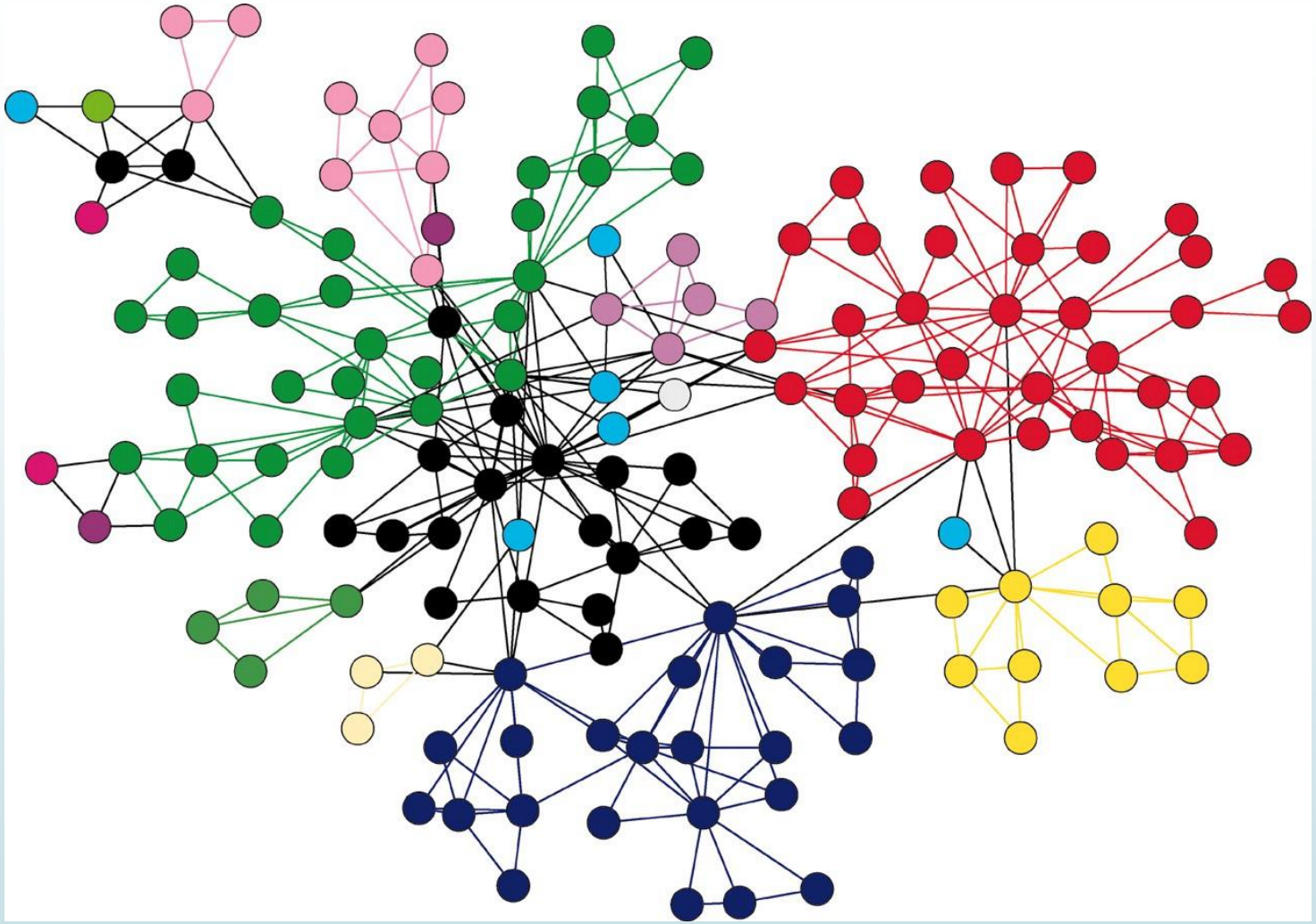
Introduction to Graph

Sutherland Programming club by Yiyou Chen

