

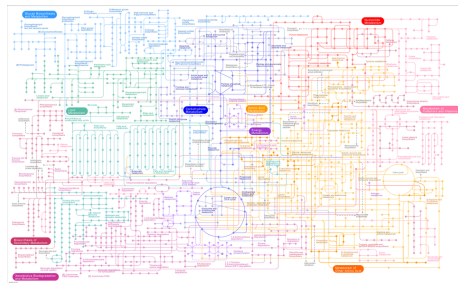
Network analysis of metabolic subsystems

Rok Novosel Matija Čufar

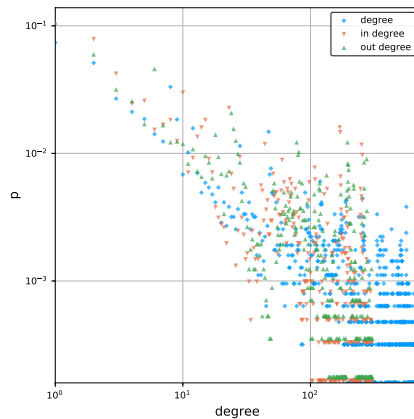
Faculty of Computer and Information Science

5. junij 2017

Network analysis of metabolic subsystems



Network stats

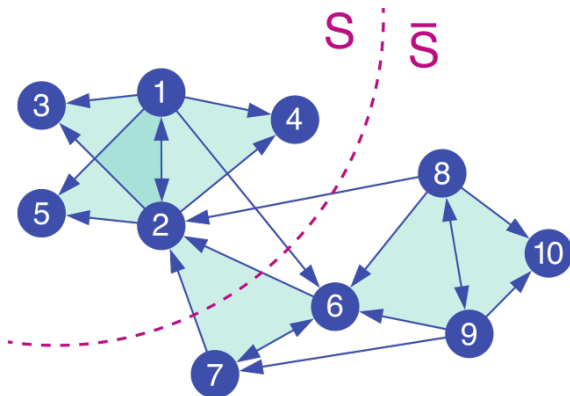
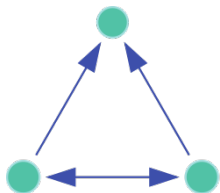


| $ V $ | $ E $ | $\langle C \rangle$ | E_{90} | ρ | $\langle k \rangle$ |
|-------|---------|---------------------|----------|--------|---------------------|
| 6,663 | 656,609 | 0.012 | 15 | 0.015 | 194.1 |

Community detection

| Algorithm | NMI |
|----------------------|------|
| Louvain Modularity | 0.10 |
| Clauset-Newman-Moore | 0.27 |
| Infomap | N/A |
| Girvan-Newman | N/A |

Motif based community detection
















$$\phi_M(S) = \frac{\text{motifs cut}}{\min(8, 10)} = \frac{1}{8}$$

1

¹source: <http://snap.stanford.edu/higher-order/>

Motif based community detection and motif significances

| | | | | | | | |
|-------|---|---|---|---|---|---|---|
| |  |  |  |  |  |  |  |
| motif | M1 | M2 | M3 | M4 | M5 | M6 | M7 |
| Z | -379.0 | 496.4 | 6,523 | 1,171,385 | 1,055 | 3,566 | 4,604 |
| NMI | 0.44 | 0.40 | 0.48 | 0.64 | 0.23 | 0.43 | 0.46 |

| | | | | | | |
|-------|---|---|---|---|---|---|
| |  |  |  |  |  |  |
| motif | M8 | M9 | M10 | M11 | M12 | M13 |
| Z | 1,411 | -867.2 | 2,599 | 1,293 | 1,387 | 40,286 |
| NMI | 0.11 | 0.09 | 0.09 | 0.20 | 0.23 | 0.42 |

$$Z = \frac{n - \mu_{\text{rand}}}{\sigma_{\text{rand}}}$$