Lecture 7: Probability

Chapter 2.x

Gambler's Fallacy: Roulette

You can bet on individual numbers, sets of numbers, or red vs black. Let's assume no 0 or 00, so that $P(\text{red}) = P(\text{black}) = \frac{1}{2}$.

Gambler's Fallacy: Roulette

One of the biggest cons in casinos: spin history boards.

Let's ignore the numbers and just focus on what color occurred.
Note: the white values on the left are black spins.

Gambler's Fallacy: Roulette

Let's say you look at the board and see that the last 4 spins were red.

Gambler's Fallacy: Roulette

Let's say you look at the board and see that the last 4 spins were red.

You will always hear people say "Black is due!"

Gambler's Fallacy: Roulette

Let's say you look at the board and see that the last 4 spins were red.

You will always hear people say "Black is due!"

Ex. on the 5th spin people think:

$$P(\text{black}_5 \mid \text{red}_1 \text{ and } \text{red}_2 \text{ and } \text{red}_3 \text{ and } \text{red}_4) >$$
$$P(\text{red}_5 \mid \text{red}_1 \text{ and } \text{red}_2 \text{ and } \text{red}_3 \text{ and } \text{red}_4)$$

Gambler's Fallacy: Roulette

But assuming the wheel is not rigged, spins are independent i.e. $P(A|B) = P(A)$. So:

Gambler's Fallacy: Roulette

But assuming the wheel is not rigged, spins are independent i.e. $P(A|B) = P(A)$. So:

$$\begin{aligned} P(\text{black}_5|\text{red}_1 \text{ and } \text{red}_2 \text{ and } \text{red}_3 \text{ and } \text{red}_4) = P(\text{black}_5) &= \frac{1}{2} \\ P(\text{red}_5|\text{red}_1 \text{ and } \text{red}_2 \text{ and } \text{red}_3 \text{ and } \text{red}_4) = P(\text{red}_5) &= \frac{1}{2} \end{aligned}$$

Next Week's Lab

Basketball players who make several baskets in succession are described as having a "hot hand." This refutes the assumption that each shot is independent of the next.

We are going to investigate this claim with data from a particular basketball player: Kobe Bryant of the Los Angeles Lakers in the 2009 NBA finals.

Next Time

Discuss the Normal Distribution