Python server for delivering fake data for demos.
- Built an eight-node Raspberry Pi cluster for training new interns on cluster computing before using the main cluster.

Programmer, Entrepreneurial Game Studio
Philadelphia, PA — October 2013 - July 2017

- Programmer for the “World's Largest Architectural Video Game” with single and multiplayer Tetris on both sides of the Cira Center skyscraper. Had an estimated 2.2 billion views.
- Developed an IOS augmented reality game using city buildings as objectives for players to capture as a team using a chat system to communicate. The project was discontinued due to hardware restraints at the time of development.
- Built a website to show the number of tweets from each country on a world map for the Dalai Lama's visit to Philadelphia.

R&D Innovations Team Development Co-op, iPipeline
Philadelphia, PA — April 2015 - September 2015

- Created “Text-a-Quote,” an SMS chatbot that sent users a life insurance quote based on information from the user.
- Built “Pipe-SMS,” a one-way texting service designed for iPipeline applications to text users information like confirmation codes.
- Coordinated with an outside vendor to implement form tracking and analytics for existing products.

Publications

- **Biemer, C.** (2023, October). Dynamic difficulty adjustment via procedural level generation guided by a Markov decision process for platformers and roguelikes. In Proceedings of the AAAI Conference on Artificial Intelligence and Interactive Digital Entertainment (Vol. 19, No. 1, pp. 436-439).
- **Biemer, C.**, & Cooper, S. (2022, October). Level Assembly as a Markov Decision Process. In 2022 Proceedings of the Experimental AI in Games Workshop.
- **Biemer, C.**, & Cooper, S. (2022, August). On Linking Level Segments. In 2022 IEEE Conference on Games (CoG) (pp. 199-205). IEEE. ★ *Best Paper Nominee*
- **Biemer, C.**, Hervella, A., & Cooper, S. (2021, August). Gram-Elites: N-Gram Based Quality-Diversity Search. In The 16th International Conference on the Foundations of Digital Games (FDG) 2021 (pp. 1-6).
- Villareale, J., **Biemer, C.**, Seif El-Nasr, M., & Zhu, J. (2020, September). Reflection in Game-Based Learning: A Survey of Programming Games. In International Conference on the Foundations of Digital Games (pp. 1-9).

Skills

TypeScript | Python | C++ | C# | Rust | Java | HTML | CSS | Git | Jupyter | SQLite | Unity | AWS | scikit-learn | Pandas | Keras | TensorFlow | MongoDB | SQL | Hive QL | Spark | Database Management | Vim | Bootstrap | Software Development | Optimization | Tools & Technology