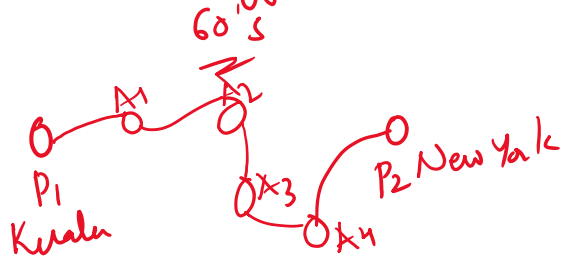


Small world effect → ch. 8 of Newman.

27 April 2023 10:43



Is (P_1, P_2)

Any 2 ppl in the world connected?

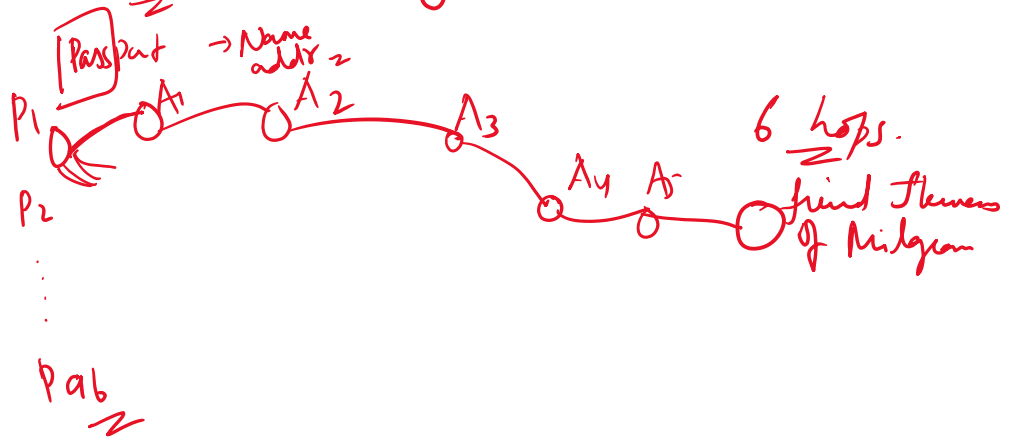
On an avg. by 6 hops



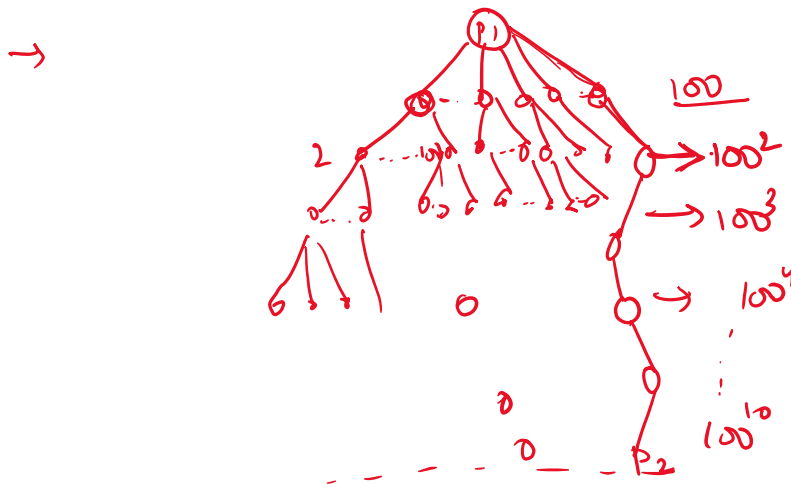
YES

Milgram

96 ppls. (randomly chosen ppl from directory)



