Visualization Design and Redesign

CS 448B | Fall 2024

MANEESH AGRAWALA

1

ANNOUNCEMENTS

3

ASSIGNMENT 2: EXP. DATA ANALYSIS

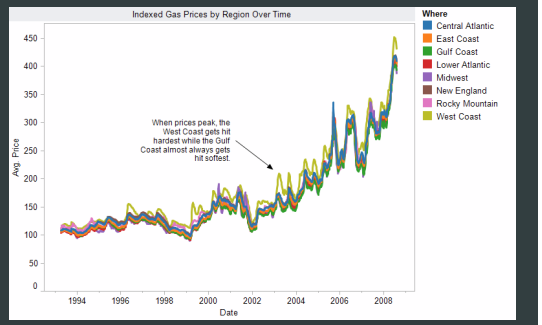
Due 10/14 10:30am

Use Tableau or Vega-Lite to formulate & answer data questions

First steps
- Step 1: Pick domain & data
- Step 2: Pose questions
- Step 3: Profile data
- Iterate as needed

Create visualizations
- See different views of data
- Refine questions

Author a report
- Screenshots of most insightful views (8+)
- Include titles and captions for each view



4

ASSIGNMENT 2: Tableau vs. Vega-Lite

Due 10/14 10:30am

Tableau
- Drag-and-drop interface with additional advanced options
- Requires student license for installation (request license ASAP)
- Cameron will be hosting an intro tutorial Friday
- Zoom link is on Canvas & course website

Vega-Lite
- Refer back to week 1 & 2 notebooks
- Learn ahead with week 3 notebooks
- Visit OH to check your answers

5

A1 REVIEW

6

DESIGN CONSIDERATIONS

Guides: Title, labels, legend, captions, source!

Expressiveness and Effectiveness

- Express the facts and only the facts
- Avoid unexpressive marks (lines? gradients?)
- Use perceptually effective encodings that match data type
- Don't distract: use faint gridlines, pastel highlights/fills
- The "elimination diet" approach – start minimal

Support comparison and pattern perception

- Between elements, to a reference line, or to counts
- Use reader-friendly units and labels

7

DESIGN CONSIDERATIONS

Group / sort data by meaningful dimensions

Transform data (e.g., filter, log, normalize)

Are model choices (regression lines) appropriate?

Reduce cognitive overhead

Minimize visual search, minimize ambiguity

Appropriate size, aspect ratio, legible text

Avoid legend lookups if direct labeling works

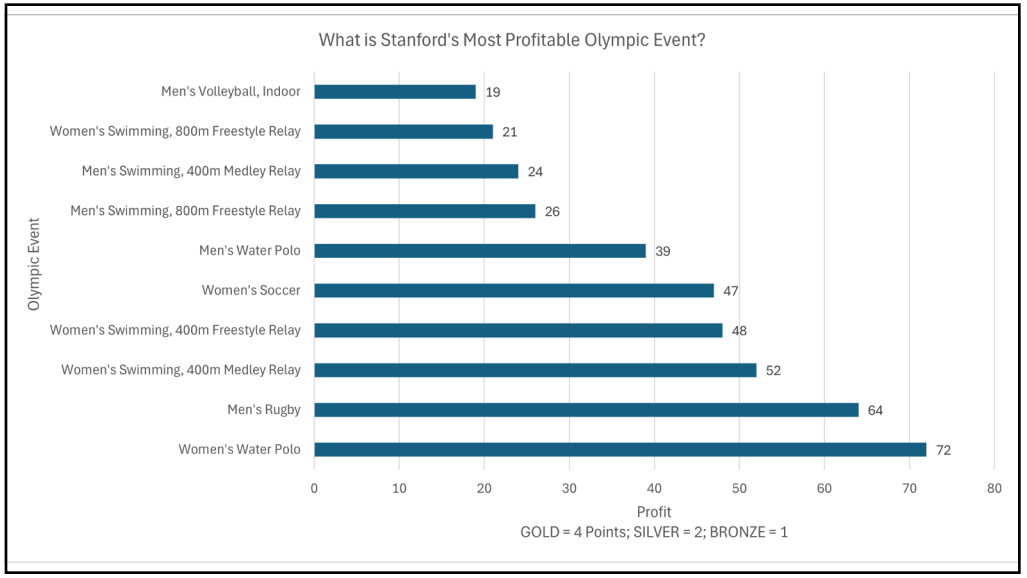
Avoid color mappings with indiscernible colors

