



COMPLEX NETWORK

Quiz 1

WANG BIYUAN

18M38156

DEPARTMENT OF COMPUTER SCIENCE

LECTURER: TSUYOSHI MURATA

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Question (i)

Graph (a) is the network of the Internet (routers and their connections) and Graph (b) is the social network (users and their friendship).

Question (ii)

-Degree Distribution

The degree of a node in a network is the number of connections it has to other nodes and the degree distribution is the probability distribution of the number of connections a node has to other nodes over the whole network. For a social network, it is highly possible that a friend of the user also knows another friend of him/she (the user). Therefore, the connections between different nodes are much more than those in the Internet network. The connections between routers represent the data transmission to different IP addresses. Only main routers can have high degree distribution so that the packets delivery is in order.

-Distance between Two Nodes

Due to the high degree distribution property of social network, the distance between two nodes can be quite short comparing to that in an Internet network. For example, an innermost node of social network might only need to pass two paths to reach a peripheral node because each node in the social network can have many possible connections with others. However, in an Internet network, due to the order among the routers, a central router must pass every router along that path to reach an outer one. This causes the long distance between two nonadjacent nodes.

-The Number of Cycles (Loop)

In a social network, there are lots of cycles because people know each other and can have lots of common friends. Every person in a social network can be a central node and connect with other people. This enables the network to form various cycles between node and node. In the Internet network, there is few cycle because the structure of connection is radial. There is an obvious central node and each node is not likely to connect the another which is nonadjacent with it.