Strategic Network Formation and Network Allocation Rules

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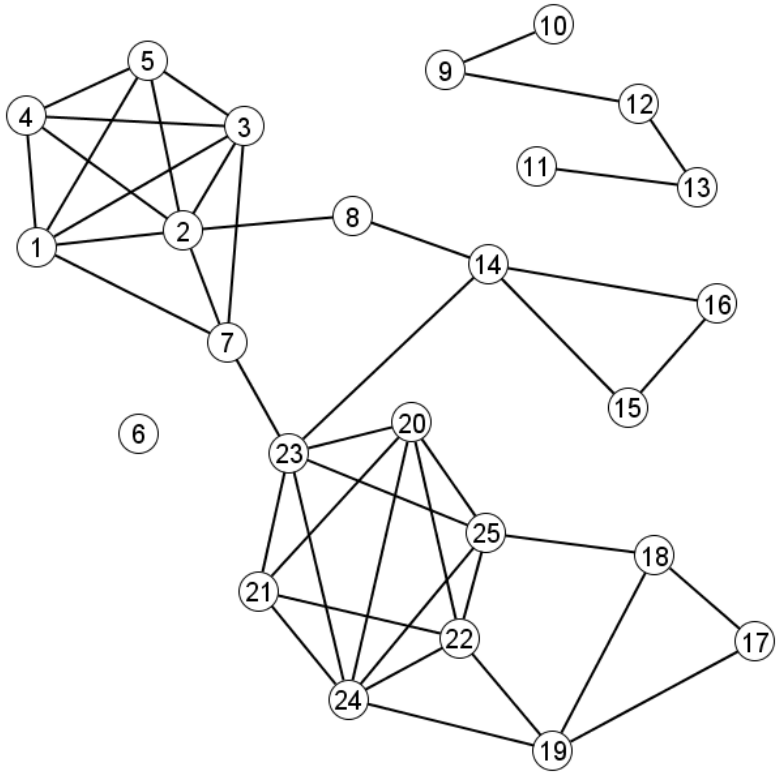
Components, cliques, clusters - What a difference?

Given an undirected network (N, g),

- A component is a subgraph (S, g_S) induced by S with the following two properties:
  - g_S is connected
  - there is no edge in N that joins a node in S to a node not in S.
- A clique is a subgraph (S, g_S) induced by S in which the density of g_S is 1 (maximal completely connected subnetwork).
- A cluster is a subgraph (S, g_S) induced by S with the following two properties:
  - the density of g_S is "relatively high"
  - there are "relatively few" edges in N that join a node in S to a node not in S.

Components, cliques, clusters - What a difference?



- Component = subnetwork maximally connected
- Not all components form clusters! $\{9, 10, 11, 12, 13\}$
- Clusters? $\{1, 2, 3, 4, 5, 7\}$, $\{20, 21, 22, 23, 24, 25\}$, $\{14, 15, 16\}$
- Clique = maximal completely connected subnetwork
- Not all cliques form clusters! $\{1, 2, 3, 4, 5\}$

Components and giant components

- Giant component - unique largest component, if there is one.
- Convention on the size of a component (Bollobas, 2001):
  - small component - has fewer than $\frac{n^{2/3}}{2}$ nodes
  - large component - has at least $n^{2/3}$ nodes.

Different centrality measures