Be consistent! Visual inferences should consistently support data inferences

8

BAR CHARTS

10


What is Stanford's Most Profitable Olympic Event?
Men's Volleyball, Indoor
19
Women's Swimming, 800m Freestyle Relay
21
Men's Swimming, 400m Medley Relay
24
Men's Swimming, 800m Freestyle Relay
26
Men's Water Polo
39
Women's Soccer
47
Women's Swimming, 400m Freestyle Relay
48
Women's Swimming, 400m Medley Relay
52
Men's Rugby
64
Women's Water Polo
72
Olympic Event
0
10
20
30
40
50
60
70
80
Profit
GOLD = 4 Points; SILVER = 2; BRONZE = 1

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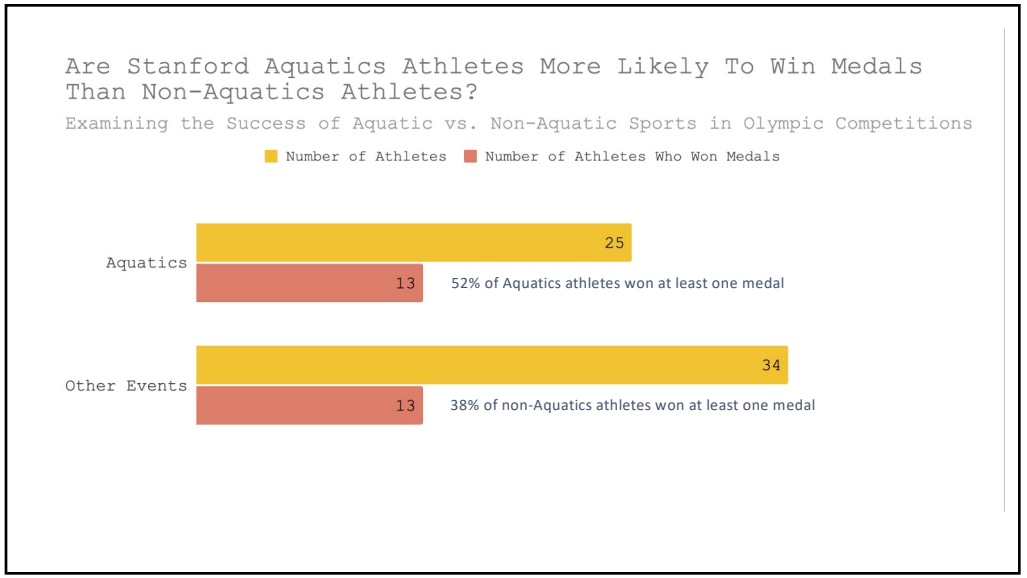
Are Stanford Aquatics Athletes More Likely To Win Medals Than Non-Aquatics Athletes?
Examining the Success of Aquatic vs. Non-Aquatic Sports in Olympic Competitions
Number of Athletes
Number of Athletes Who Won Medals
Aquatics
25
13
52% of Aquatics athletes won at least one medal
Other Events
34
13
38% of non-Aquatics athletes won at least one medal

