Bookmarks

- Introduction
- 1. Probability and Inference

Introduction to Probability (Week 1)
Exercises due Sep 21, 2016 at 21:00 UTC

Probability Spaces and Events (Week 1)
Exercises due Sep 21, 2016 at 21:00 UTC

Random Variables (Week 1)
Exercises due Sep 21, 2016 at 21:00 UTC

Jointly Distributed Random Variables (Week 2)
Exercises due Sep 28, 2016 at 21:00 UTC

Conditioning on Events (Week 2)
Exercises due Sep 28, 2016 at 21:00 UTC

Homework 1 (Week 2)
Homework due Sep 28, 2016 at 21:00 UTC

Inference with Bayes' Theorem for Random Variables (Week 3)
Exercises due Oct 05, 2016 at 21:00 UTC

Independence Structure (Week 3)
Exercises due Oct 05, 2016 at 21:00 UTC

Homework 2 (Week 3)

1. Probability and Inference > Inference with Bayes' Theorem for Random Variables (Week 3) > Exercise: The Product Rule for Random Variables - Medical Diagnosis Revisited

Bookmark

Exercise: The Product Rule for Random Variables - Medical Diagnosis Revisited

(4 points possible)

Let's revisit the medical diagnosis problem we saw earlier. We now use random variables to construct a joint probability table.

Let random variable X represent the patient's condition — whether “healthy" or “infected", with the following distribution for X:

X	Prob.
healthy	0.999
infected	0.001

Meanwhile, the test outcome Y for whether the patient is infected is either “positive" (for the disease) or “negative". As before, the test is 99% accurate, which means that the conditional probability table for Y given X is as follows (note that we also show how to write things out as a single table):

$Y \mid X = \text{healthy}$	Prob.
positive	0.01
negative	0.99

$Y \mid X = \text{infected}$	Prob.
positive	0.99
negative	0.01

$p_{Y \mid X}$	X: healthy	X: infected
Y: positive	0.01	0.99
Y: negative	0.99	0.01

Alternative way to write out the tables for $p_{Y \mid X}(\cdot \mid \text{healthy})$ and $p_{Y \mid X}(\cdot \mid \text{infected})$ in 1 table

Homework due Oct 05, 2016 at 21:00 UTC

Notation Summary (Up Through Week 3)

Mini-project 1: Movie Recommendations (Week 3)
Mini-projects due Oct 12, 2016 at 21:00 UTC

Using the product rule for random variables, what are the four entries for the joint probability table? **Please provide the exact answer for these four quantities.**

$p_{X,Y}(\text{healthy}, \text{positive}) =$ 0.00999 ✔

$p_{X,Y}(\text{healthy}, \text{negative}) =$ 0.98901 ✔

$p_{X,Y}(\text{infected}, \text{positive}) =$ 0.00099 ✔

$p_{X,Y}(\text{infected}, \text{negative}) =$ 0.00001 ✔

You have used 2 of 5 submissions