Big World → Surprisingly Small



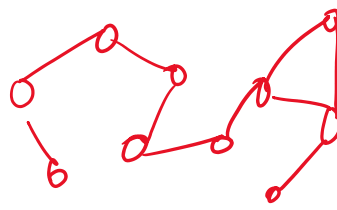
10 → log → obvious

$\frac{10}{2} \rightarrow \log_2 \rightarrow$ Obvious

2 reasons

1) Homophily

2) Weak Ties

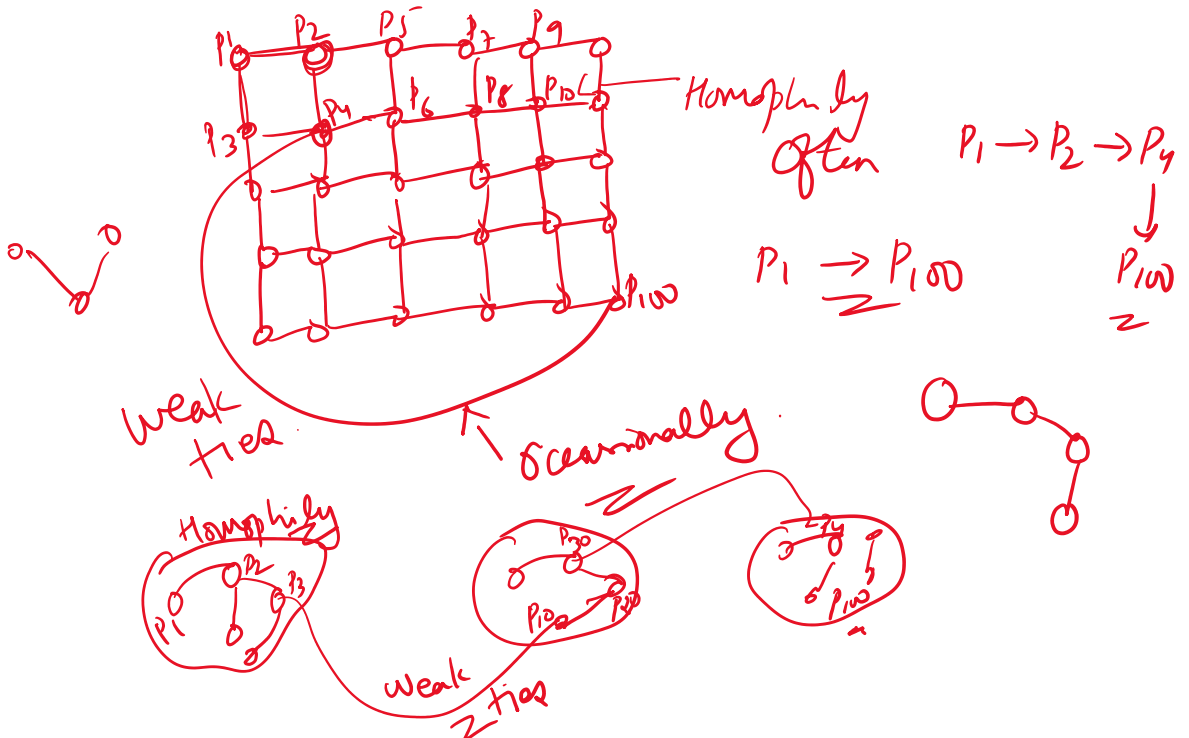


Random graph

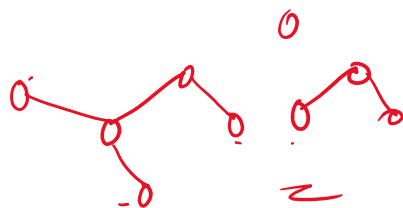
Note: Geographically friends are closer

Less: Far away

Model world in the form of grid



Degree Distribution

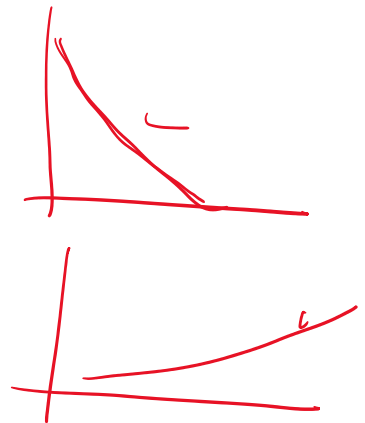
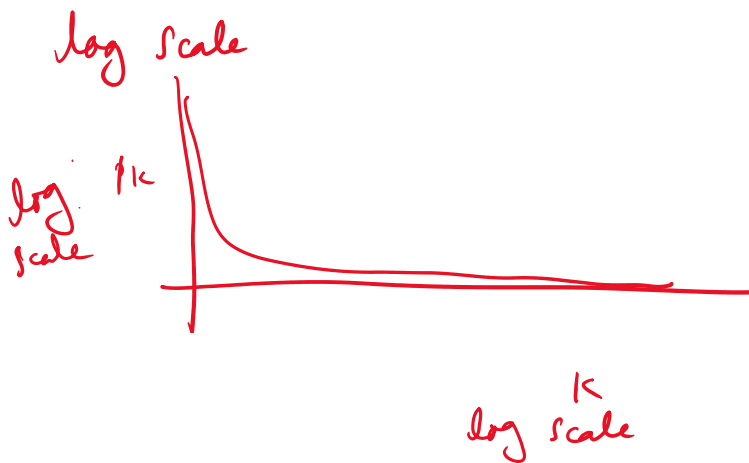
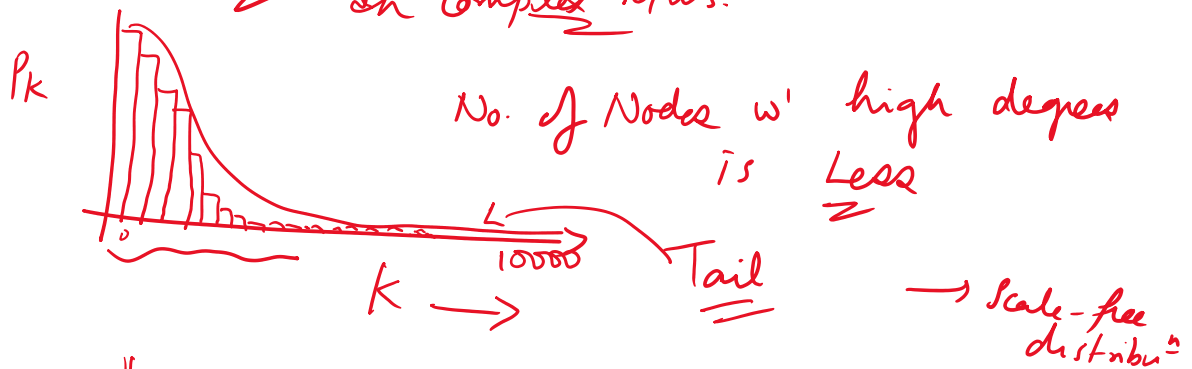


Fracⁿ of nodes w' degree $k = P_k$

$\rightarrow P_0 = \frac{1}{9}, P_1 = \frac{4}{9}, P_2 = \frac{2}{9}, \dots$

Prob. that a randomly chosen vertex has degree k

Prob. that a randomly chosen vertex has degree k
 P_k
 \approx In complex N/w.s.



log of degree distribⁿ is a linear ~~sec~~ f^{\wedge} .

$$\ln P_k = -\alpha \ln k + C$$

\swarrow \searrow
 constants constants

Exponential.

$$\begin{aligned}
 \ln P_k &= -\alpha \ln k + C \\
 e^{\ln P_k} &= e^{-\alpha \ln k + C} \rightarrow \ln k^{-\alpha} \\
 e^{\ln P_k} &= e^{-\alpha \ln k} \cdot e^C \\
 P_k &= k^{-\alpha} \cdot C
 \end{aligned}$$

$k \propto \frac{1}{k^2}$

$$P_k = k^{-\alpha} \cdot C$$

$\underbrace{\quad}_{\text{exponent of the power law}}$
 $\underbrace{\quad}_{\text{Power law.}}$

N/w that follows power law is called
Scale-free N/w.