For GMM, data points are independent from each other

For HMM, can have some dependence between datapoints

For simplicity, past and future are independent given the present = First order of Markov property

Node = State

Edge = characterized by some probability

* In Markov Models, State visible: only param = transition proba
* In Hidden Markov Models, State not directly visible: only output x visible

Z: hidden (invisible) states

X: observable (visible) states

Example:

* Z: discrete value that a hidden state can take
* X: values that a visible state can take

Parameters = proba

Figure 1:

* Z1 != Z(t=1)
* Aij: index value of a state from witch I am transitioning = **Transition proba**
  + i = starting state
  + j = arriving state
* bij: proba of the Zi state outputting Xj state = **Emission proba**

Figure 2:

* Z0 = absorbing/final/receiving/accepting state

1. Evaluation: P(x|M) = choosing the best model: given x and a model, find proba of z
2. Decoding: P(x|z) = find the most likely z states that generated x: given x and a model, find the most probable sequence of z states
3. Learning: finding aij and bij: given x, find z, aij and bij

Evaluation pb

Rmax = N power T where N = nb of values of the hidden state

P(Zr) = a

P(x|Zr) = b

Alpha j (t) = porba of Zj at moment t (This is **used to find P(x|M) in the HMM forward algo**)