Executive Summary: Javelin Throw Analysis

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Introduction

Javelin throw, a track and field event, involves throwing a spear-like implement as far as possible. This analysis explores the bio mechanical factors influencing throwing distances and predicting maximum distance under perfect conditions.

Data and Literature Review

Data from 5 athletes were analyzed, focusing on angles at various steps of the throw. Techniques such as smoothed bootstrapping were employed to simulate values and manage the small dataset.

Analysis

The study utilized various statistical models:

- **Regression Models** showed different significance levels of body angles at various steps.

- **Random Forest** identified the optimal angles contributing to a successful throw.

- **Extreme Value Theory** helped predict potential maximum throwing distances under ideal conditions, suggesting possible new world records.

Case Study: Neeraj Chopra

A specific focus was given to Neeraj Chopra, analyzing his body mechanics throughout the throwing process. Recommendations were made to adjust hip and trunk angles at specific phases to enhance stability and momentum transfer.

Conclusion

Our analysis suggests significant potential for improvement in javelin throw distances through bio mechanical adjustments. The max prediction was between 98.612 to 101.371 meters. Future studies should include more variables such as air resistance and physical characteristics like muscle mass for a comprehensive analysis.