

Problem Chosen

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Summary Sheet

Team Control Number

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title

Summary

abstract content...

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1 Introduction

1.1 Background

1.2 Literature Review

1.3 Restatement of the Problem

1.4 Our Work

2 Assumptions and Justification

3 Notations

Sport	Coach	Years	Medals	Change in Medals	Points
Volleyball	Lang Ping	2004→2008 (USA self-loop)	Gold Silver Bronze	+0 +1 +0	2
	Lang Ping	2012→2016 (USA→China)	Gold Silver Bronze	USA+0, CHN+1 USA-1, CHN+0 USA+1, CHN+0	5

Table 1: Coach Lang Ping's Medal Changes and Points from 2004 to 2016

3.0.1 Flow Calculation

Sport	Coach	Flow Path
Volleyball	Lang Ping	2004→2008 (USA self-loop): Gold +0, Silver +1, Bronze +0, Score = 2 2012→2016 (USA → China): USA Gold +0, Silver -1, Bronze +1; China Gold +1, Si

3.1 Model Results and Analysis

This section analyzes the changes in medal counts for China, the U.S., and France, focusing on the impact of the "great coach" effect. Using the flow network model, we quantify the effect of coach movements on medal counts and propose investment strategies based on the model results.

(1)China: Table Tennis, Diving, Gymnastics

- **Table Tennis:** Under Liu Guoliang's coaching, table tennis exhibited a relatively large total flow (6), but the bottleneck flow was -2, indicating that although the coach's contribution was evident, certain limiting factors restricted the potential for improvement.
- **Diving:** Zhou Jihong's coaching period was relatively stable, with a total flow of 4 and a bottleneck flow of -2, suggesting that despite the coach's contribution, the project experienced significant volatility, especially between 2008 and 2012.

Sport	Coach	Traffic Path	Total Traffic	Bottleneck
Table Tennis	Liu Guoliang	2004: Gold +1, Silver +1, Bronze +0, Score = -2 2004→2008: Gold +2, Silver +0, Bronze +0, Score = 8	6	-
Diving	Zhou Jihong	2004→2008: Gold +1, Silver -1, Bronze +2, Score = 4 2008→2012: Gold -1, Silver +2, Bronze -2, Score = -2 2012→2016: Gold +1, Silver -1, Bronze +0, Score = 2	4	-
Gymnastics	Huang Yubin	1996: Gold +1, Silver -1, Bronze +1, Score = 3 1996→2000: Gold -1, Silver +0, Bronze -1, Score = -5	-2	-

Table 3: Sports Statistics

- **Gymnastics:** Under Huang Yubin, the gymnastics team showed poor performance, with a total flow of -2 and a bottleneck flow of -5, demonstrating limited coach contribution and significant external restrictions on the project's performance.

Table tennis is the most promising project. Despite the bottleneck flow, the coach's contribution is significant, suggesting that further investment in the "great coach" effect is warranted in this area. Diving, although stable, requires improvements in other factors due to the presence of bottleneck flows. Gymnastics requires more attention and enhancement, as the coach's contribution is minimal, and both total flow and bottleneck flow indicate significant room for improvement.

(2)USA: Gymnastics, Basketball, Volleyball

Sport	Coach	Traffic Path	Total Traffic	Bottleneck
Gymnastics	Bela Karolyi	2004: Gold +1, Silver +4, Bronze +0, Score = 12 2004→2008: Gold +1, Silver +1, Bronze +0, Score = 6 2008→2012: Gold +1, Silver -4, Bronze +0, Score = -4	14	-
Basketball	Mike Krzyzewski	2004→2008: Gold +1, Silver -1, Bronze +0, Score = 2 2008→2012: Gold +0, Silver +0, Bronze +0, Score = 0 2012→2016: Gold +0, Silver +0, Bronze +0, Score = 0	2	-
Volleyball	Karch Kiraly	2008→2012: Gold +0, Silver +0, Bronze +0, Score = 0 2012→2016: Gold +0, Silver -1, Bronze +1, Score = -1 2016→2020: Gold +1, Silver +0, Bronze -1, Score = 3	2	-

Table 4: Sports Statistics

- **Gymnastics:** Bela Karolyi's total flow is relatively high (14), indicating significant coach contribution, but the bottleneck flow is negative (-4), suggesting that performance improvement is constrained by external factors.
- **Basketball:** Under Gregg Popovich, the total flow is 2, and the bottleneck flow is 0, indicating stable performance with limited fluctuations. The team has won gold in multiple editions of the Olympics, and the coach's capabilities are notable.

- **Volleyball:** Under Karch Kiraly's coaching, the total flow is 2, and the bottleneck flow is -1, indicating limited coach contribution, with performance volatility due to external restrictions.

Basketball has shown stable performance, but the coach's contribution is relatively small, and the project's performance is constrained. Volleyball shows significant volatility, with the coach's impact being limited. Gymnastics, although the coach's contribution is substantial, requires further improvements due to external constraints. The gymnastics project is best suited for further investment in "great coach" effects.

(3) France: Fencing, Basketball, Football

Sport	Coach	Traffic Path
Fencing	Yu Ge Oubuli	2016: Gold +1, Silver +1, Bronze +1, Score = 7 "2020 (France → China): China Gold +1, Silver -1, Bronze -1; France Gold +1, S
Basketball	Vincent Collet	2012→2016: Gold +0, Silver +0, Bronze +0, Score 2016→2020: Gold +0, Silver +1, Bronze +0, Score
Football	Thierry Henry	2016→2020: Gold +0, Silver +0, Bronze +0, Score 2020→2024: Gold +0, Silver +1, Bronze +0, Score

Table 5: Sports Statistics

- **Fencing** Under Yves Guillard, the coach's effect is complex. Although France's performance was relatively high, the negative change after transferring to China suggests significant external constraints. The bottleneck flow is negative, indicating limitations on performance improvement.
- **Basketball:** Vincent Collet's coaching slightly improved the French basketball team's performance, with a bottleneck flow of 0, indicating stable performance with no significant external constraints.
- **Football:** Thierry Henry's coaching had a positive impact on French football, especially in terms of silver medals. The bottleneck flow is 0, indicating a direct effect of the coach's influence on the project's performance.

3.2 Verification and Strategy Recommendations

After analyzing the performance of China, the U.S., and France and their respective coaches, this section explores the impact of the "great coach" effect on medal counts, particularly in the context of coach movements. Although athletes may find it difficult to change countries due to nationality requirements, coaches are free to move between countries and have a significant impact on performance. Based on the analysis, we can conclude that the "great coach" effect contributes significantly to certain sports, especially in gymnastics, table tennis, and football, where coach expertise and experience lead to substantial improvements.

Sport	Coach	Traffic Path	Total Traffic	Bott
Gymnastics	Bela Karolyi	2004: Gold +1, Silver +4, Bronze +0, Score = 12 2004→2008: Gold +1, Silver +1, Bronze +0, Score = 6 2008→2012: Gold +1, Silver -4, Bronze +0, Score = -4	14	
Basketball	Mike Krzyzewski	2004→2008: Gold +1, Silver -1, Bronze +0, Score = 2 2008→2012: Gold +0, Silver +0, Bronze +0, Score = 0 2012→2016: Gold +0, Silver +0, Bronze +0, Score = 0	2	
Volleyball	Karch Kiraly	2008→2012: Gold +0, Silver +0, Bronze +0, Score = 0 2012→2016: Gold +0, Silver -1, Bronze +1, Score = -1 2016→2020: Gold +1, Silver +0, Bronze -1, Score = 3	2	

Table 6: Sports Statistics