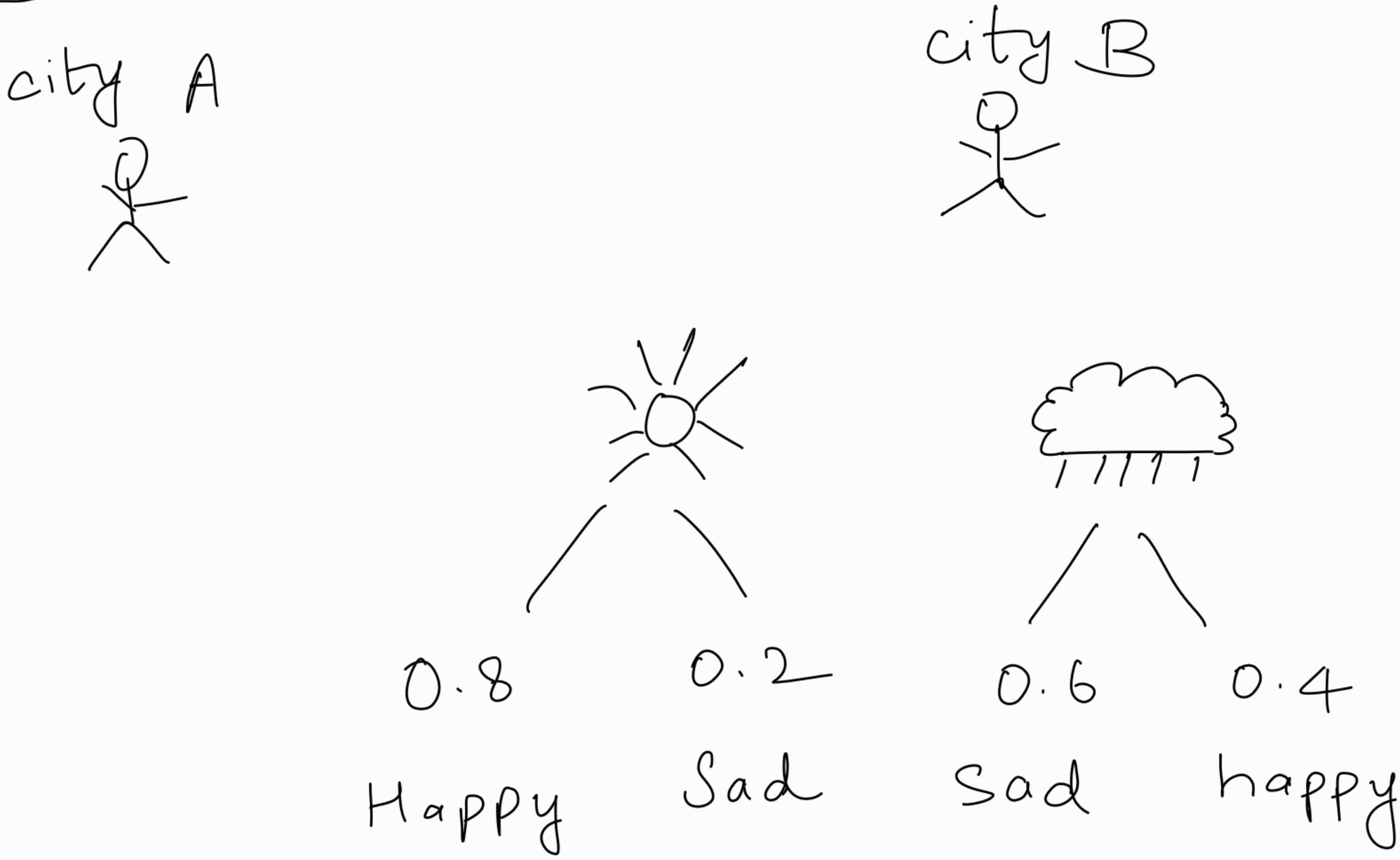
5/4/23

Emission and transition probabilities known.

eg] 2 people



Given a sequence of emotions, predict the most probable weather pattern.

