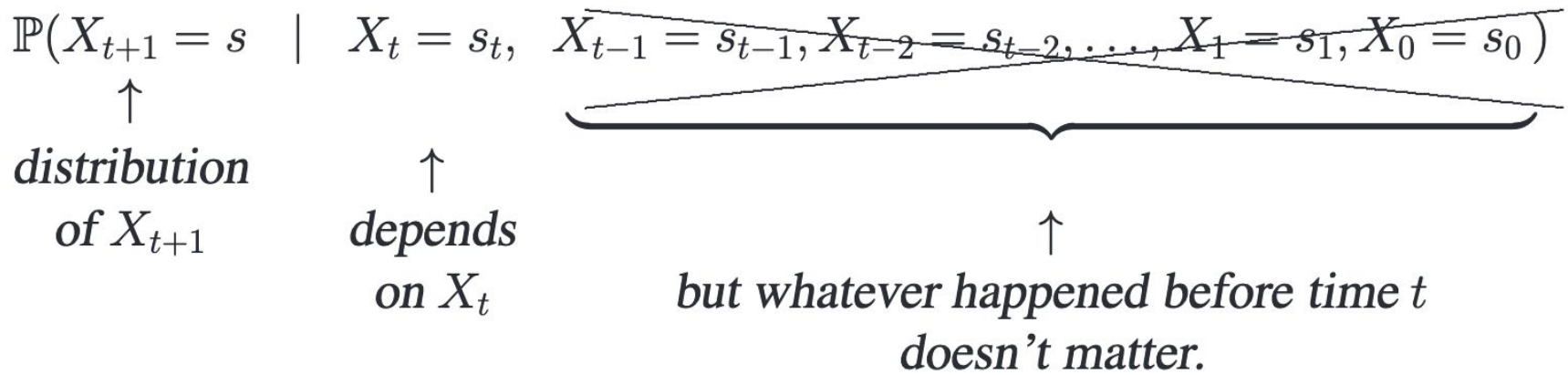

Markov Chains



What is a Markov Chain?

A Markov Chain is a mathematical system that represents probabilistic transitions between discrete states.

—



The Markov Property

Transition Matrix

Mathematicians model Markov Chains using a transition matrix



Markov Chains for Text Generation

	I	am	an	engineer	Sam	like	coding	S
I	0	2/3	0	0	0	1/3	0	0
am	0	0	1/2	0	1/2	0	0	0
an	0	0	0	1	0	0	0	0
engineer	0	0	0	0	0	0	0	1
Sam	0	0	0	0	0	0	0	1
like	0	0	0	0	0	0	1	0
coding	0	0	0	0	0	0	0	1
S	1	0	0	0	0	0	0	0

Dataset

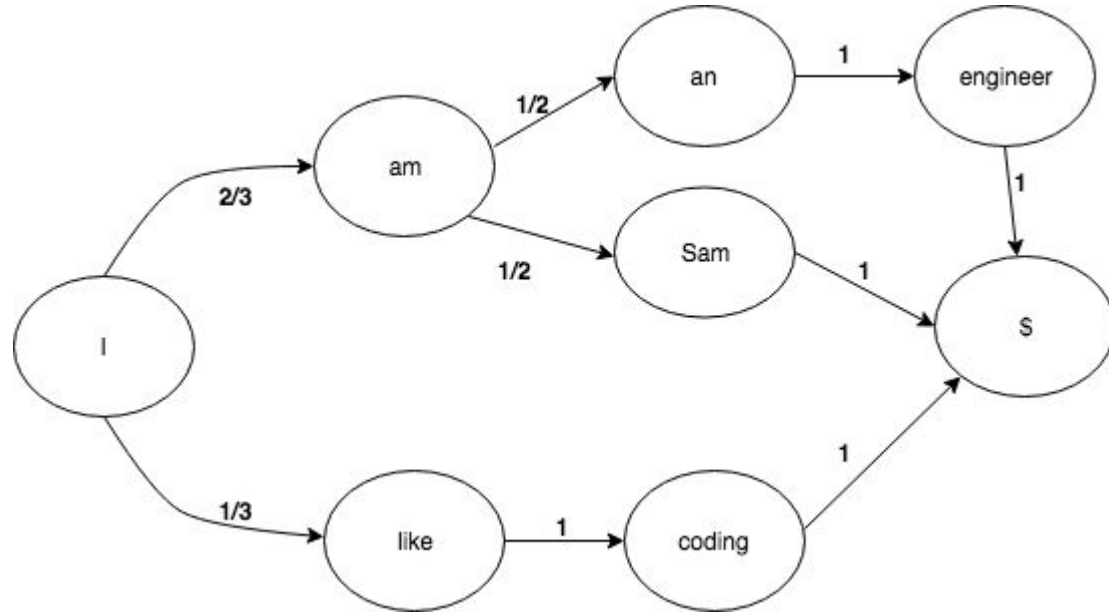
I am Sam.

I am an engineer.

I like coding.

Markov Chains for Text Generation

	I	am	an	engineer	Sam	like	coding	S
I	0	2/3	0	0	0	1/3	0	0
am	0	0	1/2	0	1/2	0	0	0
an	0	0	0	1	0	0	0	0
engineer	0	0	0	0	0	0	0	1
Sam	0	0	0	0	0	0	0	1
like	0	0	0	0	0	0	1	0
coding	0	0	0	0	0	0	0	1



Markov Chains for Text Generation

	I	am	an	engineer	Sam	like	coding	S
I	0	2/3	0	0	0	1/3	0	0
am	0	0	1/2	0	1/2	0	0	0
an	0	0	0	1	0	0	0	0
engineer	0	0	0	0	0	0	0	1
Sam	0	0	0	0	0	0	0	1
like	0	0	0	0	0	0	1	0
coding	0	0	0	0	0	0	0	1

This is a **bigram** model, in which the preceding state is represented as only the preceding word.

Markov Chains for Text Generation

	I	am	an	engineer	Sam	like	codin g	S
I am	0	0	1/2	0	1/2	0	0	0
am an	0	0	0	1	0	0	0	0
an engineer	0	0	0	0	0	0	0	1
am Sam	0	0	0	0	0	0	0	1
I like	0	0	0	0	0	0	1	0
like coding	0	0	0	0	0	0	0	1

Another option is to use, for example, a **trigram** model, in which the preceding state is represented as the two preceding words.

This helps to ensure grammatical coherence but also limits the flexibility of the model.

A few uses for Markov Chains:

- **Assess** how likely a given series of states is according to the model.
 - **Decide** which of a set of models was most likely to generate a given series of states.
 - **Generate** a series of states according to the model
-