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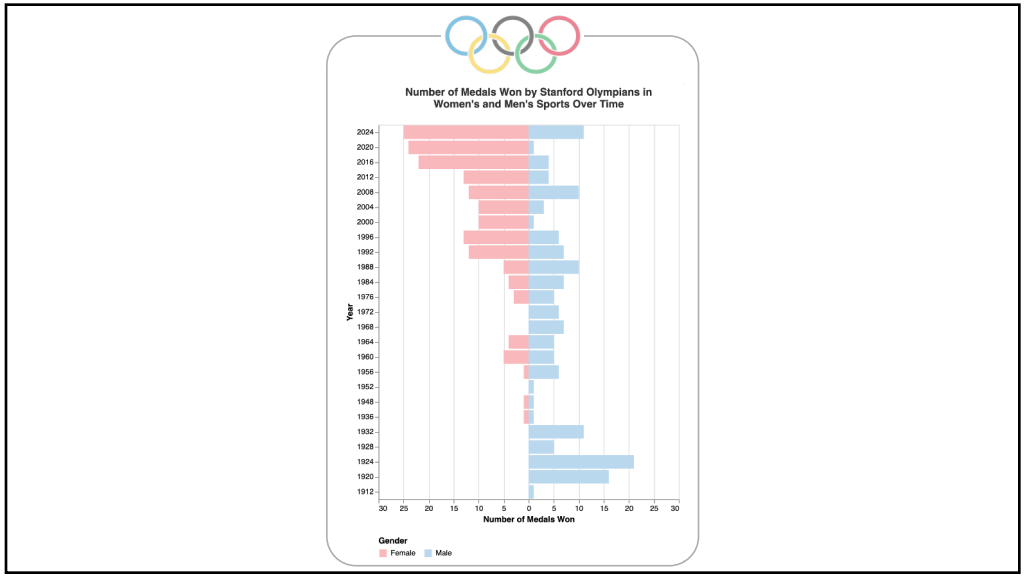
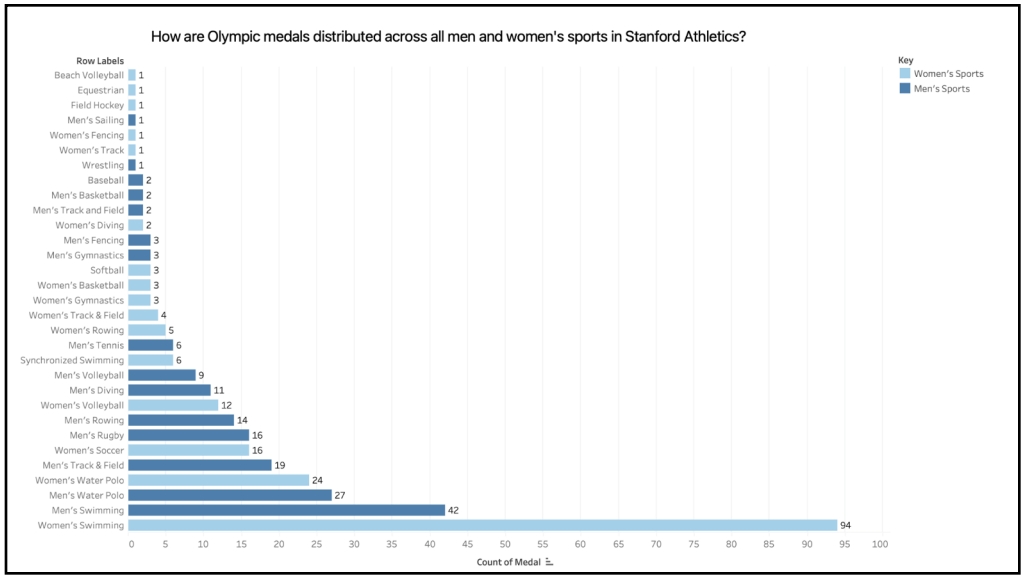

Number of Medals Won by Stanford Olympians in Women's and Men's Sports Over Time
Year
2024
2020
2016
2012
2008
2004
2000
1996
1992
1988
1984
1976
1972
1968
1964
1960
1956
1952
1948
1936
1932
1928
1924
1920
1912
30 25 20 15 10 5 0 5 10 15 20 25 30
Number of Medals Won
Gender
Female
Male

13


How are Olympic medals distributed across all men and women's sports in Stanford Athletics?
Row Labels
Beach Volleyball 1
Equestrian 1
Field Hockey 1
Men's Sailing 1
Women's Fencing 1
Women's Track 1
Wrestling 1
Baseball 2
Men's Basketball 2
Men's Track and Field 2
Women's Diving 2
Men's Fencing 3
Men's Gymnastics 3
Softball 3
Women's Basketball 3
Women's Gymnastics 3
Women's Track & Field 4
Women's Rowing 5
Men's Tennis 6
Synchronized Swimming 6
Men's Volleyball 9
Men's Diving 11
Women's Volleyball 12
Men's Rowing 14
Men's Rugby 16
Women's Soccer 16
Men's Track & Field 19
Women's Water Polo 24
Men's Water Polo 27
Men's Swimming 42
Women's Swimming 94
0 5 10 15 20 25 30 35 40 45 50 55 60 65 70 75 80 85 90 95 100
Count of Medal
Key
Women's Sports
Men's Sports

