

UMDCYL and Little Python: Teaching Coding by Playing Games

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Abstract

The University of Minnesota Duluth Cybergames Youth League (UMDCYL) Framework is an engaging platform for teaching the basics of programming in a hands-on fashion. In UMDCYL-based exercises, students write short programs to play simple video games using a purpose-built language with a simplified syntax, Little Python. The programs make decisions based on their own code and the value of variables set by the framework that reflect the game state at each round. The framework enables students to optionally compete against each other to create the best “bot”, and multiple schools using the same framework can compete against each other by comparing their best bots (hence the “league”).

The UMDCYL Framework is web-based (running on a Linux-based web server), so users do not need any special software installed on their computer, making it especially accessible for public schools and non-profit organizations. Little Python (LP) is an interesting project in its own right that provides a flexible programming environment without overwhelming students with options. Language features of LP can be enabled and disabled at compile time, which can be used to constrain user programs into a more simplified subset of the language. Limits of the number of operations each LP program can execute per turn ensures that infinite loops in student programs will not cause the game to “hang.”

More experienced students can write the turn-based games that are played by the bots, which is a rewarding experience in and of itself (and is much simpler than writing a video game from scratch). We currently have a moderate set of games for the framework,

including Apple Hunt, Robots, Ski, Space Invaders, Pac-Man, and TRON (“light cycles”). Used in the UMDCYL outreach program, middle, high school, and college-age student all seem to enjoy writing programs to play games, with students having no programming experience being able to write credible bots for simple games in a few minutes.