THE PRISONER'S DILEMMA GAME

FREQUENTLY ASKED QUESTIONS (FAQs)

Q1. What are 'round', 'move', 'match' and 'tournament' in the context of the game?

ROUND: *Each 'match' has many rounds of PD i.e. each player opting a 'C' or 'D'. End of each round gives each player some points depending upon the payoff matrix.*

MOVE: *A player's choice in a round is their 'move'.*

MATCH: *Two strategies have ONE match together i.e. they play several rounds of PD. The final score of a match is the sum of points obtained after every round.*

TOURNAMENT: *The entirety of the game played is a tournament i.e. a round-robin tournament of all strategies. The final score of a tournament is the average score obtained by a strategy from all its matches.*

Q2. What's a 'strategy' in this game supposed to achieve?

A strategy is a set of 'rules' which tells the simulator which move to play in a round. Strategy, in this game, is based upon what move the opponent played last. So, a strategy tells the simulator which move to play next and this rule is conditioned over what the opponent player had moved in the last round.

An example-
ROUND 1: C ---------- C
(Left side is your move)
Now, the strategy will tell the simulator what to play in Round 2, given that the opponent played a C in Round 1. So, if a strategy says "Play D if opponent moves C" then the simulator does this-

ROUND 1: C ---------- C
ROUND 2: D ---------- D

Since you don't know what the opponent will play, the simulator needs complete information. Your strategy, hence, must tell the simulator exactly what to do each round if the opponent plays either C or D.

Q3. How will I construct my strategy?

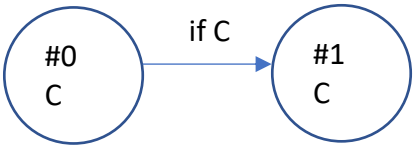
Making a strategy is very easy and it requires you to make an FSA of your strategy first. An FSA is a flow chart depiction of your strategy.

THE PRISONER'S DILEMMA GAME

In this flowchart, the bubbles are filled with either C or D as they represent the move to play. The arrows connecting these bubbles are captioned with either "if the opponent played C in the last round" or "if the opponent played D in the last round". These are abbreviated to "if C" and "if D" respectively.

The bubbles are also numbered to keep them unique. These bubbles are called 'states. The simulator reads the 'states' of the FSA to figure out which move your strategy wants to play in the round.

The simulator starts reading states from State 0, the start state. The move associated in this State 0 bubble is the one the simulator plays in Round 1. As an example-



This figure says "Play C first. If opponent plays C in Round 1, play C again". But clearly, it is not complete as the opponent could very well have played D in the first turn and then, since there is no instruction on what to do in that case, the simulator has nowhere to go then.

A strategy is always complete. To make sure your strategy is complete, remember to have all possibilities of every state checked which means make sure every state has ONE "if C" arrow and ONE "if D" arrow coming OUT from it.

Take this example of TIT FOR TAT which says "Play C first turn and copy the move opponent had played in the last round." So, TIT FOR TAT wants (a) State 0 to be C and (b) Go to C "if C" and go to D "if D".

See TIT FOR TAT's FSA diagram in the guidebook but try to make it yourself first.

Remember, the following are ***ALLOWED***

(i) More than two states.

(ii) Two or more states with the same move.

State 0 (D), State 1 (D)

(iii) Circling back to a state which has been read already.

State 0 → State 1 → State 0

State 0 → State 1 → State 2 → State 0

(iv) Circling back to the state being read. (States can arrow to themselves)

State 0 → State 0

(v) More than one state pointing to a state. (Multiple states can arrow to a single state)

State 0 → State 1 ← State 2

Whereas the following is ***PROHIBITED***

(i) *More than ONE arrow of a kind coming out from one state. That is, one state cannot be mapped to two separate states with a same "if __" arrow.*

Q4. What's 'survival scaling'?

Oyun provides a virtual evolutionary environment to put the strategies in as well. To utilise this feature as well, we will be putting all strategies in this environment where the strategies compete for 'survival'. Here, the biological fitness translates to the final points after the tournament and consequently, the next generation of the environment increases the fraction of the strategy by the point average they accumulated.

We would run this for 200 generations and the final fractions of the strategies that would come out are multiplied to 1000 and are added to the average score of that strategy from the round-robin tournament.*

In this way, we also simulate the best evolutionarily stable strategy among the ones sent in.

Q5. Do we just submit the FSA diagram of the strategy?

The FSA diagram must be condensed down to a text format before submitting. Instructions on writing out this .txt file can be found in the official guidebook.

Q6. I am the group leader of my team. How do I submit my team's name and strategy?

A Google form to do so will be made available shortly. Remember to not share the link with anyone, not even your team members. Only the team leaders must fill up the form with the .txt file attached.

Q7. How will I get to know the results?

Results will be declared within three days of the simulation. A complete report will be sent out within a week of the results being declared. The report will consist of how every strategy fared in both the round-robin tournament and the evolutionary setting.

All this will be accessible via the IISERM mail. Also, a WhatsApp group with the hosts of this event will be made for more frequent updates on what's happening and for direct contact in case of doubts. The link to joining this group would be forwarded along as soon as it is running.

**This is an arbitrary number chosen to represent the carrying capacity of the virtual environment but that's not really important.*