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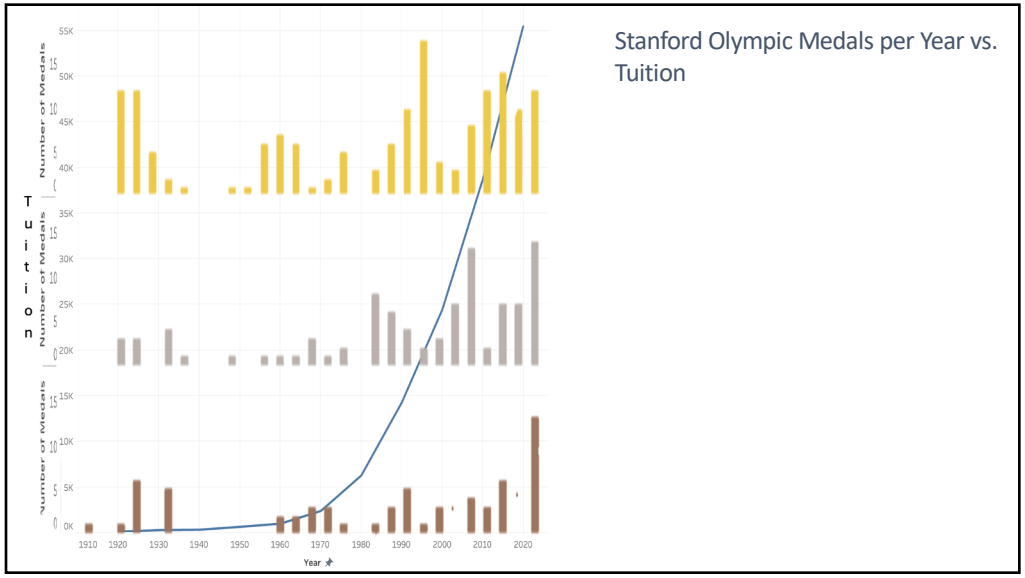

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STACKED BAR CHARTS

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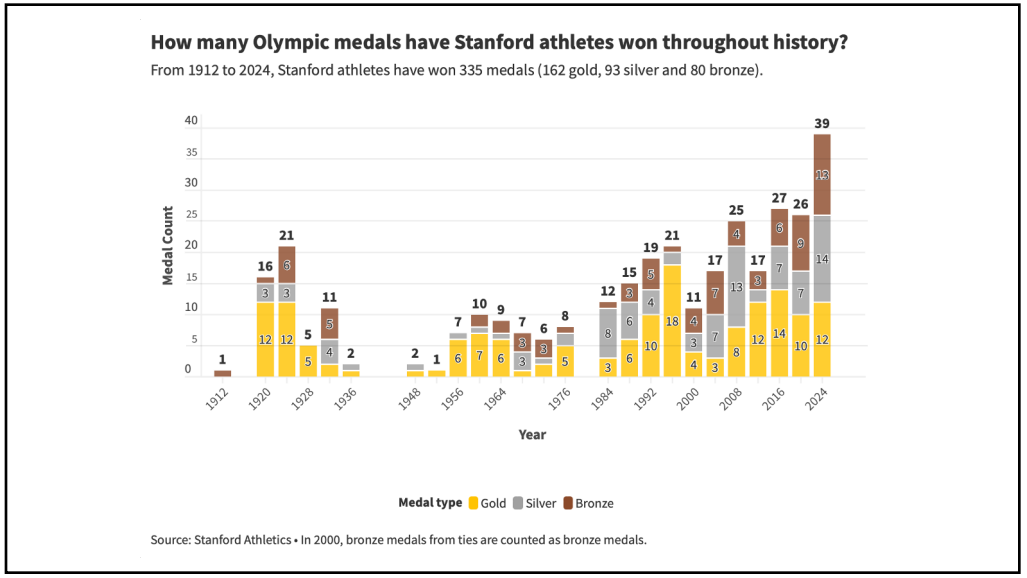
How many Olympic medals have Stanford athletes won throughout history?
From 1912 to 2024, Stanford athletes have won 335 medals (162 gold, 93 silver and 80 bronze).
Medal Count
Year
Medal type Gold Silver Bronze
Source: Stanford Athletics • In 2000, bronze medals from ties are counted as bronze medals.

