

Assignment 7

Moran Process for competition between TFT and ALLD : Obtain the fixation probability of TFT for $w=1$ for varying population sizes when evolution occurs according to the Moran process. Assume, the two types of individuals making up the population are TFT and ALLD. Take a population of size N in which there is just *one* TFT and $(N-1)$ ALLD **initially. Neither type can mutate to the other.**

Use $a=3, b=0, c=5, d=1$ for the payoffs in the PD game between C & D. Use m (#rounds of the game)=10

Note: Payoff to a TFT when it interacts with another TFT is $F_{TFT,TFT} = ma$

Payoff to a TFT when it interacts with an ALLD is $F_{TFT,ALLD} = b + (m-1)d$

Payoff to an ALLD interacting with another ALLD is $G_{ALLD,ALLD} = md$

Payoff to an ALLD interacting with a TFT is $G_{ALLD,TFT} = c + (m-1)d$

Write a program in which evolution of the population structure occurs according to the Moran Process i.e. in every generation only **one** individual is picked at random for death and **another** individual is picked for reproduction with a probability proportional to its fitness. **Run the simulation for as long as it takes for any one of the two types to get fixed in the population.**

Repeat the above simulation for **Nt=1000** trials and find out how many times TFT gets fixed ? (Note that the value of Nt is given as a guideline. In some cases, if necessary, you may have to choose $Nt > 1000$. Use your judgement to choose an appropriate value for Nt if $Nt=1000$ is not sufficient!)

Combine all of your results to plot the $N \cdot p_{TFT}$ vs N plot.

Use $N=100, 200, 250, 300, 350, 400, 600, 800, 1000$

Verify that your plot looks like Fig.7.9(a) in Nowak's book.

Submission Deadline: April 1, 2019.