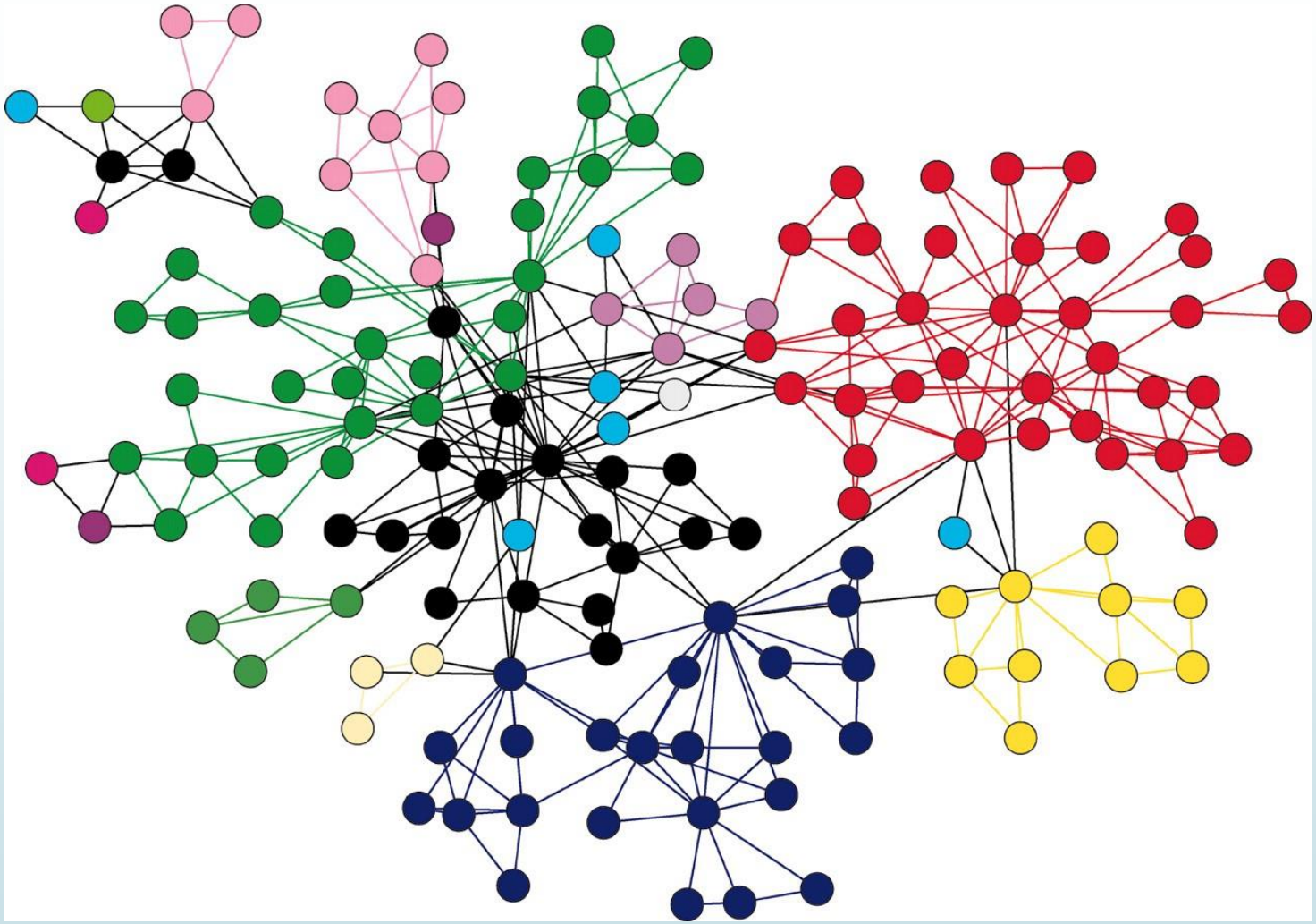
graph

- How do you know it's a graph?
- What does a graph contain?



