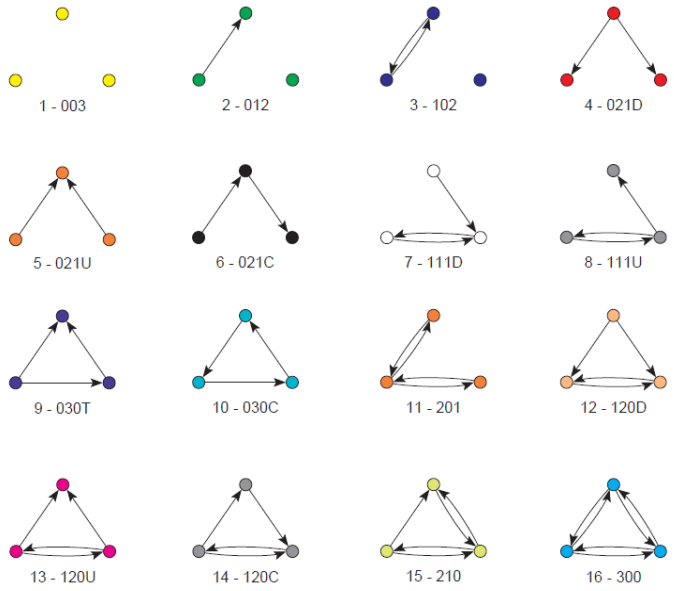
SOCn5010 Analýza sociálních sítí

Přednáška 10: Koncept ekvivalence, statistické nástroje

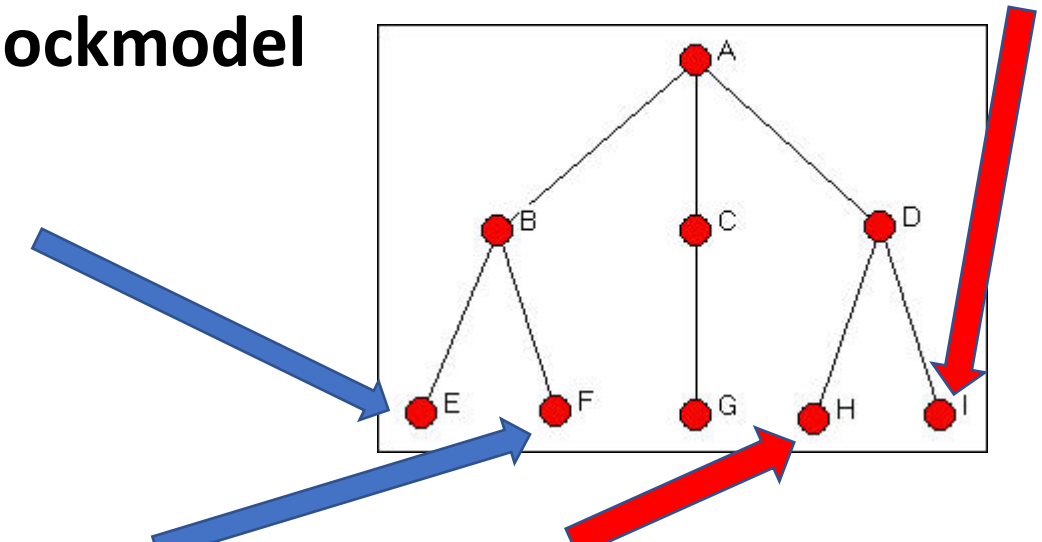


Idea of equivalence

- Concept of social roles & positions
- Similar attitudes, behaviour, etc.
- social role is determined over a number of different relations (criminal – victim, criminal – police, etc.)
- Different types of equivalence – less ad more relaxed
- Structural vs. Automorphic vs. Regular equivalence

Structural equivalence

- „Two actors are structurally equivalent if they send ties to the same third parties, and receive ties from the same third parties“
- They do **not** need to have a direct tie to each other to be equivalent
- Similarity: similar social environments provoke similar responses
- Directed, undirected and self-loops network data
- Grouping of structurally similar data: **blockmodel**