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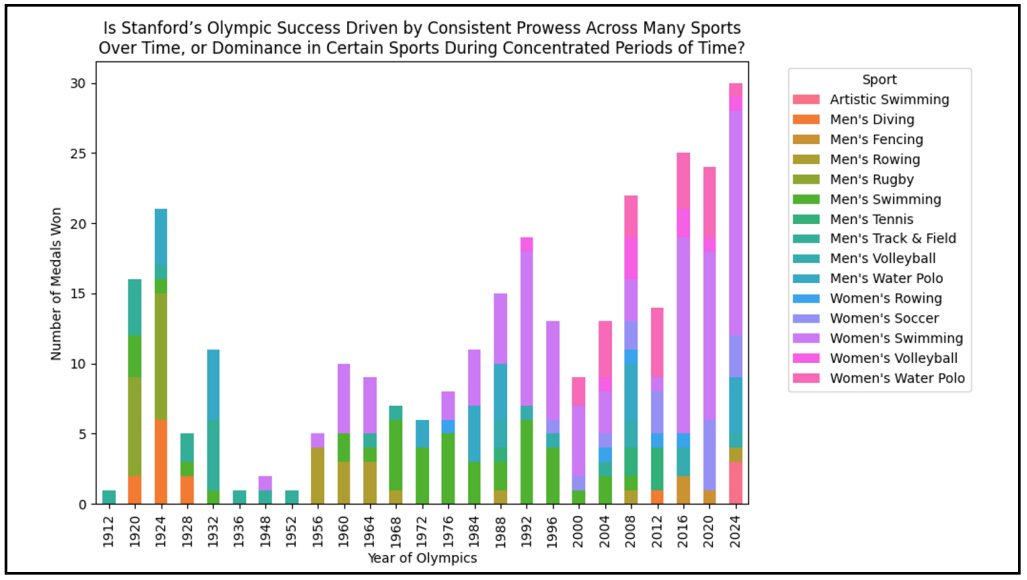
Is Stanford's Olympic Success Driven by Consistent Prowess Across Many Sports Over Time, or Dominance in Certain Sports During Concentrated Periods of Time?
Number of Medals Won
Year of Olympics
Sport
Artistic Swimming
Men's Diving
Men's Fencing
Men's Rowing
Men's Rugby
Men's Swimming
Men's Tennis
Men's Track & Field
Men's Volleyball
Men's Water Polo
Women's Rowing
Women's Soccer
Women's Swimming
Women's Volleyball
Women's Water Polo

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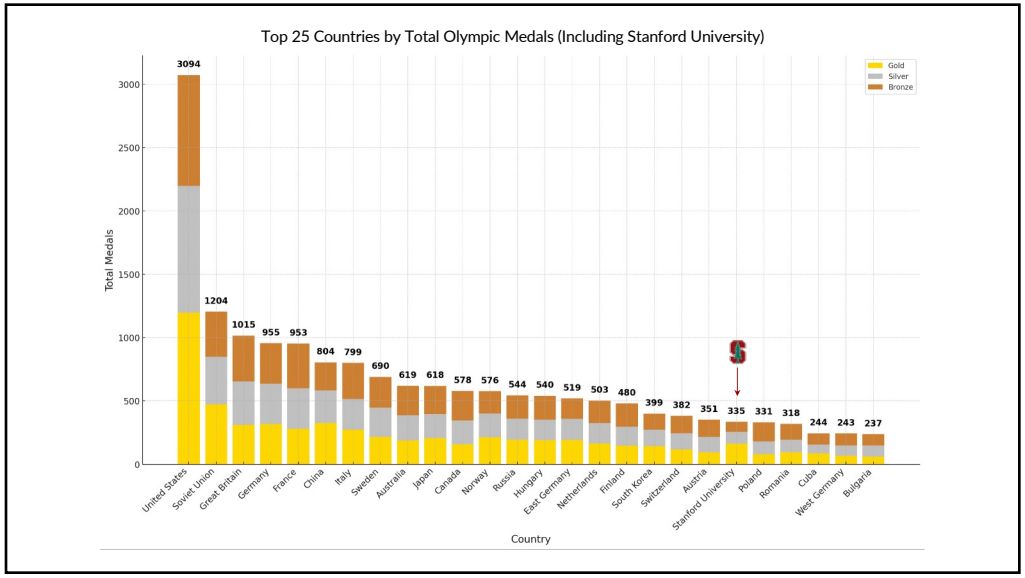
Top 25 Countries by Total Olympic Medals (Including Stanford University)
Gold
Silver
Bronze
Total Medals
0
500
1000
1500
2000
2500
3000
3094
1204
1015
955
953
804
799
690
619
618
578
576
544
540
519
503
480
399
382
351
335
331
318
244
243
237
United States
Soviet Union
Great Britain
Germany
France
China
Italy
Sweden
Australia
Japan
Canada
Norway
Russia
Hungary
East Germany
Netherlands
Finland
South Korea
Switzerland
Austria
Stanford University
Poland
Romania
Cuba
West Germany
Bulgaria
Country

