Overview

> **A Markovian Journey through Statland**
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> For a Markov chain, given the present, the past and the future are conditionally independent. For the special case of random walk on an undirected network, the network structure is the key to determining the stationary distribution.

Markov chains are a widely used way to model random variables evolving over time. They have elegant properties and are being applied throughout the natural sciences and social sciences, and even in the humanities. We can picture a Markov chain intuitively by imagining a system with *states* and someone randomly wandering around from state to state, just as Ana wanders around from city to city in Statland. For many interesting Markov chains, the *stationary distribution* of the chain helps us understand how the chain will behave in the long run, just as Ana wanted to know what proportion of her time she would spend in each city in the long run.

Learning Objectives

In this section, you will:

- Gain both mathematical and intuitive understanding of Markov chains and the Markov property
- Learn ways of classifying the states of a Markov chain
- Study stationary distributions (how to find them, and why they are important)
- Apply the concept of reversibility to help solve problems such as finding the stationary distribution of a random walk on an undirected network