STOCHASTIC PROCESSES

PROJECT

DEMONSTRATION OF NETWORK ANALYSIS USING RANDOM WALK

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CONTENT

NETWORK ANALYSIS

Network analysis involves studying the behavior of random variables or events that are interconnected in some way. For example, in social network analysis, stochastic processes can be used to model the spread of opinions or behaviors through a population.

One approach to network analysis is using a random walk, which involves simulating the movement of a particle through the network in a way that is determined by a set of probabilities.

RANDOM WALK

A random walk is a mathematical model that describes a process in which a particle, represented by a mathematical point, moves randomly from one point to another in a discrete or continuous space.

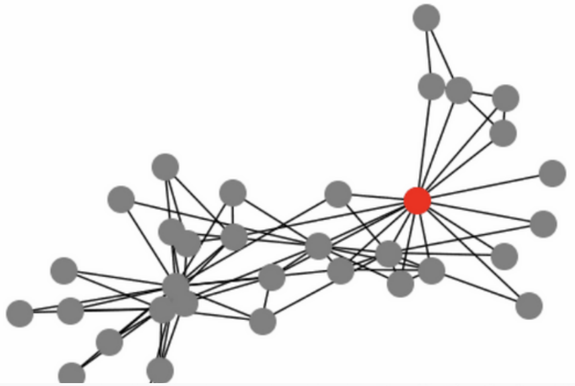
The idea behind a random walk is quite simple: at each time step, the particle moves randomly in some direction, with the direction and magnitude of the movement determined by some probability distribution.

It is a simple yet powerful model that can capture the behavior of many complex systems, and its versatility makes it a valuable tool for both theoretical and practical purposes.

NETWORK ANALYSIS USING RANDOM WALK

Random walks have been widely used in network analysis because they provide a powerful way to model the behavior of complex systems. They can be used to analyze various network properties, including node centrality, community structure, and network connectivity. In this approach, the network is modeled as a graph, where nodes represent the individual components of the system, and edges represent the connections between them.

The basic idea behind a random walk is to start at a particular node in the network and then randomly move to a neighboring node based on a set of probabilities. The probabilities are typically determined by the structure of the network, with nodes that are more connected having a higher probability of being visited during the random walk.



STEPS INVOLVED IN THE DEMONSTRATION

Step n° 1

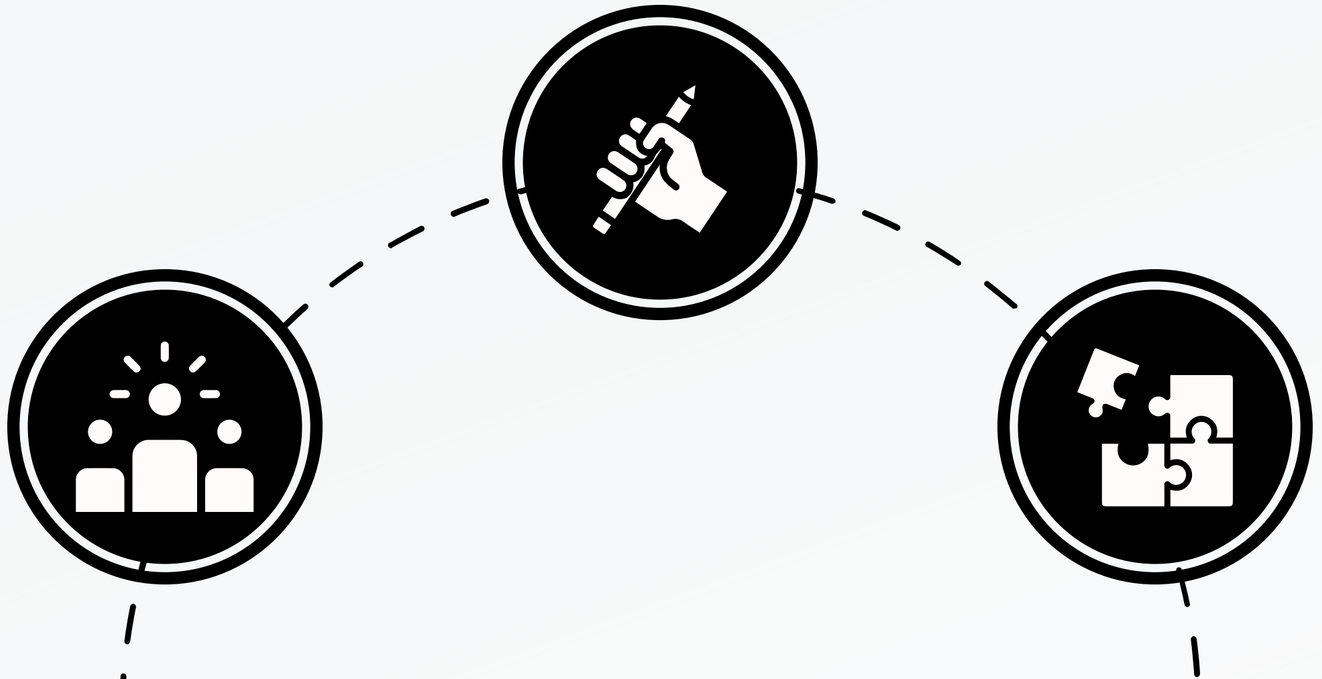
Define the network by specifying the nodes and edges between them.

