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▼ 1. Probability and Inference

Introduction to Probability (Week 1)

Exercises due Sep 22, 2016 at 02:30 IST



Probability Spaces and Events (Week 1)

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Random Variables (Week 1)

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Jointly Distributed Random Variables (Week 2)

Exercises due Sep 29, 2016 at 02:30 IST



Conditioning on Events (Week 2)

Exercises due Sep 29, 2016 at 02:30 IST



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Exercise: Conditioning for Random Variables

(4 points possible)








Consider the following two joint probability tables.

		I				Y	
		1	0			1	0
W	sunny	1/2	0	X	sunny	1/4	1/4
	rainy	0	1/6		rainy	1/12	1/12
	snowy	0	1/3		snowy	1/6	1/6

- What is $p_{W|I}(\text{sunny}|1)$?

? Answer: 1

- What is $p_{X|Y}(\text{sunny}|1)$?

Homework 1 (Week 2)Homework due Sep 29, 2016 at 02:30 IST **Inference with Bayes' Theorem for Random Variables (Week 3)**Exercises due Oct 06, 2016 at 02:30 IST **Independence Structure (Week 3)**Exercises due Oct 06, 2016 at 02:30 IST **Homework 2 (Week 3)**Homework due Oct 06, 2016 at 02:30 IST **Notation Summary (Up Through Week 3)****Mini-project 1: Movie Recommendations (Weeks 3 and 4)**Mini-projects due Oct 13, 2016 at 02:30 IST **Decisions and Expectations (Week 4)**Exercises due Oct 13, 2016 at 02:30 IST **Measuring Randomness (Week 4)**Exercises due Oct 13, 2016 at 02:30 IST **? Answer: 0.5**

- What is $p_{I|W}(1|\text{snowy})$?

? Answer: 0

- What is $p_{Y|X}(1|\text{snowy})$?

? Answer: 0.5**Solution:**

- What is $p_{W|I}(\text{sunny}|1)$?

Solution:

$$p_{W|I}(\text{sunny}|1) = \frac{p_{W,I}(\text{sunny}, 1)}{p_I(1)} = \frac{1/2}{p_I(1)}.$$

Meanwhile,

$$p_I(1) = 1/2 + 0 + 0 = 1/2.$$

Towards Infinity in Modeling Uncertainty (Week 4)

Exercises due Oct 13, 2016 at 02:30 IST



Homework 3 (Week 4)

Homework due Oct 13, 2016 at 02:30 IST



Thus combining the above two equations,

$$p_{W|I}(\text{sunny}|1) = \frac{1/2}{p_I(1)} = \frac{1/2}{1/2} = \boxed{1}.$$

- What is $p_{X|Y}(\text{sunny}|1)$?

Solution:

$$p_{X|Y}(\text{sunny}|1) = \frac{p_{X,Y}(\text{sunny}, 1)}{p_Y(1)} = \frac{1/4}{p_Y(1)}.$$

Meanwhile,

$$p_Y(1) = 1/4 + 1/12 + 1/6 = 1/2.$$

Thus combining the above two equations,

$$p_{X|Y}(\text{sunny}|1) = \frac{1/4}{p_Y(1)} = \frac{1/4}{1/2} = \boxed{1/2}.$$

- What is $p_{I|W}(1|\text{snowy})$?

Solution:

$$p_{I|W}(1|\text{snowy}) = \frac{p_{W,I}(\text{snowy}, 1)}{p_W(\text{snowy})} = \frac{0}{p_W(\text{snowy})} = \boxed{0}.$$

- What is $p_{Y|X}(1|\text{snowy})$?

Solution:

$$p_{Y|X}(1|\text{snowy}) = \frac{p_{X,Y}(\text{snowy}, 1)}{p_X(\text{snowy})} = \frac{1/6}{p_X(\text{snowy})}.$$

Meanwhile,

$$p_X(\text{snowy}) = 1/6 + 1/6 = 1/3.$$

Thus combining the above two equations,

$$p_{Y|X}(1|\text{snowy}) = \frac{1/6}{p_X(\text{snowy})} = \frac{1/6}{1/3} = \boxed{1/2}.$$

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