Small-World Networking

INTRODUCTION

The aim of this project is to research and explore small world networks and prove small world network has the shortest distance than regular network.

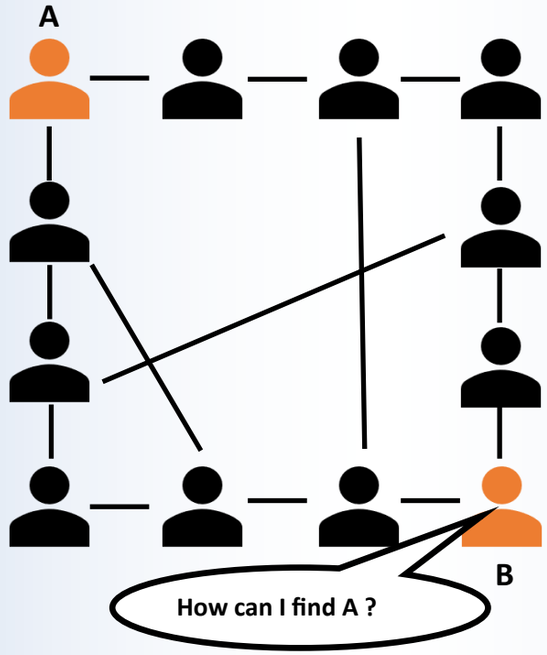
When you make a new friend and discover that he is the son of your mother's friend, it will make you think "what a small world". This is the small world effect. Small world network is a mathematical description of small world effects.

The small world network refers that no matter how large the network is, the distance between two points will always be reached by several jumps.

TECHNOLOGIES

The technologies used will be MATLAB.

MATLAB is a matrix-base mathematical software. It has powerful graphics and symbol processing functions. It has many library functions for drawing, which can easily draw various complex two-dimensional or multi-dimensional graphics.



METHOD

Use MATLAB functions to create a small world network, `function matrix = NW_SW_Network (N,m,p)`, variables N, m, p can be adjusted for later testing, N= the number of nodes, m = each node connect to the m nearest neighbours, p is the probability of random link. P = 0 to create a regular network.

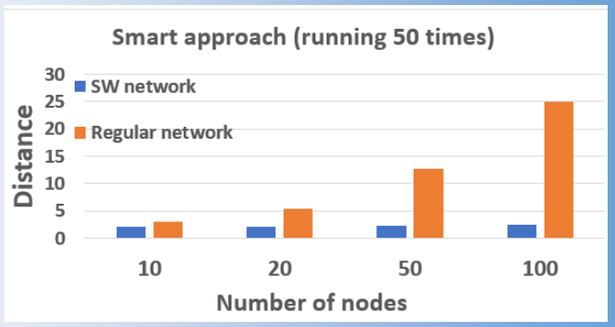
Prove that the small world network is shorter than the normal network distance by comparing the distance between two random node.

There are several different ways of comparison:

- Random node method
- Nearest node method

RESULT

* **Random method** is that every node connected to the current node has a chance to be visited. The result shows, small world network can visit more nodes than regular network, the more nodes visited, the shortest distance it has.
* **Smart method**: Always choose a connected node closest to the end node. For example, from 1 to 8, 1 = [10, 2, 7], then next node will be 7 as 7 is the closest connected node to 8.The results show that as the network increases, the distance of the small world network remains stable, but the distance of the regular network increases rapidly.



FUTURE WORK

- Create a sliders in the figure to control the variables N, m, p.
- The size of the graphics can be controlled. When the N value and P value are larger, the edge can be clearly displayed.

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