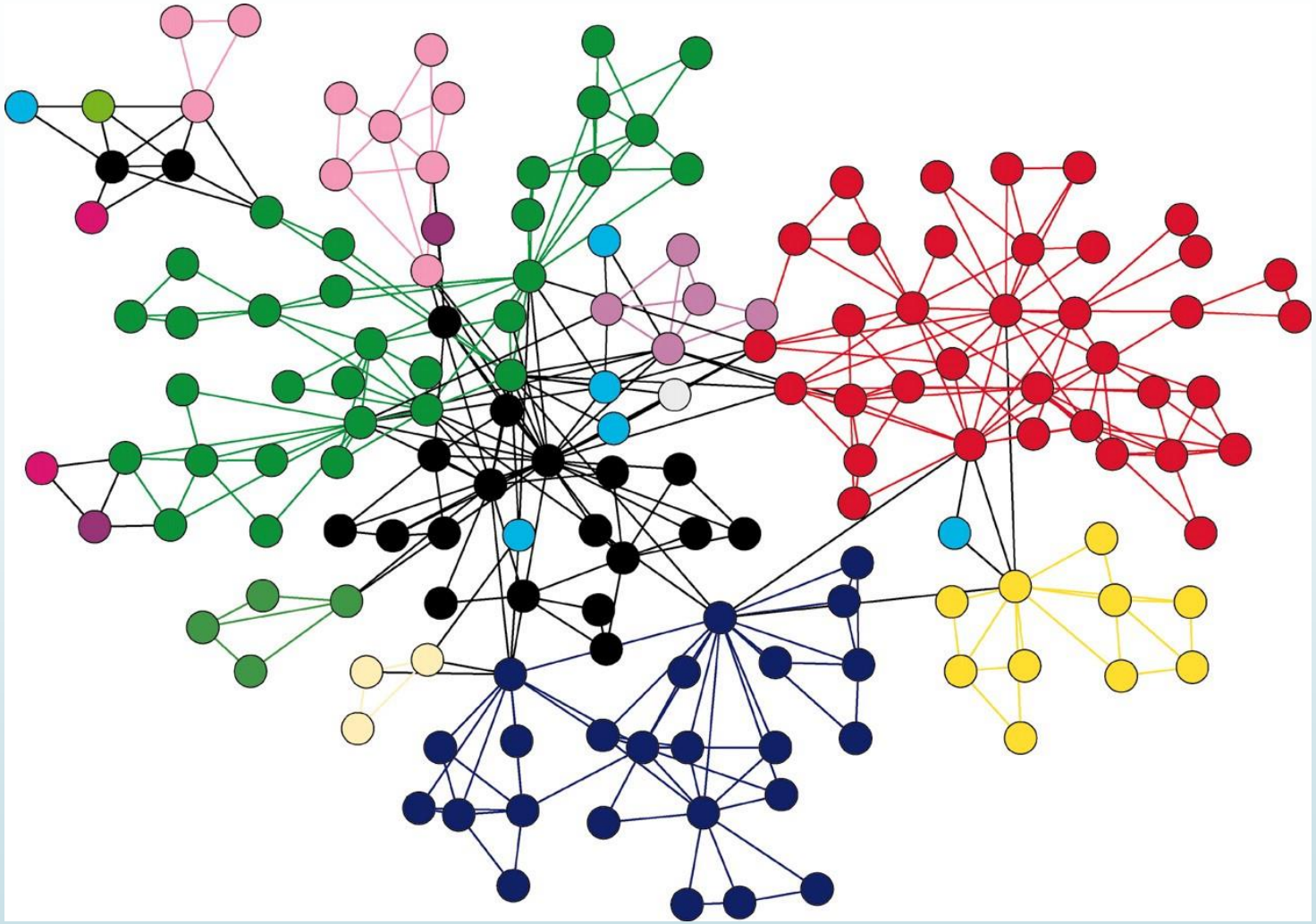
graph

- Is the graph directional? Why?
- Is the graph strongly connected(every node can be visited from all other nodes)?
- What can we do with the graph?



