Programming Assignment 2

**Group Member Contribution**

All members equally contributed to each part of the assignment as we all peer reviewed and contributed code along all parts of the assignment equally.

***Results from testing the algorithms in part II***

**Algorithm 1: Uniform Random (UR)**

**A screenshot of a computer

Description automatically generated**

A screen shot of a computer

Description automatically generatedTesting File Result

**Algorithm 2: Pure Monte Carlo Game Search (PMCGS)**

A screenshot of a computer

Description automatically generatedA computer screen shot of a code

Description automatically generated Testing File Result

**Algorithm 3: Upper Confidence bound for Trees (UCT)**

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Description automatically generated Testing File Result

***Part II: Algorithm Tournaments and Evaluation***

**A screenshot of a computer program

Description automatically generatedTournament Results**

**Tournament data table**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | **UR** | **PMCGS (100)** | **PMCGS (200)** | **UCT (100)** | **UCT (200)** |
| **UR** | 0% | 1% | 1% | 5% | 9% |
| **PMCGS (100)** | 99% | 0% | 44% | 83.5% | 89.5% |
| **PMCGS (200)** | 99% | 56% | 0% | 91% | 91% |
| **UCT (100)** | 95% | 16.5% | 9% | 0% | 50% |
| **UCT (200)** | 92% | 10.5% | 9% | 50% | 0% |

**Conclusion**

The implementation of UR, PMCGS, UCT algorithms had clear differences. We will note that we face computational challenges in the tournament and scaled down the number of simulations for the algorithms so that it will not take so long but also provide good results that highlight the differences between each algorithm in the connect four game play. UR is just picking at random it is simplest algorithm compared to PMCGS and UCT, this simple approach is not suited for competitive game playing tournaments as it just makes an immediate move with considering future outcomes. PMCGS and UCT are more suited for competitive game playing tournaments because of their decision-making strategy in playing as they asses’ potential future outcomes. UCT does more decision-making than PMCGS as they balance exploration and exploitation picking an even better move.