**Build a Game Playing Agent**

**Game Agent Implementation**

| **Criteria** | **Meets Specifications** |
| --- | --- |
| .get\_action() method calls self.queue.put() at least once before the time limit expires | (AUTOGRADED) Game playing agent can return an action.   * .get\_action() method calls self.queue.put() at least once before the time limit expires |
| CustomPlayer successfully plays as both player 1 and player 2 in a full game to a terminal state (i.e., the agent does not deadlock during search, return an invalid action, or raise an exception during a game) | (AUTOGRADED) Game playing agent can play a full game.   * CustomPlayer successfully plays as both player 1 and player 2 in a full game to a terminal state (i.e., the agent does not deadlock during search, return an invalid action, or raise an exception during a game) |

**Experimental Results & Report**

| **Criteria** | **Meets Specifications** |
| --- | --- |
| CustomAgent search function uses an advanced search technique | CustomAgent class implements **at least one** of the following:   * Custom heuristic (must **not** be one of the heuristics from lectures, and cannot *only* be a combination of the number of liberties available to each agent) * Opening book (must be at least 4 plies deep) * Implements an advanced technique not covered in lecture (e.g., killer heuristic, principle variation search, Monte Carlo tree search, etc.) |
| Report includes a table or chart documenting an experiment to evaluate the performance of their agent | Submission includes a table or chart with data from an experiment to evaluate the performance of their agent. The experiment should include an appropriate performance baseline. (Suggested baselines shown below.)  **Advanced Heuristic**   * Baseline: #my\_moves - #opponent\_moves heuristic from lecture (should use fair\_matches flag in run\_match.py) **Opening book** * Baseline: randomly choosing an opening move (should *not* use fair\_matches flag in run\_match.py) **Advanced Search Techniques** * Baseline: student must specify an appropriate baseline for comparison (student must decide whether or not fair\_matches flag should be used) |
| Report answers all required questions | Submission includes a short answer to the applicable questions below. (A short answer should be at least 1-2 sentences at most a small paragraph.)  **NOTE:** students only need to answer the questions relevant to the techniques they implemented. They may choose *one* set of questions if their agent incorporates multiple techniques.  **Advanced Heuristic**   * What features of the game does your heuristic incorporate, and why do you think those features matter in evaluating states during search? * Analyze the search depth your agent achieves using your custom heuristic. Does search speed matter more or less than accuracy to the performance of your heuristic?   **Opening book**   * Describe your process for collecting statistics to build your opening book. How did you choose states to sample? And how did you perform rollouts to determine a winner? * What opening moves does your book suggest are most effective on an empty board for player 1 and what is player 2's best reply?   **Advanced Search Techniques**   * Choose a baseline search algorithm for comparison (for example, alpha-beta search with iterative deepening, etc.). How much performance difference does your agent show compared to the baseline? * Why do you think the technique you chose was more (or less) effective than the baseline? |