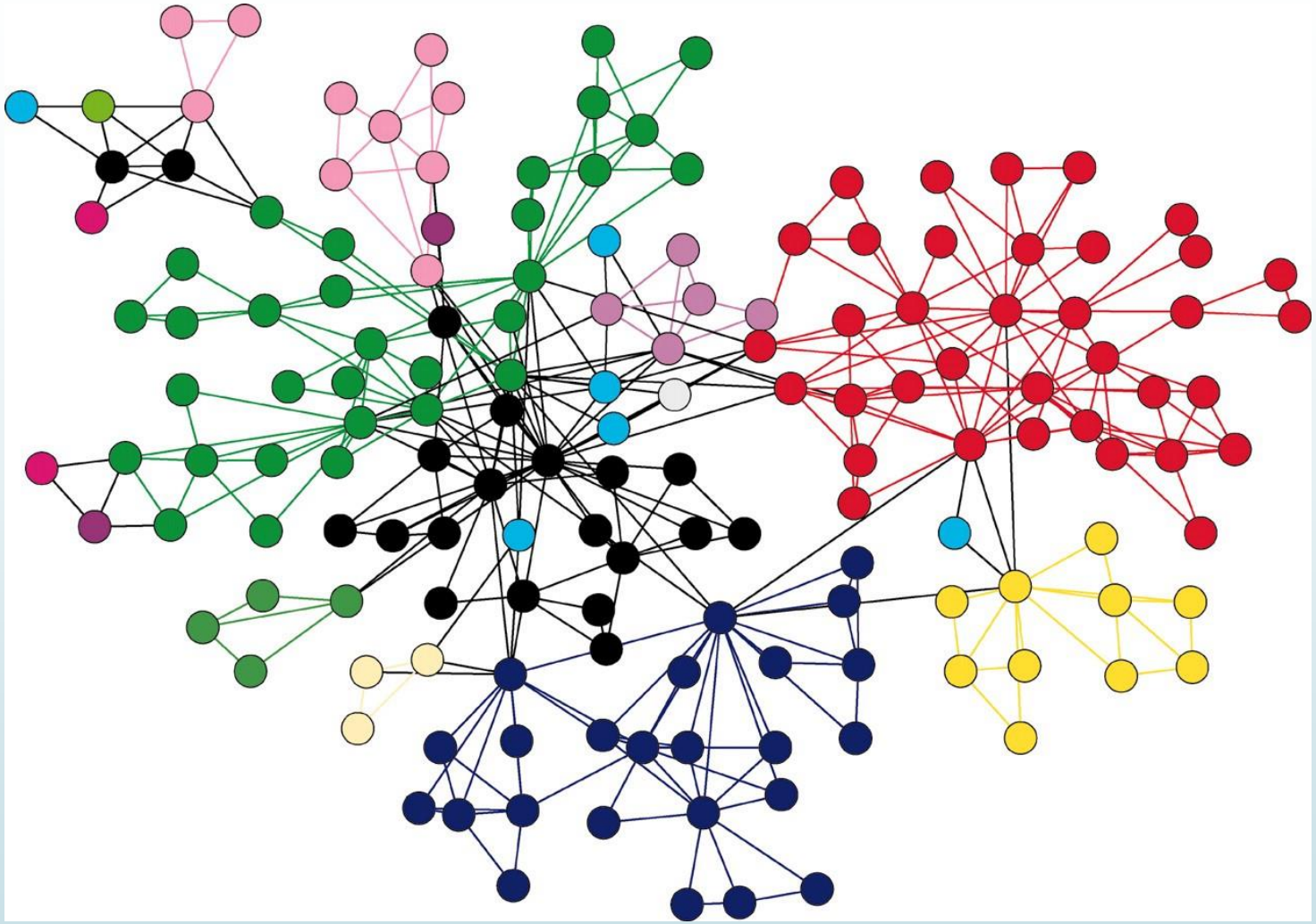
graph

- How to get there?
- How to get there in the shortest time?
- Minimum time to visit all the nodes?
- Map



