Triadic Closure, Degree Distribution, Diameter

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Dyad — two actors + ties that link them together
- initiation
- continuation
- termination

} — key points of focus — @ EOD, what happens in dyad rules social networks

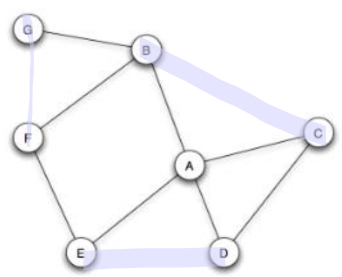
understand in terms of
- relational tie — w/ whom da connection
- directional tie — who da boss
- duration of tie — how long together

Ties can be:
- a) Mutual — alice ♥ bob
- b) Asymmetric. — alice >>>
- c) Null. — bob, alice divorce.

+ d) strength of tie (granovetter) how close are alice + bob?
- e) multiplexity open relationship b/w alice + bob

Triadic Closure

— mom + dad's story — if alice + bob have a common friend, charlie, ↑ likelihood that bob + alice become friends.



Types of Closure:

Co-evolution — all three can happen @ once — always some link b/w parties

① Triadic : (a,c) + (c,b), so ↑ likelihood of (a,b) — mom + dad
common friend

② Foci : become friends cuz of common shared interest. — me + riha
common interest (same focus)

③ Membership: I was part of this club, you're my friend, you're part of this club now too. — phil + jay
common group.

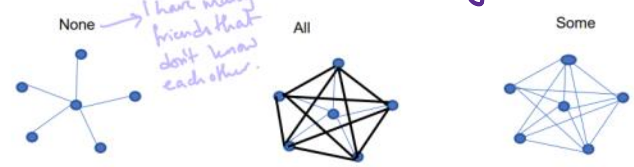
k common friends
- p = prob(alice ♥ bob)
- 1-p = prob(alice ¬♥ bob)

$(1-p)^k$ prob(alice ¬♥ bob)

$\{1-(1-p)^k\}$ prob(alice ♥ bob)

Triadic closure happens when many common friends (implicit pressure)

Triadic Closure + Density of Ego network.



Shortest path

= path b/w two nodes of shortest len (NO WAY)

= b/w v_i + v_j — l_{ij}

→ Use this to build the concept of NEIGHBORHOODS

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n-hop neighborhood
= set of nodes within n-hops from the node

Remember adjacency matrix?

$[\text{adjacency matrix}]^n$ = no. of pathways of length n. (treat self ties as 0)

↓ If A is adjacency matrix: shortest path b/w i + j by finding smallest n such that ij^{th} entry in A^n is +ve.

Why impt?

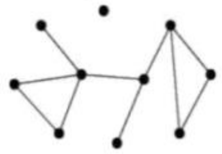
path ∝ 1/strength

Big network → few connections → long path → slow stimulus response.
= weak connect^n

Actors w/ → many connect^n → short path → faster rxn (tighter)

Degree Distribution.

= "probability distribution of degrees over network."



$$p_0 = \frac{1}{10}, p_1 = \frac{2}{10}, p_2 = \frac{4}{10}, p_3 = \frac{2}{10}, p_4 = \frac{1}{10}, p_k = 0 \, \forall k \geq 5$$

one node w/ degree 0

P_x = probability that a random node has degree x
↓
this distribution of probabilities of degrees
= degree distribution

Also shows us P_k (probability that node chosen @ random has degree k)

↓ Entropy $H = -\sum P_k \log(P_k)$

→ if high, random distr.

↓ no info about diversity

↓ gives info about network topology.

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