EVOLUTION AND THE THEORY OF GAMES

Exercises 11-4-2013

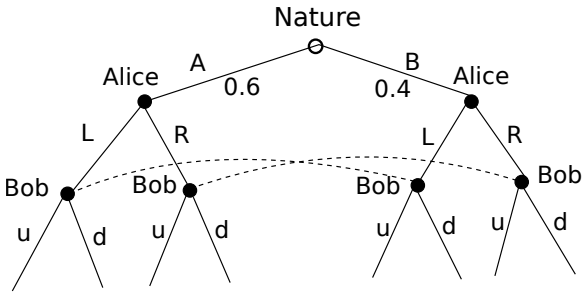
20. Consider the Iterated Prisoners Dilemma. Write out the path of play (lets say, at least the first 5 time-steps, i.e. for $t = 1, 2, 3, 4, 5$) of the following strategy profiles

(b) (3 points) $s = (allC, allD)$

(c) (3 points) $s = (Pavlov, TFT)$

(d) (3 points) $s = (TFT, TFT)$

21. (4 points) Describe how does the game, depicted in the game-tree below, proceed. (Who moves when and what the players know at the time of the move?)



22. Consider the following game: There are two players and player 1 receives a book which, with probability p is a small game theory pocket reference, and with probability $1 - p$ is a Star Trek data manual. The player sees the book, wraps it up, and decides whether to offer it to player 2 as a gift (hence player 1 has two moves: give a present or not to give a present). Player 2 hates Star Trek and is currently suffering in a graduate game theory course, so she would prefer to get the game theory references but not the Star Trek manual. Unfortunately, she cannot know what is being offered until she accepts it.

If the gift is accepted, then player 1 gets a positive payoff, say 1, because everyone likes when their gifts are accepted. Player 1 hates the humiliation of having a gift rejected, so the payoff is -1. If no gift is given both receive a 0 payoff.

Player 2 strictly prefers accepting the game theory book to not accepting it (hence accepting the game theory book yields a payoff 1 to player 1); she is indifferent

between not accepting this book and accepting the Star Trek manual (hence rejecting the game theory book as well as accepting the start trek manual yields payoff 0), but hates rejecting the Star Trek manual more than the game theory book because while dissing game theory is cool, dissing Star Trek is embarrassing (rejecting star trek manual yields payoff -1).

(a) (3 points) Construct a game-tree.

(b) (3 points) Find all pure Nash equilibria.

(c) (3 points) Are there any non-credible Nash equilibria? If yes, which one(s)?

23. Consider an iterated prisoners dilemma $\Gamma(\delta)$. Argue that

(a) (3 points) a strategy $(allD, allD)$ is a (symmetric) Nash equilibrium for a maximal strategy set (it not need to be necessarily non-terminal, i.e. we allow for strategies that terminate the game after a fixed number of rounds).

(b) (3 points) every strategy has infinitely many neutral mutants.

24. (4 points) Consider a non-terminal and maximal iterated prisoners dilemma $\Gamma(\delta)$. Show that a Nash equilibrium $allD$ can be invaded indirectly.