Bookmarks

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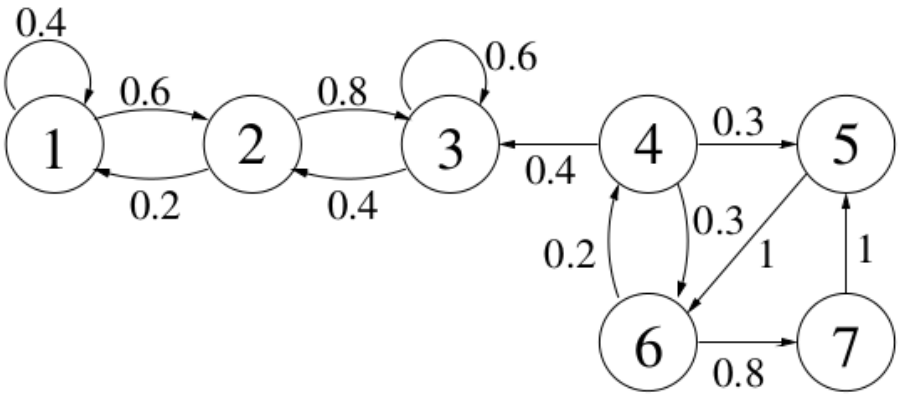
Bookmark

Exercise: Steady-state calculation

(4/4 points)

Consider again the Markov chain with the following transition probability graph:



Find the steady state distribution of the Markov chain.

$\pi_1 =$ 0.1 ✔ **Answer:** 0.1

$\pi_2 =$ 0.3 ✔ **Answer:** 0.3

- Unit 6: Further topics on random variables
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Unit overview

Lec. 24: Finite-state Markov chains
Exercises 24 due May 18, 2016 at 23:59 UTC

Lec. 25: Steady-state behavior of Markov chains
Exercises 25 due May 18, 2016 at 23:59 UTC

$\pi_3 =$ 0.6 ✔ **Answer:** 0.6

$\pi_4 =$ 0 ✔ **Answer:** 0

$\pi_5 =$ 0 ✔ **Answer:** 0

$\pi_6 =$ 0 ✔ **Answer:** 0

$\pi_7 =$ 0 ✔ **Answer:** 0

Answer:
First note that states 4 through 7 are transient since the chain will eventually transition from state 4 to state 3 and never return. Transient states have zero steady-state probability, so $\pi_4 = \pi_5 = \pi_6 = \pi_7 = 0$.

Hence, to calculate the rest of the steady-state probabilities, we can simply focus on the part of the chain involving states 1 through 3. The balance and normalization equations are

$$\begin{aligned}\pi_1 &= \pi_1 p_{11} + \pi_2 p_{21} = 0.4\pi_1 + 0.2\pi_2 \\ \pi_2 &= \pi_1 p_{12} + \pi_3 p_{32} = 0.6\pi_1 + 0.4\pi_3 \\ \pi_3 &= \pi_2 p_{23} + \pi_3 p_{33} = 0.8\pi_2 + 0.6\pi_3\end{aligned}$$

Lec. 26: Absorption probabilities and expected time to absorption
Exercises 26 due May 18, 2016 at 23:59 UTC

Solved problems

Problem Set 10
Problem Set 10 due May 18, 2016 at 23:59 UTC

▸ Exit Survey

$$1 = \pi_1 + \pi_2 + \pi_3$$

Solving for π_1, π_2, π_3, we obtain $\pi_1 = 0.1$, $\pi_2 = 0.3$, and $\pi_3 = 0.6$.

You have used 1 of 2 submissions