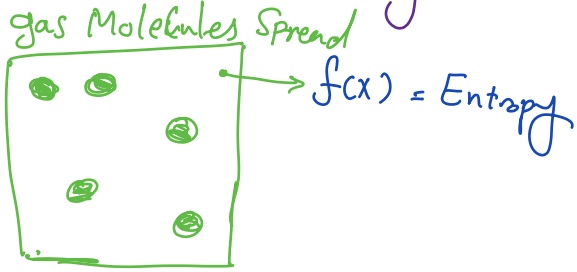
Metropolis Hasting.

for Complex Systems

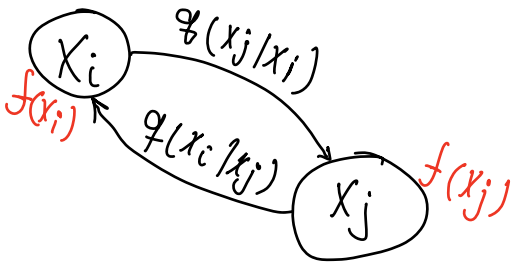
(A) you Cannot express the distribution (Space of Possible Samples)

(B) you Cannot directly Sample from the underlying dist.

→ Given a Sample you Can Compute $f(x) \sim$ Pdf




Consider a Graph where every node is one potential Sample, from Every node (Sample) we Can generate a set of other Samples




- Let $X_i$ be the Current Sample
- $X_j \sim q(X_j|X_i)$
- $P(X_i \to X_j) = \text{Min}\left(1, \frac{f(x_j)}{f(x_i)} \frac{q(x_j|x_i)}{q(x_i|x_j)}\right)$
- $u = U[0,1]$

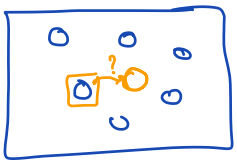
if $(u \leq P(X_i \to X_j))$

next Sample $\leftarrow X_j$

else

next Sample $\leftarrow X_i$

e.g.



← Compute the entropy of blue circles $f(x_i)$

← " " " " + orange $f(x_j)$

$$p(x_i \to x_j) = \min\left(1, \frac{f(x_j)}{f(x_i)}\right)$$

← $q(x_i/x_j) = q(x_j/x_i)$

This technique does not generate indep. samples.