Step n° 2

Define the adjacency matrix and construct transition matrix.

Step n° 3

Run the random walk and analyze the results.



SIMULATION IN ACTION

01

Step 25: Node 23

02

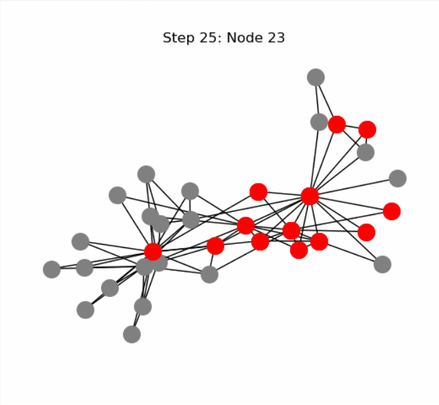
Step 50: Node 25

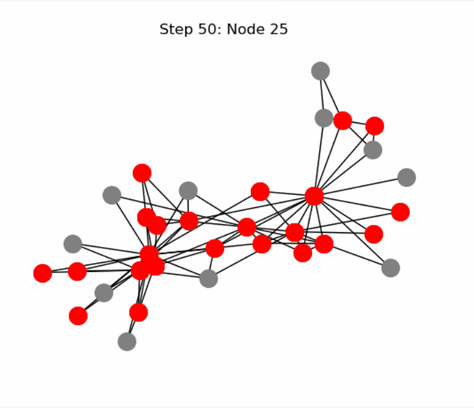
03

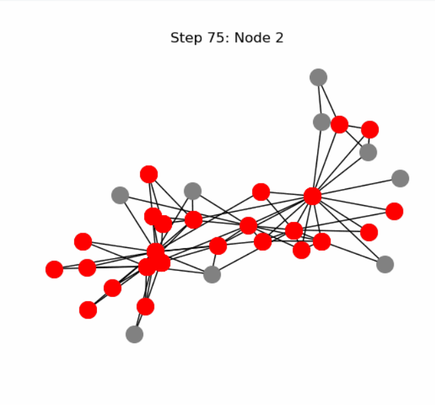
Step 75: Node 2

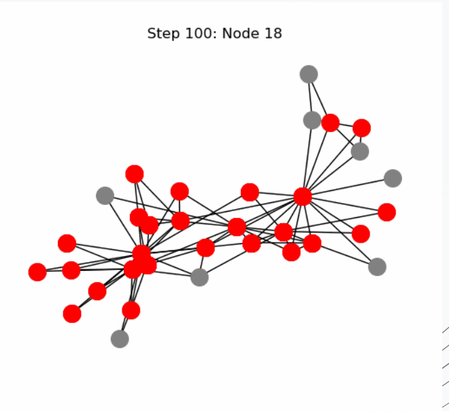
04

Step 100: Node 18









THANK YOU