8. Let's do some statistics
The first example

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(Caption will be displayed when you start playing the video.)

This is it for the philosophy part of the class.
And we'll start doing some really serious statistics
in good French tradition.
Let's talk about kissing.
All right.
So everybody's familiar with this sculpture by Rodin.
So this is The Kiss.

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Review: probability question

1/1 point (graded)

Assume that we observe three draws, X_1, X_2, X_3 from a Bernoulli distribution with parameter $p = \frac{1}{2}$. For example, imagine that in the model for the preferred head direction for kissing, either direction were actually equally likely and we observed three kissing couples.

What is the probability of observing at least two ones, i.e., what is $\mathbf{P}\left(\sum_{i=1}^{3} X_i \geq 2\right)$?

1/2 ✔ **Answer:** 0.5

Solution:

$\sum_{i=1}^{3} X_i$ follows a Binomial distribution with parameters $n = 3$ and $p = \frac{1}{2}$, hence the probability in question is

$$\mathbf{P}\left(\sum_{i=1}^{3} X_i \geq 2\right) = \binom{3}{2}\left(\frac{1}{2}\right)^3 + \binom{3}{3}\left(\frac{1}{2}\right)^3 = \frac{4}{8} = \frac{1}{2}.$$

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Answers are displayed within the problem

Confidence, continued

1/1 point (graded)

If in the model above, let us assume we decided to consider two or more right-turns as significant evidence for a predisposition of this direction for kissing. Now, 10 students go out and each observe three different couples kissing. How many of them would on average come to the conclusion that right-leaning is more common than left-leaning when kissing?

5 ✔ **Answer:** 5

Solution:

We just computed the chance for one of these events to occur to be $\frac{1}{2}$, so if we perform 10 repeats, we expect it to happen 5 times.

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Answers are displayed within the problem

Friendships

1/1 point (graded)
In a group of n people indexed 1 through n, each pair (i, j) (there are $\binom{n}{2}$ of them) are either friends, or not friends. To model this situation, we assign a random variable to each pair. Which one of the probability distributions below is the most appropriate model?

- A Poisson random variable.
- A Gaussian random variable.
- A Bernoulli random variable. ✔
- An exponential random variable.

Solution:

We need a random variable, which takes only two values (for convenience, 1 for being friends; and 0 for strangers), and this is precisely a Bernoulli distribution.

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Answers are displayed within the problem

Friendships (Continued)

1/2 points (graded)
We say a group of four people is “interesting", if there are at most five pairs who are friends. Assume that each pair of people are friends, independent of every other pair, with probability $1/2$. Let N be the number of pairs that are friends in this group.

- What distribution does N follow?
  - Poisson
  - Bernoulli
  - Binomial ✔
- What is the probability that a randomly chosen group of four people is “interesting"?

$t =$ 6/64 ✖ **Answer:** 0.984

Solution:

- There are, in total, $\binom{4}{2} = 6$ different pairs. Notice that N is a random sum of 6 Bernoulli trials; this is a binomial random variable: $N \sim \mathbf{Bin}\,(6, 1/2)$.
- $\mathbb{P}\,(N \leq 5) = 1 - \mathbb{P}\,(N = 6) = 1 - (1/2)^6$.

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Answers are displayed within the problem

How many interesting groups?

0/1 point (graded)
Following the model above, if 128 different people observe randomly chosen groups of four people, how many times on average do these observations lead to the conclusion that the society is interesting?

0.984 ✖ **Answer:** 126

Solution:

We just computed the chance for one of these events to occur to be $\mathbf{1 - 1/64}$, so if we perform 128 repeated experiments, we expect it to happen $\mathbf{128\,(1 - \frac{1}{64}) = 126}$ times.

提交 你已经尝试了3次（总共可以尝试3次）

Answers are displayed within the problem

讨论

显示讨论

主题： Unit 1 Introduction to statistics:Lecture 1: What is statistics / 8. Let's do some statistics

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