Project Proposal

Networks class

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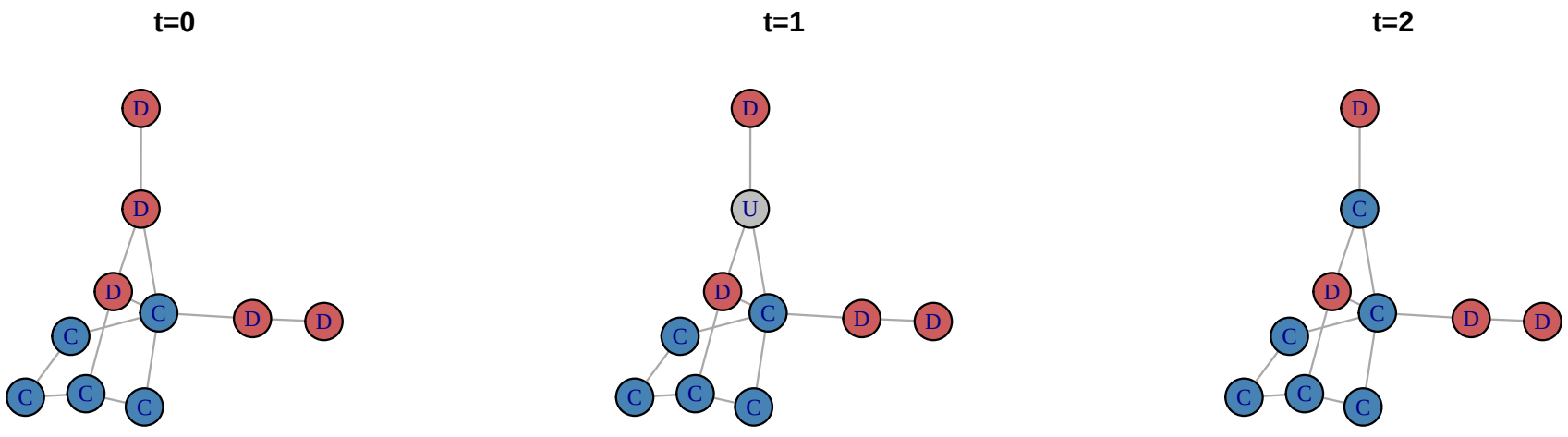
What I want to do / Who cares

- Paper Ohtsuki et al. (2006) "A simple rule for the evolution of cooperation on graphs"
- Networks as models to understand evolution/ natural selection (evolutionary graph theory)
- Interesting because it can help explain how characteristics (like cooperation) spread in a population based on fitness
- Fitness in this case is defined by :
  Baseline Fitness + (benefit gained from cooperation with neighbours) - (cost of cooperating with neighbours).

General idea

- each node has a fitness attribute, and a cooperator/defector attribute
- At each time, an individual dies and its spot is 'won' by either cooperator or defector
- With probability $\frac{F_c}{(F_c+F_d)}$ the cooperator will win
- their hypothesis is that cooperation is favored by natural selection if $\frac{b}{c} > k$, where b is benefit, c is cost, and k is number of neighbours. I.e. at time t=n(nodes), all will be cooperators.



Project, challenges and checks

- From literature, we know that in a complete graph cooperators lose to defectors.But what about other graphs?
- Othsuki et al. tested on model networks (e.g. circle network, lattice, model scale-free)
- For project, I will reproduce simulation and test it on three "real life networks" (e.g. monks, fb network. . .)
- Challenges: Create proper simulation in that updates network properly – define what b and c are
- Midterm success : test simulation on model graphs like in the paper.
- Final success : test simulation in existing "real life" networks, observe results.