RATS EAT CATS

Abstract

DOOOOOOOOOOOOOOOOO This study explores the concept of gambler's ruin and the probability of ruin versus gain for gamblers. Initially, a constant generation size is studied, with data collected on the following points of interest; the first appearance of a universally common ancestor among a generation (MRCA); an identical set of ancestors across all members of a generation (ACA); and the size of the ACA to determine how many of the original ancestors do not continue in the lineage. Sample trials of randomly paired ancestor groupings are generated using Python with each trial ending when an ACA is found. The code uses set union, comparisons, and probability. After many trials using a population size of 6, it was found that an MRCA is most likely to appear in the second or third generation, and an ACA is found within 4-6 generations in most cases. Additionally, the data collected suggests that it is rare for more than 2 ancestors not to continue their lineages. This suggests results contradictory to conventional assumptions.

Project 1
Mathematics 3030
Submitted by: Emily Dunn
Submitted to: Alex Bihlo
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1 PLAN (REMOVE)

-START INTRO AND METHODOLOGY -WRITE CODE -ANALYZE AND ADD RESULTS -EDIT

2 Introduction

This paper will discuss the topic of gamblers' ruin, a concept that states that regardless of the betting system, a gambler will always reach a monetary balance of zero if they continue to bet indefinitely. This an extremely common problem across the world and espically more prominent in north america. Wether an iniduavl is facing addiction, betting for fun or feelings and adrenaline rush psychology proves that the feel of constant betting after a win is in fact hard to beat (ADD IN A SOURCE AND REFINE THIS). This project examines classical gambling models and attempts to challenge this concept by questioning whether it is possible to mitigate or overcome gambler's ruin. Through many attempts it is found that an infinite amount of money will lead to Gambler's ruin eventually so this paper will stop once a ruin is met or winning of double the amount (MAYBE LOOK INTO A BETTER NUMBER)

MAKE THE AMOUNT OF TRIALS REPESENATIVE OF A SCALE FACTOR OF THE AMOUNT OF PEOPLE GAMBLING PER DAY

ADD IN TERMS YOU WILL USE

This analysis will exclude the trivial solution of the gambler stopping betting, and look at **alternative betting methods** and factors that have a greater impact on gambler's ruin. TALK ABOUT ANOTHER METHOD AND GOOGLE OPTIONS

3 Research Questions

1. What effect does increasing and decreasing the gambler's initial capital have on the probability of gambler's ruin?
2. What effect does the fairness of the game, specifically a bias in favor of the dealer, have on the probability of gambler's ruin?
3. What effect does the size of the wager bet and received on each game have on the probability of gambler's ruin?

4 Methodology

This project will use Markov's process, a stochastic process in which the probability of one variable is directly effected by the outcome of the previous variable, to write a computer code which models the gambler's capital over multiple games. Additionally this will be simulated under various conditions to answer the research questions above. Finally, in addition a literature review will be conducted to compare the results with past supports or contradictions and for the purpose of better understanding the concepts.

Introduce a "Stop-Loss" or "Win-Goal": The indefinite betting model always ends in ruin as you said, which makes for a very short conclusion. To make your challenge to the concept more interesting give your gambler a target goal (e.g., "Stop if I double my money"). This allows you to calculate the probability of success vs. ruin, which is much more visually interesting to graph than just seeing that everyone eventually hits zero.

4.1 Initial Capital

Tests will be run with initial capital ranging from $I_n = 100, 500, 1000$. The math scales proportionally, so you don't need massive numbers to prove the point.

4.2 Size of Wager

The wager bet will range from $r = 1, 5, 10, 100$.

4.3 Fairness

We also take into account the edge that the house has. This is extremely important as the position of a casino is to ultimately hook you into gambling to the point of Gambler's ruin but house's benefit. By shifting the favor towards the house we take into account the lighting, alcohol consumption addiction and other psychological effects leading to gambler's ruin. We can assume this is symbolic of the ruin.

For fair games the betting will follow $P = 0.5$ while it will follow $P = 0.45, 0.49$ for unfair games (MAYBE LOOK INTO WHAT PROBABILITIES ARE BEST). This mimics real-world casino games (like Roulette or Blackjack) and shows how a slight bias is often more dangerous to a gambler than a massive one because it encourages longer play.

4.4 ADD IN TEST

5 Results

5.1 Initial Capital

5.2 Size of wager

5.3 Dealer bias

5.4 ADD IN A GAMBLING METHOD

6 Conclusion

7 Declaration on the use of generative AI

This project used generative AI tools including Chat GPT and Grammarly to assist with the writing of code, understanding of mathematical concepts and the overall improvement of grammar and clarity.

References

[1] (NOT A REAL ONE I'VE USED Slade, D., Smell, A., Wilson, E. and Drumsta, R. (2023) *Percentage of U.S. Adults Suffering from Religious Trauma: A Sociological Study*. Socio-Historical Examination of Religion and Ministry 5(1):1-28. doi: 10.33929/sherm.2023.vol5.no1.01