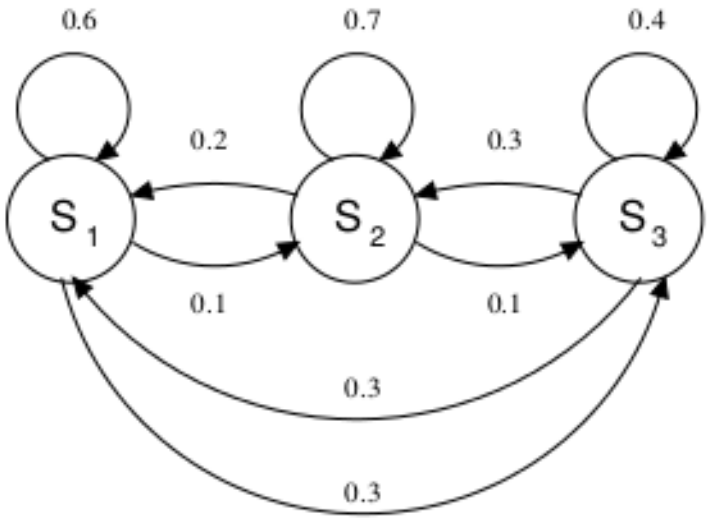
9. Exercise: n-step calculation

None due May 29, 2020 05:29 IST

Exercise: n-step calculation

0.0/2.0 points (ungraded)

Consider the following transition probability graph:



Calculate the three-step transition probability $r_{11}\left(3\right)$ by using the recursion formula

$$r_{ij}\left(n\right)=\sum_{k=1}^{3}r_{ik}\left(n-1\right)p_{kj}\,.$$

$r_{11}\left(3\right)=$ [ ] **Answer:** 0.419

Solution:

We first calculate the 2-step transition probabilities $r_{1k}\left(2\right)$:

$$r_{11}\left(2\right)\ =p_{11}p_{11}+p_{12}p_{21}+p_{13}p_{31}$$

$$
\begin{aligned}
&= (0.6)(0.6) + (0.1)(0.2) + (0.3)(0.3) \\
&= 0.36 + 0.02 + 0.09 \\
&= 0.47, \\
r_{12}(2) &= p_{11}p_{12} + p_{12}p_{22} + p_{13}p_{32} \\
&= (0.6)(0.1) + (0.1)(0.7) + (0.3)(0.3) \\
&= 0.06 + 0.07 + 0.09 \\
&= 0.22, \\
r_{13}(2) &= p_{11}p_{13} + p_{12}p_{23} + p_{13}p_{33} \\
&= (0.6)(0.3) + (0.1)(0.1) + (0.3)(0.4) \\
&= 0.18 + 0.01 + 0.12 \\
&= 0.31.
\end{aligned}
$$

Using these 2-step transition probabilities, we can then calculate the desired 3-step transition probability:

$$
\begin{aligned}
r_{11}(3) &= r_{11}(2)\,p_{11} + r_{12}(2)\,p_{21} + r_{13}(2)\,p_{31} \\
&= (0.47)(0.6) + (0.22)(0.2) + (0.31)(0.3) \\
&= 0.419.
\end{aligned}
$$

Submit You have used 0 of 3 attempts

Answers are displayed within the problem

Discussion

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Topic: Unit 10: Markov chains:Lec. 24: Finite-state Markov chains / 9. Exercise: n-step calculation

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- Another Python implementation — 1
  P = np.array([[0.6,0.1,0.3], [0.2,0.7,0.1], [0.3,0.3,0.4]]) def Pij(i,j): return P[i - 1, j - 1] def Rij(i,j,n): if n - 1 ==...
- Calculations by hand — 3
- Implementing the process into a Python Recursive solution

markov = { (1,1,1):0.6, (1,2,1):0.1, (1,3,1):0.3, (2,1,1):0.2, (2,2,1):0.7, (2,3,1):0.1, (3,1,1):0.3, (3,2,1):0.3, (3,3,1):... 4

Python Numpy version.
As per title. import numpy as np from numpy.linalg import matrix_power P = np.array([[0.6, 0.1, 0.3], [0.... 3

Implementation in R :)
matrix(c(0.6, 0.2, 0.3, 0.1, 0.7, 0.3, 0.3, 0.1, 0.4), nrow = 3) -> a a %*% a %*% a 2

hint: using matlab to save time 8