Stochastic processes

Markov chains, random walks & queues



Andrey Markov (1856–1922)

Photo: History of the USSR Academy of Sciences, 1964 (public domain)

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Part 6

Last week we introduced

Turing Machines

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Turing Machines

A powerful model of computation

Anything a computer can do, a Turing machine can do

We completed the hierarchy of languages

each class recognized by its own machine

Language	Regular	Context-Free	Decidable
Machine	DFA/NFA/REX	CFG/PDA	Turing Machine

We discovered that

computers are not limitless

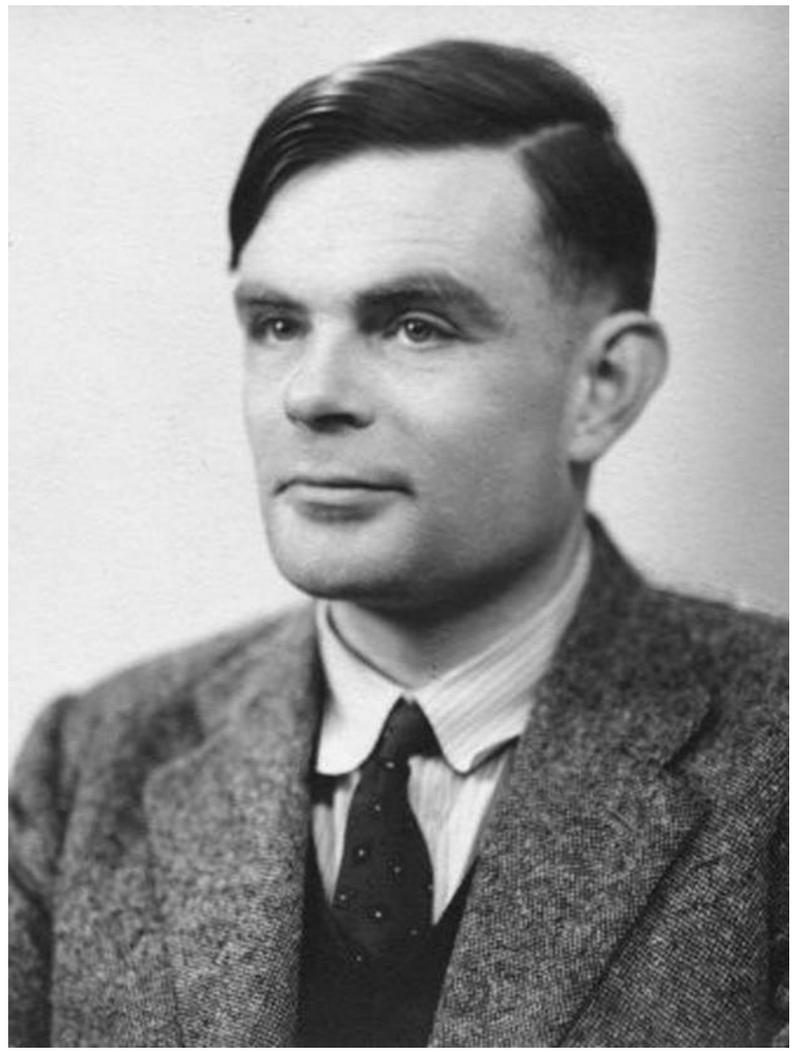
Some problems

cannot be solved

by a computer

(e.g., the Halting problem)

Alan Turing (1912-1954)



We now enter the second part of the course:

stochastic processes

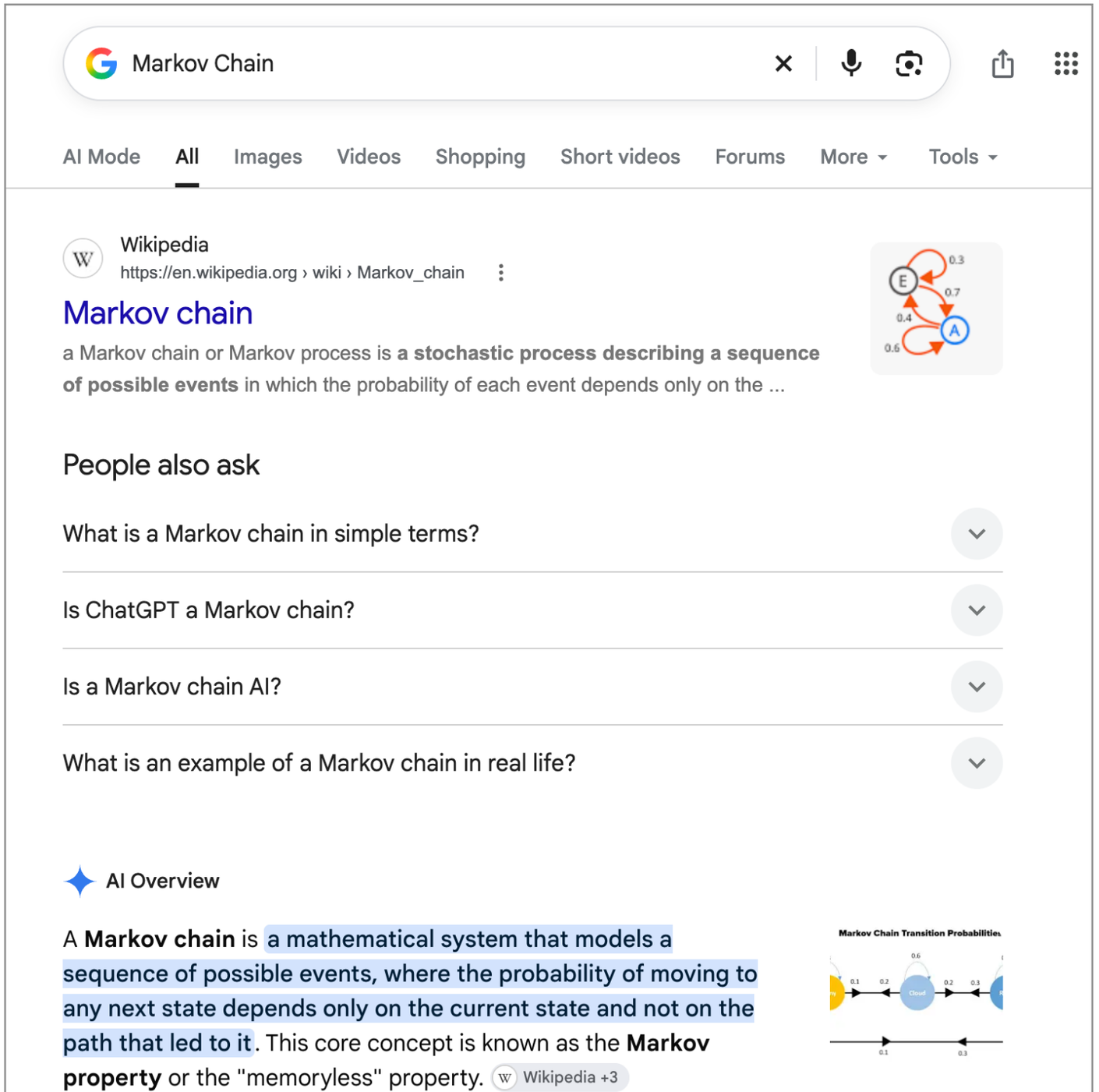
Thus far systems were deterministic

next state depends on the current state + input

From now on, systems are stochastic

next state depends on chance

We'll use these concepts to understand how Google ranks web pages



Today's plan

Thu Oct 22

1. Markov chains
2. Stationary distribution
3. PageRank