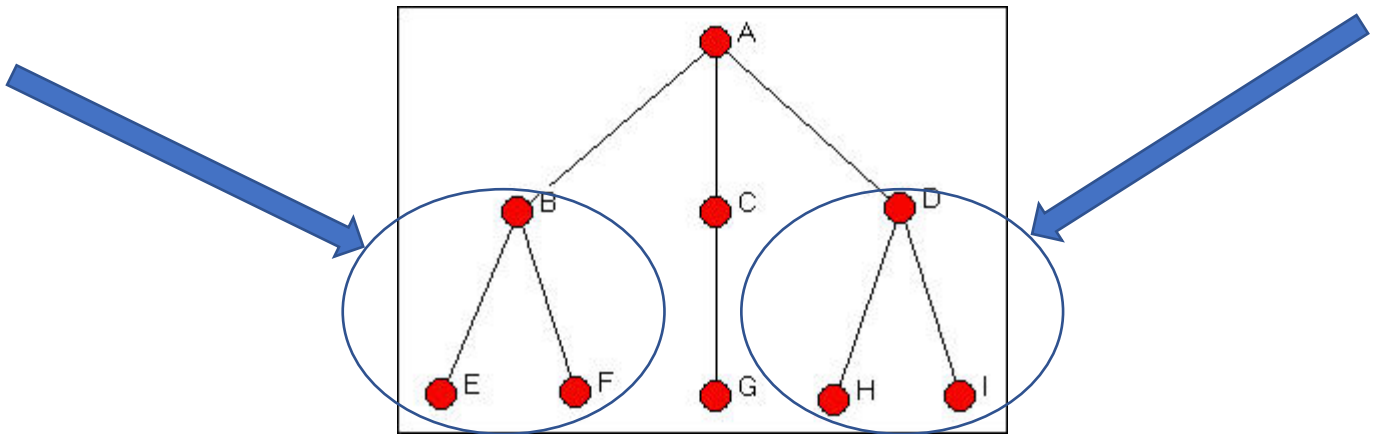


Structural equivalence

- Profile similarity
- Direct method - optimatization

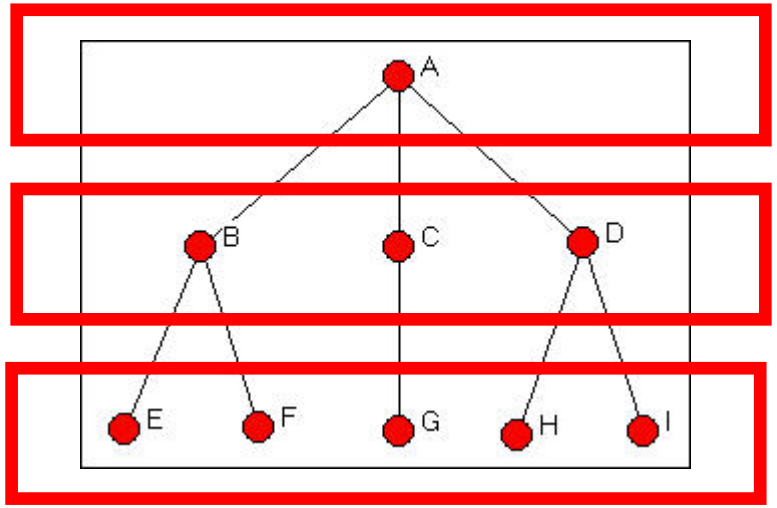
Automorphic equivalence

- identifies actors that have the same position, or who are completely substitutable
- sets of actors can be equivalent by being embedded in local structures that have the same patterns of ties -- "parallel" structures
- If exchanged - all of the **distances among all the actors** in the graph would be exactly identical



Regular equivalence

- the **same profile of ties** with **members of other sets of actors** that are also **regularly equivalent**
- actors can be structurally similar in ways that do not involve being connected to the same actors
- similar patterns:
- structural equivalence - two teachers are structurally equivalent if they teach the same students
- regular equivalence - teachers have to teach at least one student each



Core - periphery

- partition of the nodes into two groups: the core and the periphery
- The core block contains the **core-to-core** interactions, and the peripheral block contains the **periphery-to-periphery** interactions, with the two off-diagonal blocks containing the **core-to-periphery** and the **periphery-to-core** interactions
- In a core–periphery structure, we expect **core nodes to be well connected to other core nodes** + **peripheral nodes not to be connected to other peripheral nodes**
- ideal structure the core block would be a 1-block and the peripheral block would be a 0-block
- cannot be directly applied to valued data

Type of hypotheses

- **Node-level (monadic)** – cases are nodes – higher centrality in professional network – higher wage
- **Dyadic level – cases are pairs** - the stronger the tie of professional cooperation, the stronger the tie of mutual trust
- **Group/network level** – the higher the density of the network, the faster the spread of innovation

Statistics

- Description of a network
- Hypotheses about theoretical parameter
- Hypotheses about **two paired means/densities** (test for differences in the probability of a tie of one type and the probability of a tie of another type)
- **Correlation** between two networks with the same actors (if there is a tie of one type among two actors, is there a likelihood of a tie of another type)

Node-level regression

- Symmetric associations (correlation) Vs. Assymetric relations (regression)
- Regressing position on attributes
- Attributes explaining the position of node
- Attributes measured at interval level
- E.g. Predicting centrality in a friendship network using age and income variables

Dyadic regression

- Predicting a relation from another one
- Dependent network, independent network + node attributes, regressing each element in dependent network on its corresponding elements in the independent network + attribute-similarity network
- E.g. Predicting friedship relation by co-occurence network (attendance of same uni courses) + gender

References

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