graph

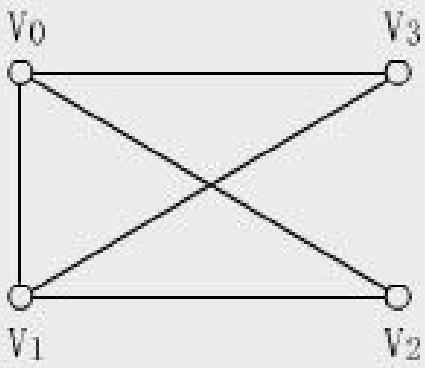
- What do we expect to know about a graph?
- How to save them?

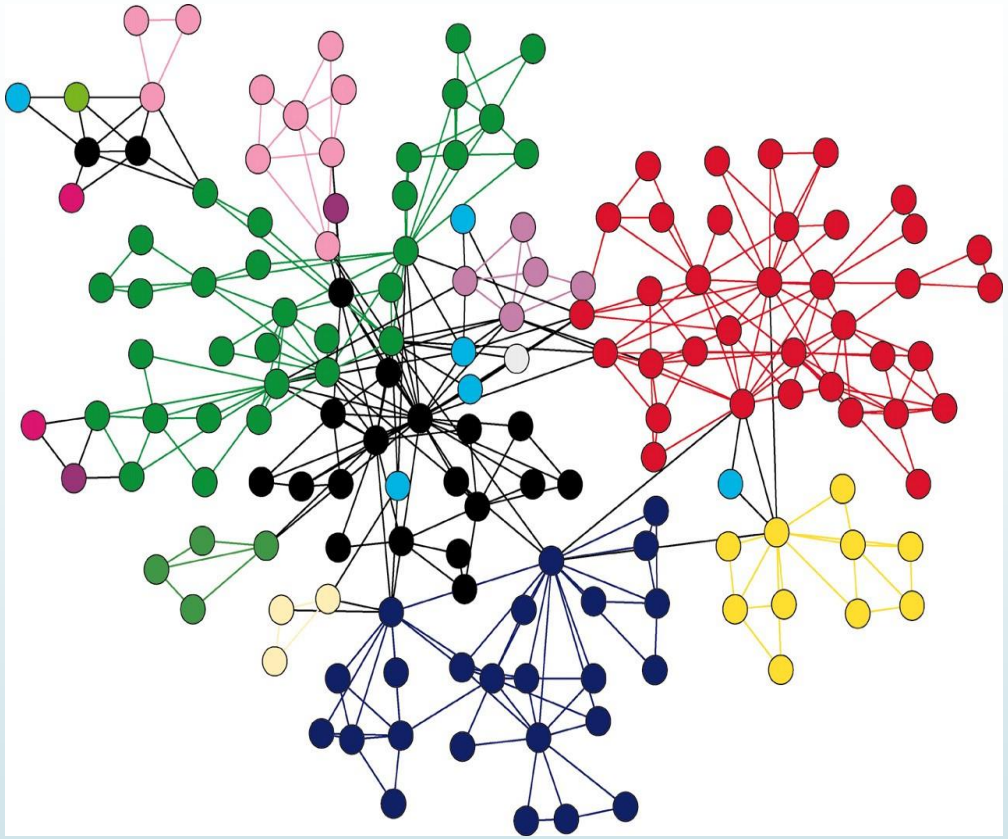


Idea 1

- save the edge and the weight between every two nodes.
- Is it effective?
- # of nodes > 3000
- More effective ways?

