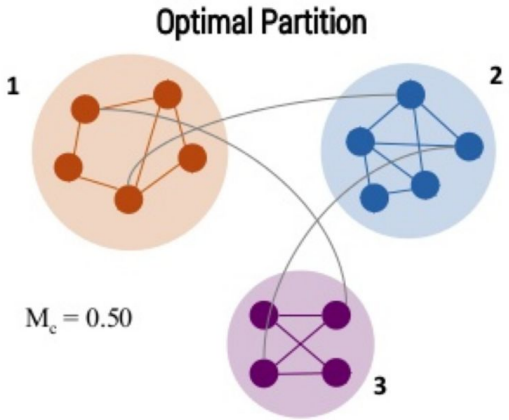
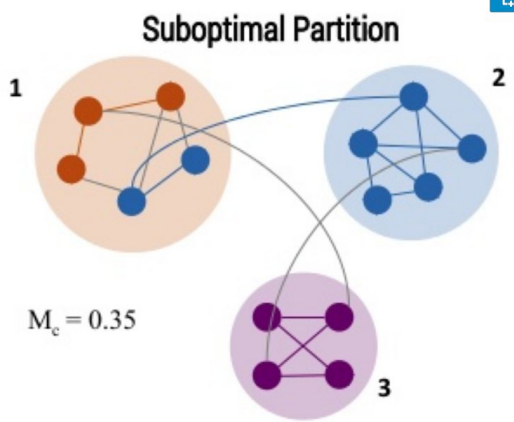
Graphs-Modularity

Frank Burkholder

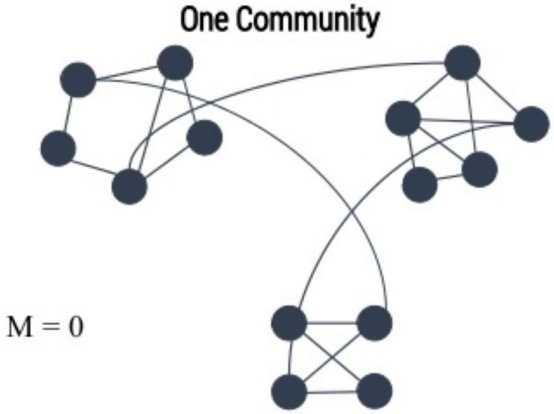
Clip slide





Modularity

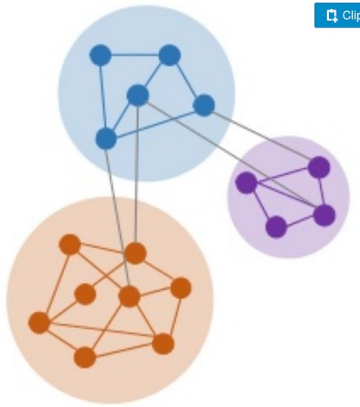
$$M_c = \sum_{c=1}^{n_c} \left[\frac{L_c}{L} - \left(\frac{k_c}{2L} \right)^2 \right]$$



https://www.slideshare.net/ErikaFilleLegara/community-detection-with-networkx-59540229

Clip slide

Modularity



- Measure the quality of a partition

$$M_c = \sum_{c=1}^{n_c} \left[\frac{L_c}{L} - \left(\frac{k_c}{2L} \right)^2 \right]$$

"the fraction of edges that fall within communities, minus the expected value of the same quantity if edges fall at random without regard for the community structure"

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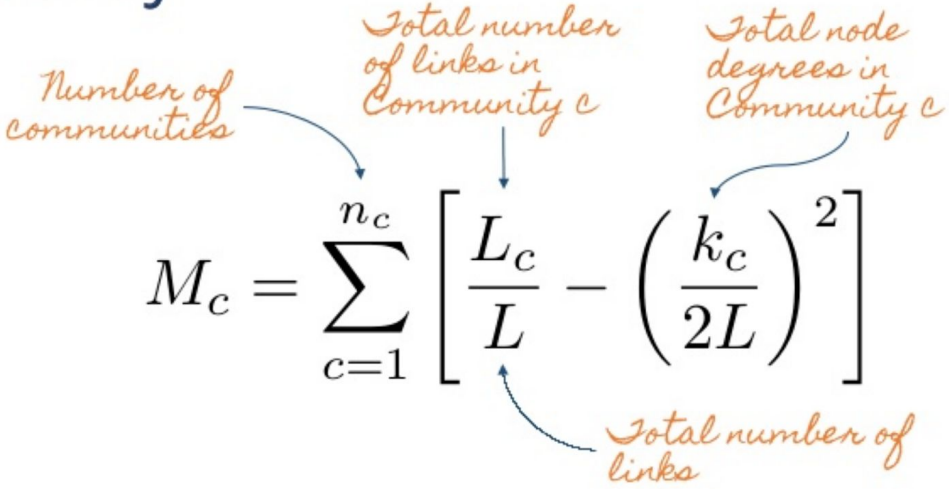
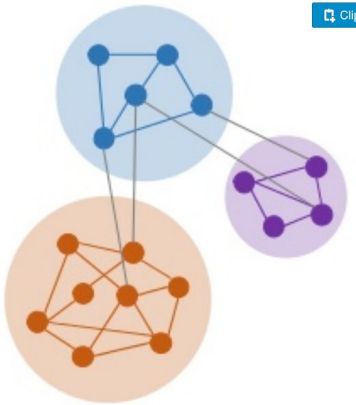
Modularity





