Eco 311/511: Game Theory
Bonus question

November 19, 2024

Instructions: Attempting this question is optional. Your score will be counted only if you score 3 or above. You are required to show all the steps, but marks will be allotted only if the answer is correct.

Q. Consider a finite set of agents in a network. Suppose each agent can choose one of two actions: 1 or 0. If for any agent i, more than half of his neighbours (people who have a direct link with him) choose 1, then it is best for i to choose 1. If less than half of i's neighbours choose 1, then it is best for i to choose 0. If exactly half of an agent's neighbours choose 0 (or 1) then the network dissolves- we exclude such cases.

1. Formulate this scenario as a strategic game where the agents' payoffs is a function of their own action, their neighbours' actions and the network in which they are located. (1)

2. Is the action profile $a_i = 0$ for all i a pure strategy Nash equilibrium? (1)

3. In the above setting, construct a network with at least 6 and at most 12 agents such that there is a pure strategy Nash equilibrium in which there is a connection/path (direct or indirect) between any two agents and some agents choose 0, while others choose 1. (3)