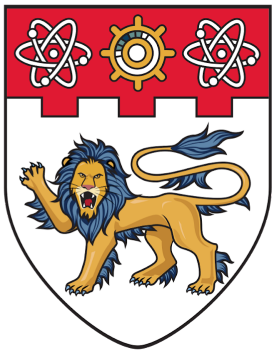

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Agent Rules

The overall strategy of the agent is a mix of *Tit-for-Tat* and *Tolerant*. The agent is designed keeping in mind Axelrod's suggestions. Below are some of the rules that the agent will follow for the Three Prisoners Dilemma Tournament.

Rule 1
If it is the first round, then I will cooperate by default

Rule 2
If the game is almost over, then I will defect since my opponent does not have any turns to retaliate

Rule 3
If both my opponents cooperated the previous round, then even I will cooperate

Rule 4
If both my opponents defected the previous round, then even I will defect

Rule 5
If only one of my opponents cooperated, then I will play "*Tolerant Action*".

Definition of Tolerant Action

If anyone of my opponents has defected more than cooperated then I will defect. Otherwise I will be tolerant and cooperate with them.

Agent Implementation

The code snippet shown below is the implementation of the agent

```
public class Acharya_Atul_Player extends Player{

    int selectAction(int n, int[] myHistory, int[] oppHistory1, int[] oppHistory2) {

        // Rule 1
        if (n==0) return 0; //cooperate by default

        // Rule 2
        if (n>=99) return 1; // defect in the end

        // Rule 3, 4, 5
        return oppHistory1[n-1] == oppHistory2[n-1] ? oppHistory1[n-1]:
        playTolerantAction(n, myHistory, oppHistory1, oppHistory2);
    }

    int playTolerantAction(int n, int[] myHistory, int[] oppHistory1, int[] oppHistory2) {
        int opponent1 = 0;
        int opponent2 = 0;

        for (int i=0; i<n; ++i){
            opponent1 += (oppHistory1[i] == 0? 1 : -1);

            opponent2 += (oppHistory2[i] == 0? 1: -1);
        }

        if (opponent1 >= 0 && opponent2 >= 0) return 0;
        return 1;

    }
}
```

Agent Implementation

Rule 1 is followed in the statement:

if (n==0) return 0;

Rule 2 is followed in the statement:

if (n>=99) return 1;

Rules 3, 4, 5 are implemented in the following statement:

return oppHistory1[n-1] == oppHistory2[n-1] ? oppHistory1[n-1] : playTolerantAction(n, myHistory, oppHistory1, oppHistory2);

Rule 5 is implemented in the *playTolerantAction* method

Agent Evaluation

	Scores				
Player	**Tournament 1**	**Tournament 2**	**Tournament 3**	**Tournament 4**	**Tournament 5**
Acharya_Atul_Player	174.30652	168.66257	160.13881	170.1696	173.31863
TolerantPlayer	165.95259	159.51935	158.56355	168.87167	159.28564
T4TPlayer	162.82137	160.27852	157.43025	165.84247	169.92761
NicePlayer	152.48169	147.41974	152.02113	150.97244	154.38113
FreakyPlayer	151.67511	142.64024	141.05913	142.4041	165.09494
NastyPlayer	146.60754	136.21846	147.12944	136.17455	136.88568
RandomPlayer	136.59172	143.79819	132.38307	151.24973	151.32278

The agent Acharya_Atul_Player was tested for 5 tournaments. In all the 5 tournaments, the agent was able to beat all other example strategies.

However, this is not always the case as later tests show the agent losing against the TolerantPlayer and T4TPlayer sometimes.

In conclusion the agent is able to win most of the time against the example agents strategies.

Program Output

Following are the outputs in the when *ThreePrisonersDilemma.java* is executed with 7 players. A total of 5 tournaments were played to record the performance of our agent with the other example agents.

Tournament 1

```
Tournament Results
Acharya_Atul_Player: 174.30652 points.
TolerantPlayer: 165.95259 points.
T4TPlayer: 162.82137 points.
NicePlayer: 152.48169 points.
FreakyPlayer: 151.67511 points.
NastyPlayer: 146.60754 points.
RandomPlayer: 136.59172 points.
atul@atul-Lenovo-ideapad-S530-13IWL:~/Desktop/Code/UniWork/cz4046/ThreePrisonersDilemma$
```

Tournament 2

```
Tournament Results
Acharya_Atul_Player: 168.66257 points.
T4TPlayer: 160.27852 points.
TolerantPlayer: 159.51935 points.
NicePlayer: 147.41974 points.
RandomPlayer: 143.79819 points.
FreakyPlayer: 142.64024 points.
NastyPlayer: 136.21846 points.
atul@atul-Lenovo-ideapad-S530-13IWL:~/Desktop/Code/UniWork/cz4046/ThreePrisonersDilemma$
```

Tournament 3

```
Tournament Results
Acharya_Atul_Player: 160.13881 points.
TolerantPlayer: 158.56355 points.
T4TPlayer: 157.43025 points.
NicePlayer: 152.02113 points.
NastyPlayer: 147.12944 points.
FreakyPlayer: 141.05913 points.
RandomPlayer: 132.38307 points.
atul@atul-Lenovo-ideapad-S530-13IWL:~/Desktop/Code/UniWork/cz4046/ThreePrisonersDilemma$
```

Tournament 4

```
Tournament Results
Acharya_Atul_Player: 170.1696 points.
TolerantPlayer: 168.87167 points.
T4TPlayer: 165.84247 points.
RandomPlayer: 151.24973 points.
NicePlayer: 150.97244 points.
FreakyPlayer: 142.4041 points.
NastyPlayer: 136.17455 points.
atul@atul-Lenovo-ideapad-S530-13IWL:~/Desktop/Code/UniWork/cz4046/ThreePrisonersDilemma$
```

Tournament 5

```
Tournament Results
Acharya_Atul_Player: 173.31863 points.
T4TPlayer: 169.92761 points.
FreakyPlayer: 165.09494 points.
TolerantPlayer: 159.28564 points.
NicePlayer: 154.38113 points.
RandomPlayer: 151.32278 points.
NastyPlayer: 136.88568 points.
atul@atul-Lenovo-ideapad-S530-13IWL:~/Desktop/Code/UniWork/cz4046/ThreePrisonersDilemma$
```