Exploiting weak modularity in cancer progression to infer large Mutual Hazard Networks

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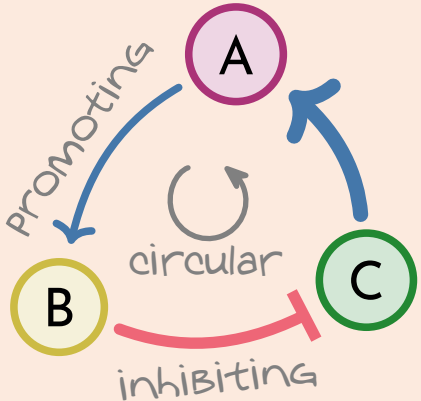
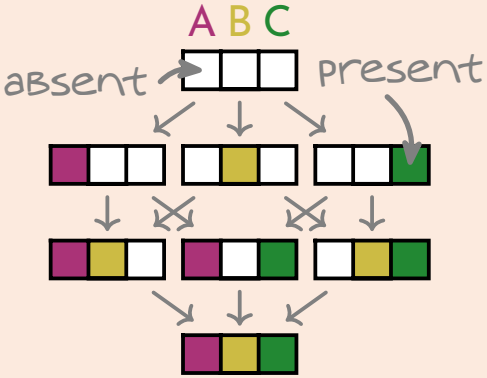
Mutual Hazard Networks

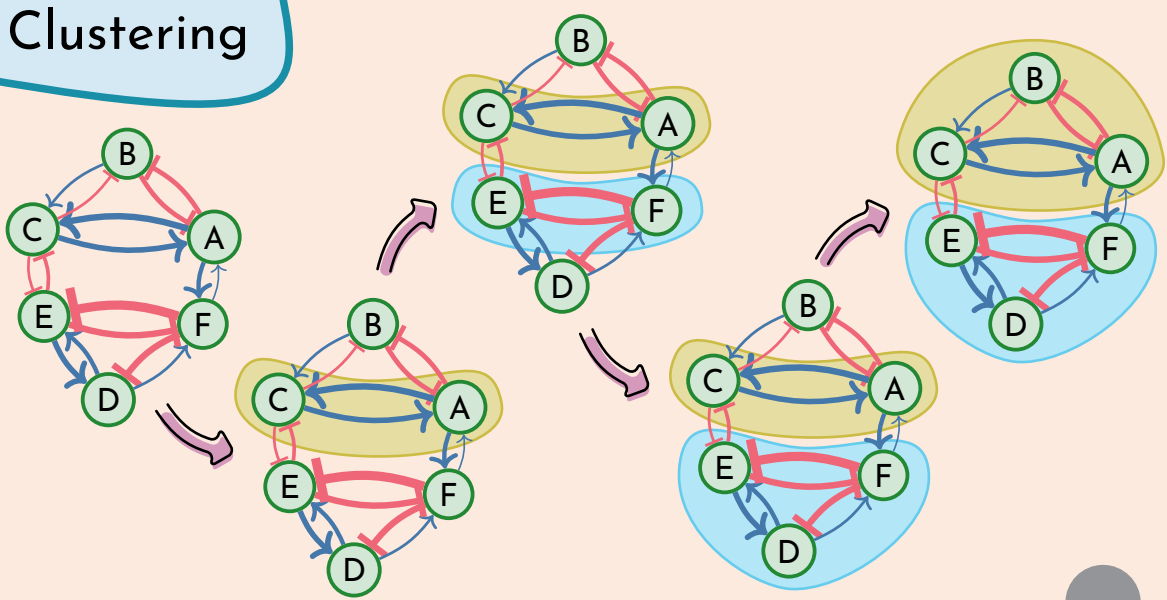




Transition rates:

$$\mathbf{Q}_{x^{+i},x} = \Theta_{ii} \prod_{x_j=1}^{d} \Theta_{ij}$$

Clustering



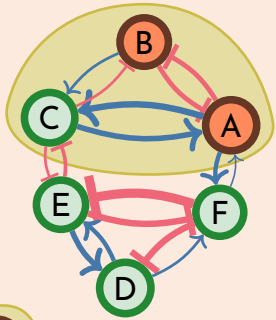
Learning process

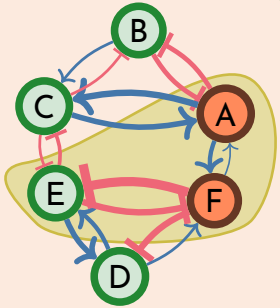
step $\Theta_{ij}^{(n)} \to \Theta_{ij}^{(n+1)}$

for Θ_{ij}, do:

- get a cluster containing events i and j
- perform one step of training for the MHN defined only on this cluster
- set $\Theta_{ij}^{(n+1)}$ from this smaller MHN

Clusters for different i and j can overlap!





Biological results

MSK-CHORD data of 5907 LUADs
trained on 125 genetic events
strongest 30 connections shown