

Adversarial Search Based AI Bot

Abstract:

For my capstone project for CSCI1410, I implemented an artificial intelligence based bot in order to beat computer bots which each employ different strategies within a sequential, turn based strategy game. The project implementation leverages adversarial search where I'm using the minimax algorithm with alpha beta pruning and a cutoff value in tandem with a heuristic to evaluate the game when the cutoff value has been reached. The heuristic relies on a ratio of the current "space" occupied by each of the players which is normalized where I allow for negative values in order to account for evaluation of moves where the other player would have a decisive advantage. From a results perspective, my bot performs well against the random bot in the vast majority of rooms except the large room which is empty as on occasion, the random bot takes a path where it escapes out of the opening phase of the game and is able to claim large chunks of territory. My bot has strong win rates against both the attack and the safe bots in all scenarios as my bot is good at not dying due to the hyena within the case of competing with the attack bot along with being relatively more aggressive in claiming territory as compared to the safe bot. The win rate against TA-Bot-1 is also quite high compared to the benchmark. However, the bot is slightly less successful within the empty, small room due to TA-Bot-1 being good at not dying whilst also being more proactive within the early stages of games within capturing territory. My bot's performance against TA-Bot-2 is above the benchmark on average for the empty rooms but performance against TA-Bot-2 remains volatile within the context of the rooms with hyenas. This occurs due to the opposing bot's ability to aggressively capture territory within all stages of the game whilst being adept at not being killed by the hyena as compared to my bot which is passively capturing area within the starting stages of the game ie. remains too close to the walls when being chased by the hyena which allows for TA-Bot-2 to gain a large territory advantage at the start of the game in maps with hyenas.