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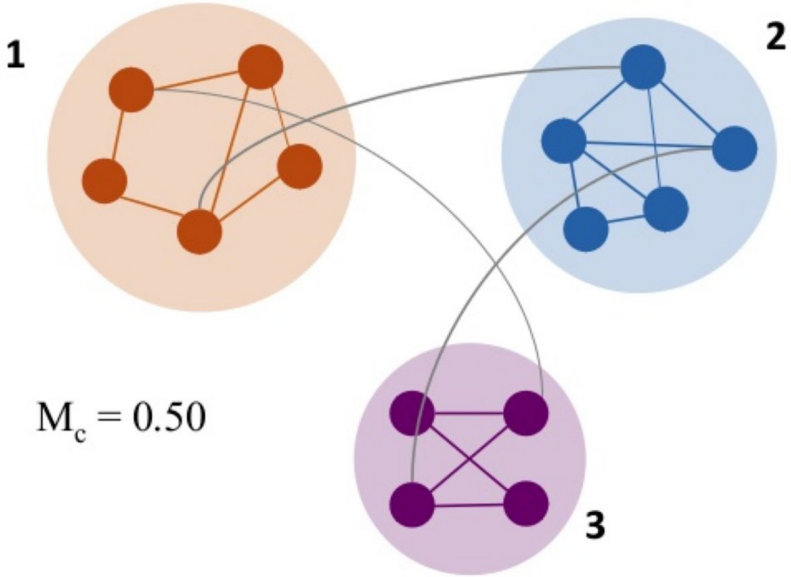
Modularity



$M_c = 0.50$

Number of communities

Total number of links in Community c

Total node degree Community c

Total number of links

$$M_c = \sum_{c=1}^{n_c} \left[\frac{L_c}{L} - \left(\frac{k_c}{2L} \right)^2 \right]$$

Community 1: $\left[\frac{6}{20} - \left(\frac{14}{40} \right)^2 \right]$

Community 2: $\left[\frac{7}{20} - \left(\frac{16}{40} \right)^2 \right]$

Community 3: $\left[\frac{4}{20} - \left(\frac{10}{40} \right)^2 \right]$

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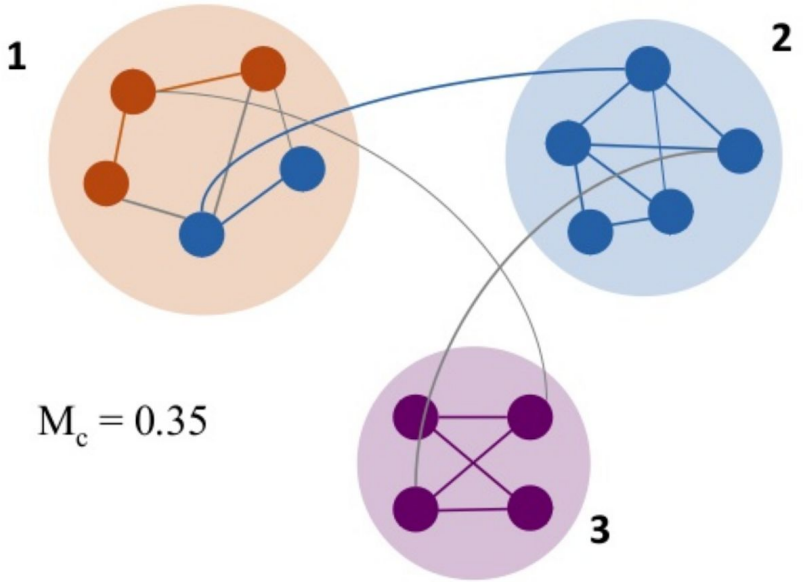
Modularity



Number of communities | Total number of links in Community c | Total node degree Community c | Total number of links

$$M_c = \sum_{c=1}^{n_c} \left[\frac{L_c}{L} - \left(\frac{k_c}{2L} \right)^2 \right]$$

Community 1: $\left[\frac{2}{20} - \left(\frac{8}{40} \right)^2 \right]$

Community 2: $\left[\frac{9}{20} - \left(\frac{22}{40} \right)^2 \right]$

Community 3: $\left[\frac{4}{20} - \left(\frac{10}{40} \right)^2 \right]$

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