China Wins the 2028 Olympic Games!

Peter Bendel, Marcos Martinez, and Nicholas Mohrhauser

Overview of Project- Two Models

- **First Model- Predicting the Medal Table**
  Predicts which seven countries will have the most gold medals at the next Olympics using only the number of medals earned in previous Olympics
- **Second Model-Predicting New Winners**
  Predict countries that have never won an Olympic medal before to win their first medal at the next Olympics

Home Field Advantage and Great Coaches

Home Field Advantage

- In sports, home field advantage can often have a great effect on winning, especially when traveling between countries
- By examining the medal trends for the host country before and after hosting compared to the host year, we found a trend
- By hosting the Olympics, a country that earns relatively fewer medals will increase their medals earned, but a country that earns many medals, like the United States, will not earn many more medals

Total Medals from Select Host Countries Before and After Hosting

Team	3 Before	2 Before	1 Before	Host Year	1 After	2 After	3 After
Brazil	10	17	17	19	21	20	NA
United States	174	94	108	101	93	101	112
Spain	6	5	4	22	17	11	20
Total	350	319	390	536	417	341	355

Winners: Model 1 vs. Model 2

Model 1: The countries predicted to win the most gold medals

Country	Gold	Silver	Bronze	Total (Direct)	Total (Indirect)
China	44+10	30+5	26+5	101+16	100+20
United States	41+4	46+5	43+4	130+8	130+15
Australia	20+4	20+5	18+4	58+10	58+13
Japan	19+6	11+3	12+4	42+11	42+13
Great Britain	17+7	24+5	31+5	72+15	72+17
Netherlands	16+3	8+2	13+3	38+6	37+8
South Korea	14+2	9+3	11+2	34+4	34+7

Model 2: Countries predicted to win their first medal

Country	Total Athletes	Predicted 2028 Athletes	Pr(X>Total Athletes + Predicted Athletes) 95% confidence [1]
Angola	313	26	0.9388-0.999
El Salvador	234	10	0.8661-0.993
Honduras	218	23	0.8628-0.9925

Problem Overview

The Problem

Our goal was to use data provided by the previous Olympic games to predict the results for the 2028 Olympic games. More specifically, we are trying to predict the medal counts for each country and predict which countries will win their first medal in the 2028 Olympic games

Model 2- Predicting New Winners

Simplifying Assumptions

1. The probability that a country will earn their first medal follows a binomial distribution
2. The probability of a success is consistent and is equal to the inverse of the average number of athletes sent for a country to earn their first medal
3. The number of athletes sent to the Olympics is the biggest factor for a country to earn their first medal

Country/ Team	Athletes For First Medal
Refugee	8
Albania	24
Cape Verde	31
Burkina Faso	37
San Marino	38
Dominica	45
Bahrain	48
Turkmenistan	52
St. Lucia	54
Botswana	57
Cyprus	64
Jordan	76
Kosovo	79
Gabon	80
Grenada	82
Guatemala	93
Montenegro	117
Afghanistan	122
Mauritius	152
Tajikistan	157
Togo	385

Country	Total Athletes	Predicted 2028 Athletes	Pr(X>Total Athletes + Predicted Athletes) 95% confidence [1]
Angola	313	26	0.9388-0.999
El Salvador	234	10	0.8661-0.993
Honduras	218	23	0.8628-0.9925
Antigua and Barbuda	144	9	0.7166-0.9554
Bolivia	130	12	0.6897-0.9442
Malta	129	8	0.6767-0.9383
Madagascar	130	6	0.674-0.937
Tuvalu	11	1	0.0942-0.2165

Summary

This models shows that countries who have sent many athletes to the Olympics are more likely to win a medal. Using the number of athletes sent in total as well as the predicted number of athletes set to compete in 2028, this model shows countries, such as Angola or El Salvador would be expected to earn a medal, while a country like Tuvalu is not expected to earn a medal at the upcoming Olympics.

Model 1- Predicting the Medal Table

Exponential Smoothing – Weighted Medal Counts

Exponential Smoothing uses past data, weighted by how recent the data is, to predict future trends. Because we are given the data of many Olympic games, we decided that far enough back, the Olympics would have little to no bearing on the current Olympics, so the cutoff was set at the 1988 Olympics and onwards.

Simplifying Assumptions

1. The more recent Olympics are better predictors, so the cutoff date is the 1988 Olympics
2. If a country did not participate in the 2024 Olympics, they will not participate in the 2028 Olympics
3. Every number is rounded as there are no partial people nor medals
4. The medal trends for Gold, Silver, and Bronze are similar to total medal trends

Real Results of 2024 Olympics from Problem C

	Gold	Silver	Bronze	Total
United States	40	44	42	126
China	40	27	24	91
Japan	20	12	13	45
Australia	18	19	16	53
France	16	26	22	64
Netherlands	15	7	12	34
Great Britain	14	22	29	65

Predicted Top Seven Countries for 2024

Country	Gold	Silver	Bronze	Total (Direct)	Total (Indirect)
United States	44+4	46+5	37+4	126+8	127+15
China	41+10	35+5	22+5	97+16	98+20
Japan	26+6	15+3	19+4	63+11	62+13
Great Britain	25+7	23+5	24+5	71+15	72+17
Australia	18+4	9+5	23+4	49+10	50+13
Germany	12+6	13+5	18+7	42+15	43+18
France	11+3	14+5	13+4	38+9	38+12

Summary

This model is effective at predicting the medal counts of countries who earn more medals on average. As the number of events at the Olympic games are typically increasing, so do the total amount of medals which this model is accurate in predicting.

Predicted Top Seven Countries for 2028

Country	Gold	Silver	Bronze	Total (Direct)	Total (Indirect)
China	44+10	30+5	26+5	101+16	100+20
United States	41+4	46+5	43+4	130+8	130+15
Australia	20+4	20+5	18+4	58+10	58+13
Japan	19+6	11+3	12+4	42+11	42+13
Great Britain	17+7	24+5	31+5	72+15	72+17
Netherlands	16+3	8+2	13+3	38+6	37+8
South Korea	14+2	9+3	11+2	34+4	34+7

Conclusions

- Model 1 predicts the number of medals every country will earn based on their previous Olympic performances
- Our Model predicts that China will win the most gold medals at the 2028 Olympic games, followed by the United States and Australia
- A country can improve their chances of winning more medals by either hosting the Olympics or by hiring a great coach to help their teams succeed
- Model 2 helps predict countries to get their first medal by using the number of athletes each country has sent in the past
- Model 2 shows that countries such as Angola, El Salvador, and Honduras have a great chance at winning their first Olympic medal while a country like Tuvalu does not have a great chance