

Extension of Recommendation Model to Dynamic Population

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Recommendation Model [1]

is a model that is used to investigate the effects of memory size with respect to the population size where an agent learns a new agent by recommendation.

In recommendation model, there are n agents where each of them has the same memory size, m . The memory M_i of an agent a_i is a subset of the agents in the population. An agent a_i knows a_j if a_j is an element of M_i . The knownness k_i of an agent a_i is the number of agents that know a_i . If $k_i = 0$, then the agent a_i is called completely forgotten. The fame f_i of an agent a_i is k_i/n .

The memory ratio ρ is m/n .

Initially, an agent knows its m -neighbors. At each simulation cycle, a giver agent a_G selects the recommended agent a_R from its memory and recommends a_R to a taker agent a_T . If a_T already knows a_R , it does not do anything. Otherwise, a_T learns a_R by forgetting an agent a_F from its memory (learning an agent means getting it into the memory and forgetting an agent means removing it from the memory). The a_G , a_T , a_R and a_F are selected randomly. The simulation ends when the average recommendation per agent is 10^6 .

Minimum fame in the population, maximum fame in the population, cumulative (average) fame of the top 5 percent of the agents from the population that are selected by ordering the agents according to their fame values in decreasing order and percentage of forgotten agents in the population vs. ρ graphs are investigated at the end of simulations for

different combinations of n and ρ .

Why not try to extend the Recommendation Model to simulate the fame in a world where agents born and die, agents can communicate with a limited number of agents, memory size of agents is not static and agents don't forget an agent that they know randomly.

The features of Recommendation Model that will be extended are dynamic population size, dynamic memory size, dynamic selection of a_F and dynamic selection of a_T . Simulation result of each possible combination of these features is going to be investigated one by one to see the effect of each feature.

[1] H. Bingol, *Phys. Rev. E* **77**,
036118 (2008).