

CSCI 5582

Artificial Intelligence

Lecture 17
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Today 10/31

- HMM Training (EM)
- Break
- Machine Learning

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Urns and Balls

- Π Urn 1: 0.9; Urn 2: 0.1

- A

	Urn 1	Urn 2
Urn 1	0.6	0.4
Urn 2	0.3	0.7

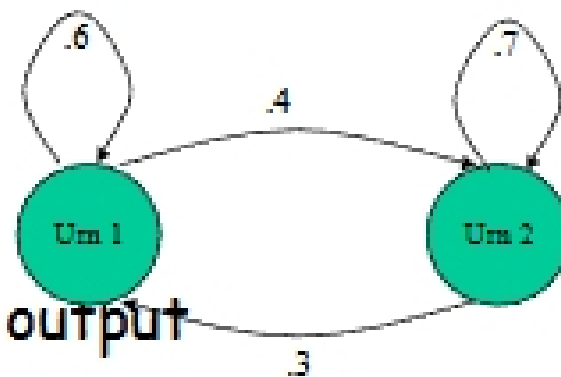
- B

	Urn 1	Urn 2
Red	0.7	0.4
Blue	0.3	0.6

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Urns and Balls

- Let's assume the input (observables) is Blue Blue Red (BBR)
- Since both urns contain red and blue balls any path through this machine could produce this output



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Urns and Balls

Blue Blue Red

1 1 1	$(0.9*0.3)*(0.6*0.3)*(0.6*0.7)=0.0204$
1 1 2	$(0.9*0.3)*(0.6*0.3)*(0.4*0.4)=0.0077$
1 2 1	$(0.9*0.3)*(0.4*0.6)*(0.3*0.7)=0.0136$
1 2 2	$(0.9*0.3)*(0.4*0.6)*(0.7*0.4)=0.0181$
2 1 1	$(0.1*0.6)*(0.3*0.7)*(0.6*0.7)=0.0052$
2 1 2	$(0.1*0.6)*(0.3*0.7)*(0.4*0.4)=0.0020$
2 2 1	$(0.1*0.6)*(0.7*0.6)*(0.3*0.7)=0.0052$
2 2 2	$(0.1*0.6)*(0.7*0.6)*(0.7*0.4)=0.0070$

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Urns and Balls

- Baum-Welch Re-estimation (EM for HMMs)
 - What if I told you I lied about the numbers in the model (π, A, B) .
 - Can I get better numbers just from the input sequence?

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