

MITx: 6.008.1x Computational Probability and Inference

Heli



- **▶** Introduction
- ▼ Part 1: Probability and Inference

Week 1: Introduction to Probability

due Sep 22, 2016 02:30 IST

Week 1: Probability Spaces and Events

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due Sep 22, 2016 02:30 IST

Week 1: Random Variables
due Sep 22, 2016 02:30 IST

Week 2: Jointly Distributed Random Variables

due Sep 29, 2016 02:30 IST

Week 2: Conditioning on Events

due Sep 29, 2016 02:30 IST

Week 2: Homework 1 due Sep 29, 2016 02:30 IST Part 1: Probability and Inference > Week 2: Jointly Distributed Random Variables > Exercise: Conditioning for Random Variables

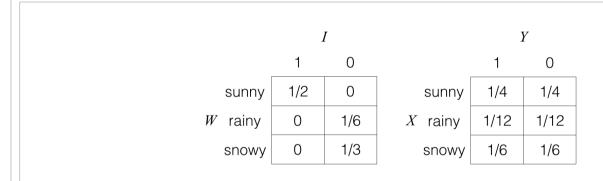
### **Exercise: Conditioning for Random Variables**

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**Exercise: Conditioning for Random Variables** 

4 points possible (graded)

Consider the following two joint probability tables.



• What is  $p_{W|I}(\mathrm{sunny}|1)$ ?

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

Exercise: Conditioning for Random Variable	Week 2: Jointly Distributed Random	Variables   6.008.1x Courseware   ed
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Week 3: Inference with
<b>Bayes' Theorem for Random</b>
Variables

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due Oct 6, 2016 02:30 IST

## Week 3: Independence Structure

due Oct 6, 2016 02:30 IST

Week 3: Homework 2 due Oct 6, 2016 02:30 IST

Notation Summary Up Through Week 3

Weeks 3 and 4: Mini-project
on Movie Recommendations
due Oct 21, 2016 02:30 IST

Week 4: Decisions and Expectations

due Oct 13, 2016 02:30 IST

# Week 4: Measuring Randomness

due Oct 13, 2016 02:30 IST

Week 4: Towards Infinity in Modeling Uncertainty

due Oct 13, 2016 02:30 IST

Week 4: Homework 3

due Oct 13, 2016 02:30 IST

 Part 2: Inference in Graphical Models

Answer: 0.5

• What is  $p_{I|W}(1|\mathbf{snowy})$ ?

	Answer: 0

• What is  $p_{Y|X}(1|\mathbf{snowy})$ ?

Answer: 0.5

#### **Solution:**

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

**Solution:** 

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

Meanwhile,

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

Part 3: LearningProbabilistic Models

▶ Final Project

Thus combining the above two equations,

$$p_{W|I}( ext{sunny}|1) = rac{1/2}{p_I(1)} = rac{1/2}{1/2} = oxed{1}.$$

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

**Solution:** 

$$p_{X|Y}( ext{sunny}|1) = rac{p_{X,Y}( ext{sunny},1)}{p_Y(1)} = rac{1/4}{p_Y(1)}.$$

Meanwhile,

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

Thus combining the above two equations,

$$p_{X|Y}( ext{sunny}|1) = rac{1/4}{p_Y(1)} = rac{1/4}{1/2} = oxed{1/2}.$$

• What is  $p_{I|W}(1|\mathbf{snowy})$ ?

**Solution:** 

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

• What is  $p_{Y|X}(1|\mathbf{snowy})$ ?

**Solution:** 

$$p_{Y|X}(1| ext{snowy}) = rac{p_{X,Y}( ext{snowy},1)}{p_X( ext{snowy})} = rac{1/6}{p_X( ext{snowy})}.$$

Meanwhile,

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

Thus combining the above two equations,

$$p_{Y|X}(1| ext{snowy}) = rac{1/6}{p_X( ext{snowy})}. = rac{1/6}{1/3}. = igg[1/2igg].$$

Submit

You have used 0 of 5 attempts

#### Discussion

**Topic:** Jointly Distributed Random Variables / Exercise: Conditioning for Random Variables

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Add a Post

### possible error

question posted 2 months ago by **kalosobat** 

How is pY | X(1 | snowy) not 1/3

This post is visible to everyone.

+ Expand discussion

## Syntax in this exercise

discussion posted 2 months ago by deep-one

What kind of syntax does the grader accept? Neither Python {'hot': 1/2, 'cold': 1/2} nor math {hot: 1/2, cold:1/2} don't work. Even the figure-based...

This post is visible to everyone.

+ Expand discussion

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