CZ4046 Intelligent Agents

Semester 2 2017/2018

Assignment 2: Repeated Prisoners Dilemma

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# Code:

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| class tsKennethTeo\_Player extends Player {  // A Tolerant Tit for Tat player that considers action of both  // opponents instead of just looking at one.  // If opponents are not acting in unison, fall back to being an  // alternator  int selectAction(int n, int[] myHistory, int[] oppHistory1,  int[] oppHistory2) {  // Cooperate on the first two rounds  if (n==0 || n==1) {  return 0;  }  // Defect on the last two rounds  else if (n==98||n==99) {  return 1;  }    // If both opponents are nasty, turn nasty as well. Only give  // two chances before defecting  if ((oppHistory1[n-1]==1&&oppHistory1[n-2]==1)  &&(oppHistory2[n-1]==1&&oppHistory2[n-2]==1)) {  return 1;  }  // If both opponents in synchronisation, possibly Tit for tat,  // return Tit for tat  else if (oppHistory1[n-1] == oppHistory2[n-1]  && oppHistory1[n-2] == oppHistory2[n-2]) {  return oppHistory1[n-1];  }  // Opponents not acting in unision, alternate between 0 and 1  else {  if(myHistory[n-1] == 1) {  return 0;  } else {  return 1;  }  }  }  } |

# Code breakdown

There are total of 5 rules that guide the agent, in order of priority:

**Rule 1:** Cooperate for first two rounds

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| if (n==0 || n==1) {  return 0;  } |

**Rule 2:** Defect in the last two rounds

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| else if (n==98||n==99) {  return 1;  } |

**Rule 3:** Tolerate defection for 2 rounds before defecting as well

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| if ((oppHistory1[n-1]==1&&oppHistory1[n-2]==1)  &&(oppHistory2[n-1]==1&&oppHistory2[n-2]==1)) {  return 1;  } |

**Rule 4:** Adopt Tit-for-Tat if opponents are acting in unison

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| else if (oppHistory1[n-1] == oppHistory2[n-1]  && oppHistory1[n-2] == oppHistory2[n-2]) {  return oppHistory1[n-1];  } |

**Rule 5:** Alternate between 1 and 0

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| else {  if(myHistory[n-1] == 1) {  return 0;  } else {  return 1;  }  } |

# Evaluation

This player looks at the actions of both opponents at the same time and mainly seek cooperation rather than taking advantage of the opponents. The player also looks at maximising its gain rather than minimising opponent’s gains (i.e. prefer U(CCC) and U(CDC) than U(DCC) due to fears of reducing to U(DDD) with the latter). Hence, the number one priority is to achieve U(CCC) more than anything else.

## Against Nice Players

If both opponents are nice players (cooperate all the way), this player will cooperate from the first two rounds till the last two rounds due to rule 1,2 and 4. If only one player is a nice player, the player alternates between 0 and 1 to achieve U(CDC) and U(DDC).

## Against Nasty Players

If both opponents are nasty players (defect all the way), this player will cooperate for the first two rounds and defect till the end due to rule 1 and 3. If only one player is a nasty player, the player alternates between 0 and 1 to achieve U(CDC) and U(DDC). However, this may reduce to a U(DDD) as the non-nasty player may defect considering the nasty player’s actions (triggered by rule 4).

## Against Random Players

If both opponents are random players (defect 50% of the time), this player will cooperate for the first two rounds and defect on the last two rounds due to rule 1 and 2. Due to the randomness, it is difficult to ascertain the strategy of random players. Hence, when either players are random players, it can trigger any of rule 3 to 5. This shows that the player will also depend on randomness to score with these opponents.

## Against Tolerant Players

If both opponents are tolerant players (defect if opponents defect >50%), this player will cooperate for the first two rounds and defect on the last two rounds due to rule 1 and 2. This player will also cooperate throughout the game due to rule 4 to achieve U(CCC). If only one opponent is a tolerant player, then this player will either alternate (rule 5) or become tit for tat (rule 4).

## Against Freaky Players

If both opponents are freaky players (decides to be nasty or nice at the start) this player will cooperate for the first two rounds and defect on the last two rounds due to rule 1 and 2. This player will react accordingly when they become nasty or nice players as per mentioned above.

## Against T4T Players

If both opponents are tit for tat players (follows either players half the time) this player will cooperate for the first two rounds and defect on the last two rounds due to rule 1 and 2. This player will also cooperate for the rest of the game due to rule 4 to achieve U(CCC). If only one player is a T4T player, the player will become an alternator. However, this may reduce to U(DDD) by sheer chance that the T4T player follows the defection of both players.