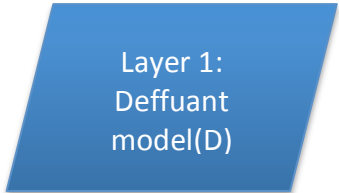

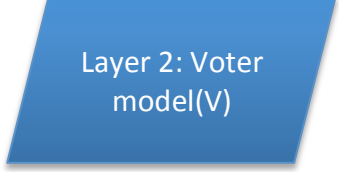


Coupled opinion dynamics in community network

Question: will the two different voting systems (like multiply democracy voting VS binary voting), after the interaction with each other, they could change? (Opinion Invasion)

 <p style="text-align: center;">Layer 1: Deffuant model(D)</p>	<p>Deffuant model: $O_{i,t} \in [-1,1]$ If $O_{i,t} - O_{j,t} < \varepsilon$</p> $O_{i,t+1} = O_{i,t} + \mu(O_{j,t} - O_{i,t})$ $O_{j,t+1} = O_{j,t} + \mu(O_{i,t} - O_{j,t})$ <p>if $\varepsilon < 1/2$, NO consensus. The stable state which have opinion clusters depends on μ and ε</p>
	<p>The interaction strength (p percent of interlink between two modules) will have effect on the final steady state.</p> <p>Evolution rule for each timestep:</p> <ol style="list-style-type: none"> 1. If randomly chosen one pair of nodes in the same layer, they evolve according to the corresponding rule in that layer. 2. If randomly chosen one pair of nodes in the different layer, they evolve according to the probability : <p>$P_{(\text{layer rule})} = \text{number of neighbors in the same layer} / \text{number of total neighbors}$</p> <p>Result:</p> <p>If $p=0$, it will equal to Deffuant model layer with opinion clusters and voter model layer with consensus.</p> <p>If $p=1$, ?.</p> <p>If $0 < p < 1$, where will have one critical point p_c ?</p>
 <p style="text-align: center;">Layer 2: Voter model(V)</p>	<p>Voter model: $O_{i,t} = \pm 1$: $O_{j,t+1} = O_{i,t}$, agent i is neighbor of agent j</p> <p>Consensus with fix point(1,0) and (0,1)</p>

The communities are labeled A and B and consist of N_a and N_b nodes, respectively. Here $N_a = N_b = 5000$, $K=10^6$. We use two probability parameters to generate an initial network with two communities by creating links. Parameter $d \in [0, 1]$ determines the asymmetry in average degree of the communities, and $f \in [0, 1]$ determines the number of links between communities. Links are created as follows. With probability d we choose a node among the N_a nodes in community A (otherwise choosing a node in community B), and with probability f its neighbor is chosen at random from the opposite community as the first node (otherwise choosing from the same community). This process is repeated until a total of K links are created. Self-links and multiple links are disallowed. Then a fraction $(1-f)d$ of the links are AA, $(1-f)(1-d)$ are BB, and f are AB. The average degrees in communities A and B are $\langle k \rangle_A = [2(1-f)d + f]K/N_a$ and $\langle k \rangle_B = [2(1-f)(1-d) + f]K/N_b$, respectively. Thus the communities are symmetric when $d = 0.5$. The total number of cross links between communities is fK .