

Linear Algebra and Differential Equations Project 1

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Abstract

[Write a brief summary of your project here.]

1 Part 1: Colley Method

1.1 Explanation

Colley's method is used to rank sports teams based on their win-loss ratio. The method was created by Wesley Colley to handle situations where teams may not have played each other an equal number of times. Colley's method takes advantage of Laplace's Rule of Succession.

$$\begin{aligned}total - wins &= \frac{total - wins}{2} + \frac{total - wins}{2} \\&= \left[\frac{total - wins}{2} + \frac{total - wins}{2} \right] + \left[\frac{total - loss}{2} - \frac{total - loss}{2} \right] \\&= \left[\frac{total - wins}{2} - \frac{total - loss}{2} \right] + \left[\frac{total - wins}{2} + \frac{total - loss}{2} \right] \\&= \left[\frac{total - wins}{2} - \frac{total - loss}{2} \right] + \frac{1}{2} [total - wins + total - loss] \\&= \left[\frac{total - wins}{2} - \frac{total - loss}{2} \right] + \frac{1}{2} [total - games]\end{aligned}$$

1.2 Laplace's Rule of Succession

Laplace's Rule of Succession provides a formula to relate observed instances to unobserved ones, formally referred to as "enumerative induction." The formula for probability is $(k+1)/(n+2)$. Where 'k' is the number of times an event has occurred, and 'n' is the total number of trials. In sports ranking, Laplace's rule provides a more accurate probability result for small data sets by accounting for future outcomes. This is achieved through the use of biases, +1 and +2. The bias also eases the jumps in ranking when the observed data, number of games played, is scarce.

1.3 Example Calculation

[Provide a sample calculation to illustrate the method.]

2 Part 2: Massey Method

2.1 Introduction

Massey's method includes teams' differences in points, and assumes transitivity will hold true.

2.2 Methodology

[Explain the approach and relevant equations.]

2.3 Example Calculation

[Show an example using the method.]

2.4 Results

[Discuss your findings from applying the Massey method.]

3 Part 3: Application to Real Data

3.1 Data Collection

[Explain the source and characteristics of the data you used.]

3.2 Implementation

[Discuss how you applied the Colley and Massey methods to the real data.]

3.3 Comparison of Results

[Compare the outcomes of both methods when applied to the data.]

4 Part 4: Cutting Edge

4.1 Overview of New Methods

[Summarize any novel or emerging methods in ranking.]

4.2 Application and Analysis

[Describe your research and analysis of the cutting-edge approach.]

4.3 Comparison with Traditional Methods

[Compare these new methods with Colley and Massey.]

References

[Include your references here in the format required by your institution.]