UTAustinX UT.5.05x
Linear Algebra - Foundations to Frontiers

Help

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🏠 Course / Week 4: Matrix-Vector to Matrix-Matrix Multiplication / 4.1 Opening Remarks

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4.1.1 Predicting the Weather

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Calculator

Week 4 due Oct 24, 2023 19:42 IST

4.1.1 Predicting the Weather

A (very) naive way for predicting the weather...

		Today		
		sunny	cloudy	rainy
Tomorrow	sunny	0.4	0.3	0.1
	cloudy	0.4	0.3	0.6
	rainy	0.2	0.4	0.3

If today is cloudy, what is the probability that tomorrow is
▶ sunny?
▶ cloudy?
▶ rainy?
Take a moment to complete Homework 4.1.1.1.

▶ 2:00 / 2:00   ▶ 2.0x 🔊 ⛶ CC ❝

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Reading Assignment

0 points possible (ungraded)
Read Unit 4.1.1 of the notes. [LINK]

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Discussion

Topic: Week 4 / 4.1.1

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💬 **Analyzing Scripts**   **3**
    One interesting example is to create a Markov matrix for a written language. E.g., in English you find that certain letters follow other letters frequ...

Homework 4.1.1.1

3/3 points (graded)

		Today		
		sunny	cloudy	rainy
Tomorrow	sunny	0.4	0.3	0.1
	cloudy	0.4	0.3	0.6
	rainy	0.2	0.4	0.3

If today is cloudy, what are the probability that tomorrow is

sunny → [0.3] ✔ Answer: .3

cloudy → [0.3] ✔ Answer: .3

rainy → [0.4] ✔ Answer: .4

AHHH
Explanation

Answer: To answer this, we simply consult the table:

- sunny? 0.3

- cloudy? 0.3

- rainy? 0.4

[Submit]

ℹ Answers are displayed within the problem

		Today		
		sunny	cloudy	rainy
Tomorrow	sunny	0.4	0.3	0.1
	cloudy	0.4	0.3	0.6
	rainy	0.2	0.4	0.3

▶

If today is sunny, what is the probability that a week from today it is sunny? cloudy? rainy?

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▶   3:00 / 3:00| ▶ **2.0x**   ◀))   ✕   CC   66

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Homework 4.1.1.2

3/3 points (graded)

		Today		
		sunny	cloudy	rainy
Tomorrow	sunny	0.4	0.3	0.1
	cloudy	0.4	0.3	0.6
	rainy	0.2	0.4	0.3

If today is sunny, what is the probability that the day after tomorrow is

sunny → | 0.3 | ✔ Answer: .3

cloudy → | 0.4 | ✔ Answer: .4

rainy → | 0.3 | ✔ Answer: .3

Explanation
Answer:

- The probability that it will be sunny the day after tomorrow and sunny tomorrow is 0.4×0.4.

- The probability that it will sunny the day after tomorrow and cloudy tomorrow is 0.3×0.4.

- The probability that it will sunny the day after tomorrow and rainy tomorrow is 0.1×0.2.

Thus, the probability that it will be sunny the day after tomorrow, if it is sunny today, is $0.4 \times 0.4 + 0.3 \times 0.4 + 0.1 \times 0.2 = 0.30$.
Notice that this is the inner product of the vector that is the row for "Tomorrow is sunny" and the column for "Today is sunny".
By similar arguments, the probability that it is cloudy the day after tomorrow is 0.40 and the probability that it is rainy is 0.3.

Submit

🛈   Answers are displayed within the problem

		Today		
		sunny	cloudy	rainy
Tomorrow	sunny	0.4	0.3	0.1
	cloudy	0.4	0.3	0.6
	rainy	0.2	0.4	0.3

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If today is sunny/cloudy/rainy, what is the probability that a week from today it is sunny? cloudy? rainy?

We can now answer this!

40 / 66

▶ 4:57 / 4:57   ▸ 2.0x   ◄))   ✕   CC   ❝

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▶ 6:39 / 6:39   ▸ 2.0x   ◄))   ✕   CC   ❝

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Homework 4.1.1.3

1/1 point (graded)

		Today		
		sunny	cloudy	rainy
Tomorrow	sunny	0.4	0.3	0.1
	cloudy	0.4	0.3	0.6

	rainy	0.2	0.4	0.3

Follow the instructions in the above video.

☑ Done

✔

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▶ 2:12 / 2:12   ▸ 2.0x   🔊   ✕   CC   "

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Homework 4.1.1.4

9/9 points (graded)
Given

		Today		
		sunny	cloudy	rainy
Tomorrow	sunny	0.4	0.3	0.1
	cloudy	0.4	0.3	0.6
	rainy	0.2	0.4	0.3

fill in the following table that predicts the weather the day after tomorrow given the weather today:

	Today		
	sunny	cloudy	rainy

⊞ Calculator

Day after Tomorrow	sunny			
	cloudy			
	rainy			

0.3 ✔	0.25 ✔	0.25 ✔
Answer: 0.3	Answer: 0.25	Answer: 0.25
0.4 ✔	0.45 ✔	0.40 ✔
Answer: 0.4	Answer: 0.45	Answer: 0.4
0.3 ✔	0.30 ✔	0.35 ✔
Answer: 0.3	Answer: 0.3	Answer: 0.35

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