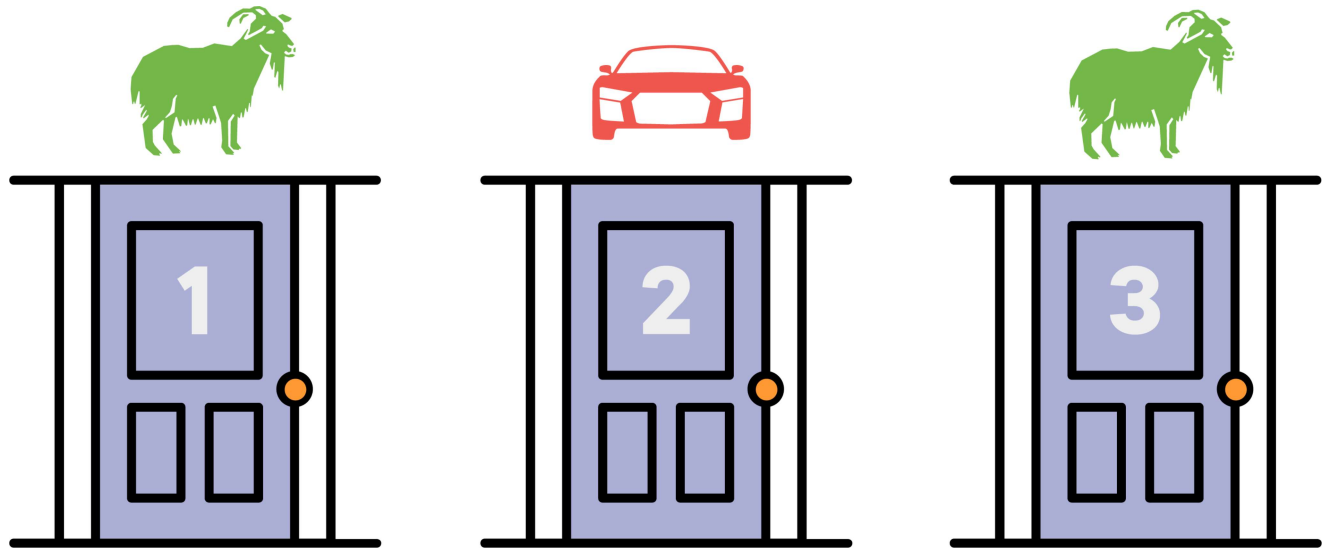


The Monty Hall Problem

Introduction

The Monty Hall problem is a famous little puzzle from a game show. It goes like this: you are presented with 3 doors. Behind two are goats and behind the third is a car. You are asked to select a door; if you select the door with the car, you win! After selecting, the host then opens one of the remaining two doors, revealing a goat. The host then asks if you would like to switch doors or stick with your original choice. What would you do? Does it matter?



Objectives

In this lab you will:

- Use Bayes' theorem along with a simulation to solve the Monty Hall problem

Run a simulation

This is not a traditional application of Bayes' theorem, so trying to formulate the problem as such is tricky at best. That said, the scenario does capture the motivating conception behind Bayesian statistics: updating our beliefs in the face of additional evidence. With this, you'll employ another frequently used tool Bayesians frequently employ, running simulations. To do this, generate a random integer between one and three to represent the door hiding the car. Then, generate a second integer between one and three representing the player's selection. Then, of those the contestant did not choose, select a door concealing a goat to reveal. Record the results of the simulated game if they changed versus if they did not. Repeat this process a thousand (or more) times. Finally, plot the results of your simulation as a line graph. The x-axis should be the number of simulations, and the y-axis should be the probability of winning. (There should be two lines on the graph, one for switching doors, and the other for keeping the original selection.)

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Summary

In this lab, you further investigated the idea of Bayes' theorem and Bayesian statistics in general through the Monty Hall problem. Hopefully, this was an entertaining little experience!