Real World Graph

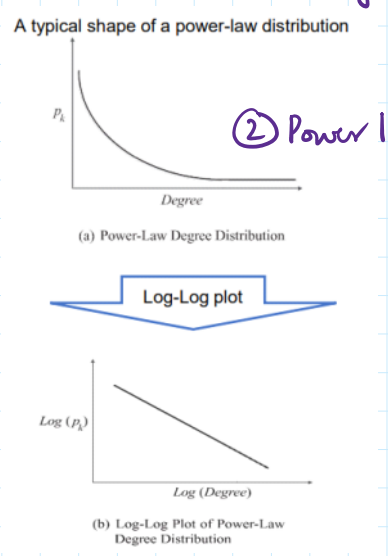
25 September 2024 21:30

Generative Models

└ model mechanism that drives network formation ← power law, small world property, avg. shortest path

Properties of real world graphs:

① Average Shortest Path
- Stanley Milgram : at most 6
- Lars Backstrom : at most 4



② Power law distribution
- plot log x vs log(probability x) — straight line.] degree dist is a power law dist.
- $p(x) \propto \frac{1}{x^b}$
- frequency of event changes as a negative power of attribute. (frequency → power law)

If p(k) = fraction of individuals w/ degree k:

$P_k = ak^{-b}$

$\ln p_k = -b \ln k + \ln a$ ← b = power law exp., a = power law intercept

- Scale free network → one w/ power-law degree distribution; same functional form @ all scales.
  - → characterized by presence of large hubs
  - → More brittle
  - ↓ clustering coeff ↓ as node degree ↑ → low degree nodes belong to dense subgraphs
  - → Small world phenomena: Avg. path $= 0.35 + \log_{10} N$
- Heavy / fat tails → greater than expected probabilities of extreme values.
  - → power law + tail in high k-region.
  - → outliers allowed + expected