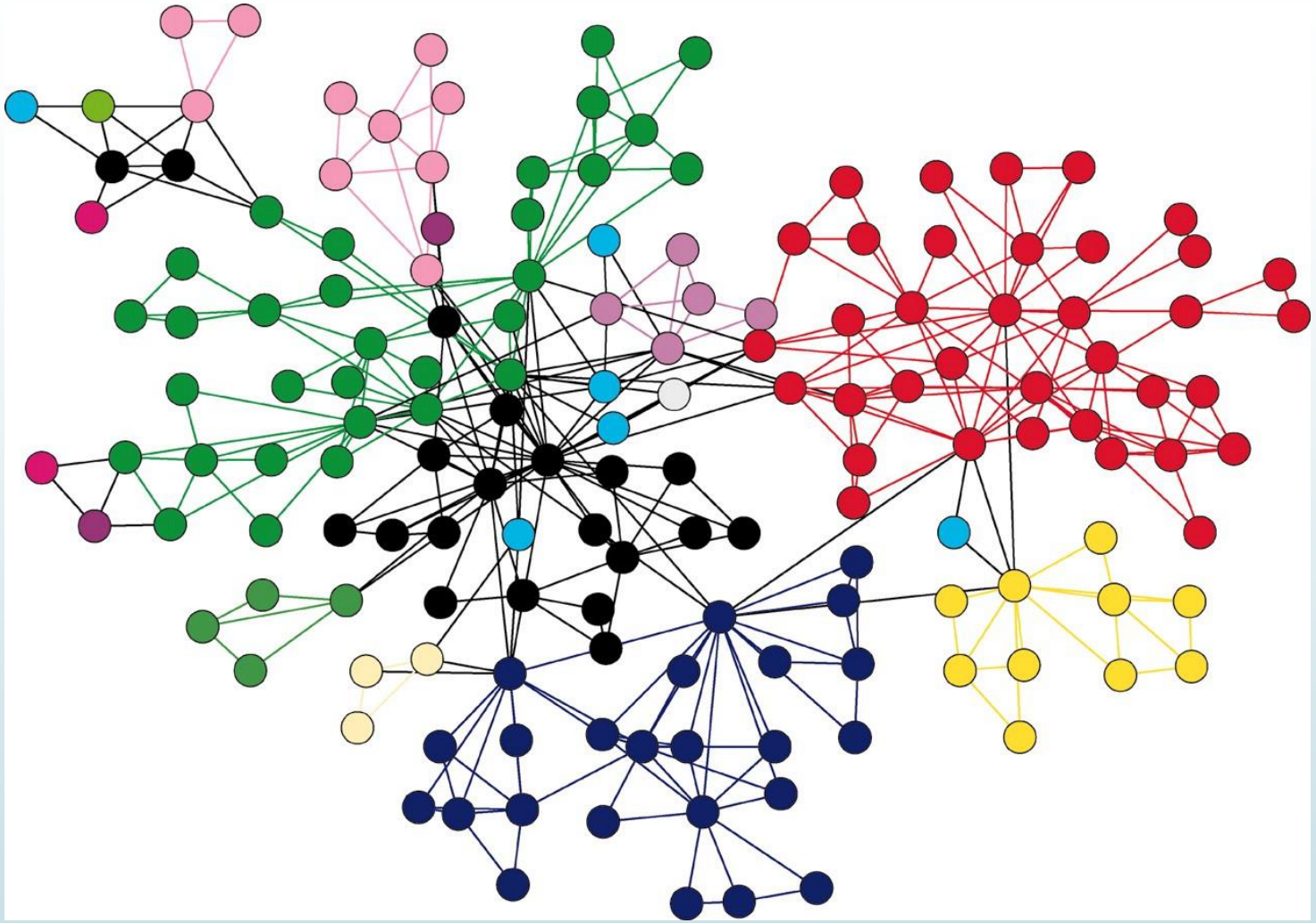
$$A_1 = \begin{bmatrix} 0 & 1 & 1 & 1 \\ 1 & 0 & 1 & 1 \\ 1 & 1 & 0 & 0 \\ 1 & 1 & 0 & 0 \end{bmatrix}$$





Idea 2(better)

- How many nodes does each edge connect?
- Save nodes and edges separately?
- assign numbers to both nodes and edges?



How to effectively save a graph? (Hard but important)

- Assign numbers to all edges
- Assign numbers to all nodes
- Save the number of edges for each nodes, and the specific edge numbers.
- Save the next node number for each edge.