



MITx: 6.041x Introduction to Probability - The Science of Uncertainty



Bookmarks

- ▶ Unit 0: Overview
- ▶ Entrance Survey
- ▶ Unit 1: Probability models and axioms
- ▶ Unit 2: Conditioning and independence
- ▶ Unit 3: Counting
- ▶ Unit 4: Discrete random variables
- ▶ Exam 1
- ▶ Unit 5: Continuous random variables

Unit 10: Markov chains > Lec. 25: Steady-state behavior of Markov chains > Lec 25 Steady-state behavior of Markov chains vertical2



Bookmark

Exercise: Steady-state behavior

(1/2 points)

In the previous video, we have seen that for a homogeneous discrete-time Markov chain with m states and one aperiodic recurrent class, the steady-state probabilities π_1, \dots, π_m can be found as the unique solution to the balance equations

$$\pi_j = \sum_k \pi_k p_{kj} \quad j = 1, \dots, m,$$


together with the normalization equation $\sum_{j=1}^m \pi_j = 1$.

In order to derive this system of equations, we have used one type of recursion for $r_{ij}(n)$. Inspired by the fact that there are many ways to write such recursions, let us see if similar other balance equations can be obtained. For each of the following systems of equations, decide whether, when combined with the normalization equation, it also has the steady-state probabilities as the unique solution.


- ▶ Unit 6: Further topics on random variables
- ▶ Unit 7: Bayesian inference
- ▶ Exam 2
- ▶ Unit 8: Limit theorems and classical statistics
- ▶ Unit 9: Bernoulli and Poisson processes
- ▼ **Unit 10: Markov chains**

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 

$$1. \pi_j = \sum_k p_{ik} \pi_j \quad j = 1, \dots, m$$

Yes ▼ ✗ Answer: No

$$2. \pi_j = \sum_k \pi_k r_{kj}(2) \quad j = 1, \dots, m$$


Yes ▼ ✓ Answer: Yes

Answer:


1. No. Since $\sum_k p_{ik} = 1$ for all i , each of these m equations simply say that $\pi_j = \pi_j$, which does not even have a unique solution, not to mention a unique solution that also gives the correct steady-state probabilities.
2. Yes. We obtain the given system of equations by taking the limit as n goes to infinity on both sides of $r_{ij}(n) = \sum_k r_{ik}(n-2)r_{kj}(2)$.

You have used 1 of 1 submissions

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

© All Rights Reserved



© edX Inc. All rights reserved except where noted. EdX, Open edX and the edX and Open EdX logos are registered trademarks or trademarks of edX Inc.

POWERED BY
OPENedX