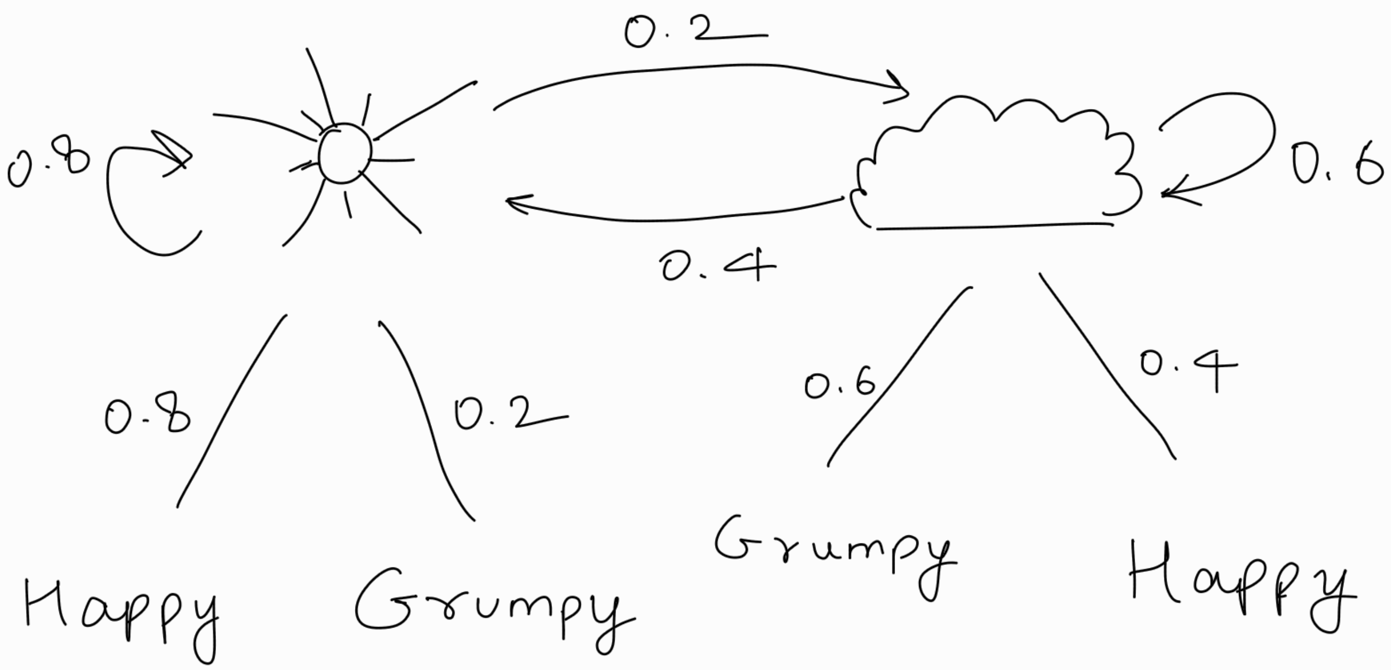
This is what HMMs do.

Emission probabilities

$$P(\text{Happy} \mid \text{sunny}) = \frac{n(\text{Happy} \,\&\, \text{Sunny})}{n(\text{Sunny})}$$

Transition probs

Probability of weather being sunny today given it was rainy yesterday.



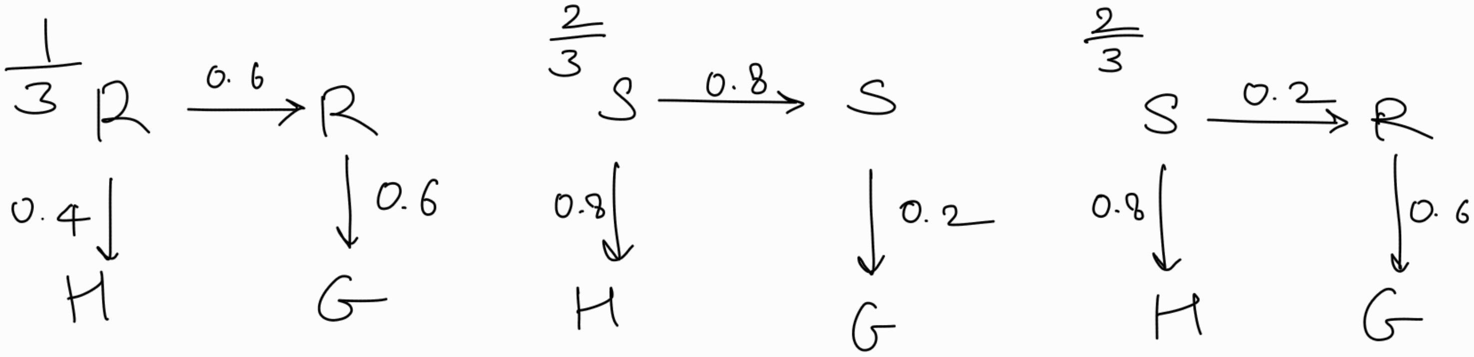
S S S S R R R S S S S R R S S S
G H H H G G H G H H H G H H H H

Find How many are $S \to S$ and $S \to R$

Use this to find transitional probabilities

Prior prob

$$P(S) = \frac{\sum S}{\sum S + \sum R}$$



2^n configurations for n samples.

Use viterbi algorithm (Dynamic Programming)

Viterbi Algorithm

Given : H H G G G H

	H	H	G	G	G	H
S	$\frac{2}{3} \times 0.8 = 0.533$	0.341	0.0546	0.0087	0.0014	0.0017
R	$\frac{1}{3} \times 0.4 = 0.133$	0.043	0.041	0.0147	0.0053	0.0013

$S[2] =$

max (come from S , come from R)

$$= \max(\underbrace{0.533}_{\text{Previous } S} \times \underbrace{0.8}_{P(S|S)} \times \underbrace{0.8}_{P(H|S)}, \underbrace{0.133}_{\text{Prev } R} \times \underbrace{0.4}_{P(S|R)} \times 0.8)$$

We're taking max as we want to find the weather pattern which is most likely.

$R[2]$

$$= \max(0.533 \times 0.2 \times 0.4, 0.133 \times 0.6 \times 0.4)$$

We only look at previous result. This is the Markovian Assumption

Once you've filled all, trace the max cells backwards. This is the weather pattern

In this case it is S S S R R S