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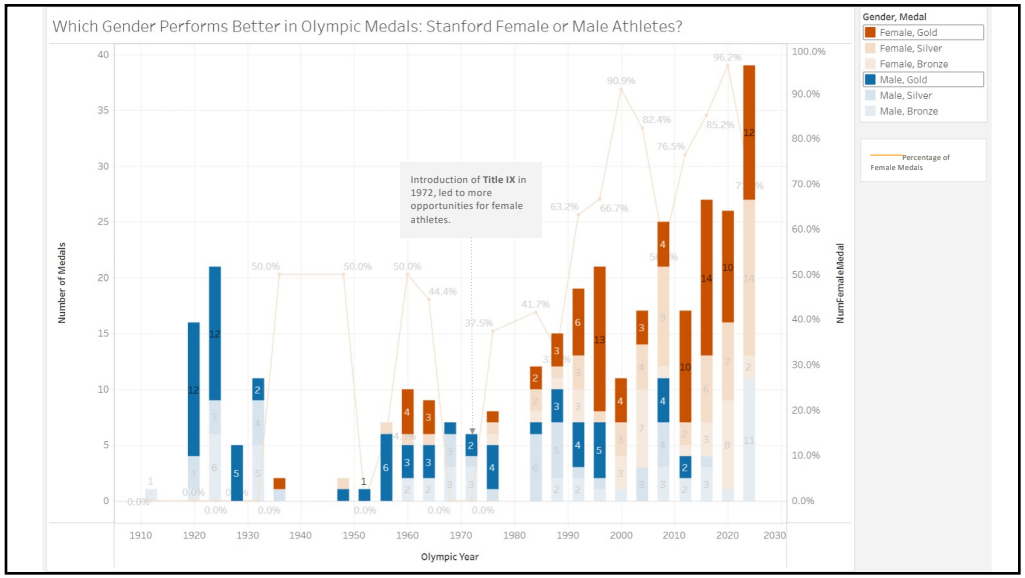
Which Gender Performs Better in Olympic Medals: Stanford Female or Male Athletes?
Gender, Medal
Female, Gold
Female, Silver
Female, Bronze
Male, Gold
Male, Silver
Male, Bronze
Percentage of Female Medals
Introduction of Title IX in 1972, led to more opportunities for female athletes.
Number of Medals
NumFemaleMedal
Olympic Year
1910
1920
1930
1940
1950
1960
1970
1980
1990
2000
2010
2020
2030

20

LINE CHARTS

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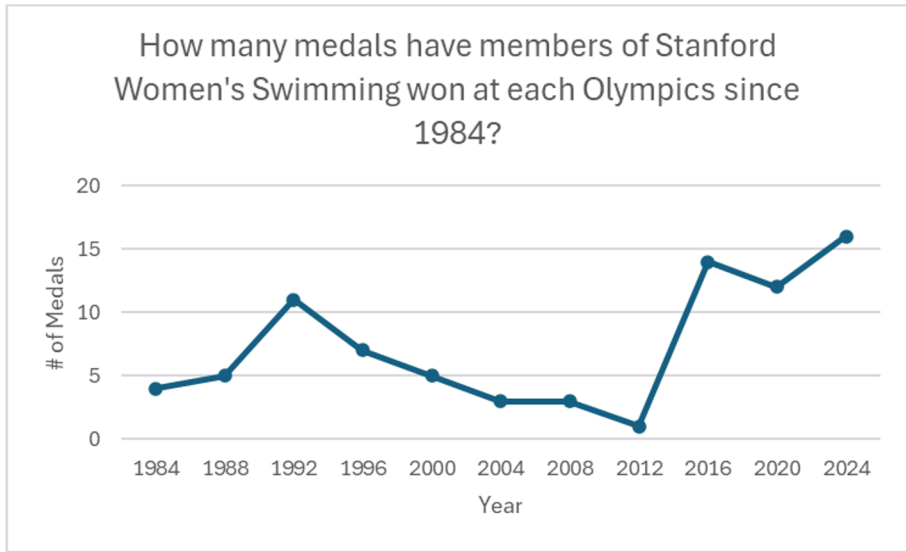

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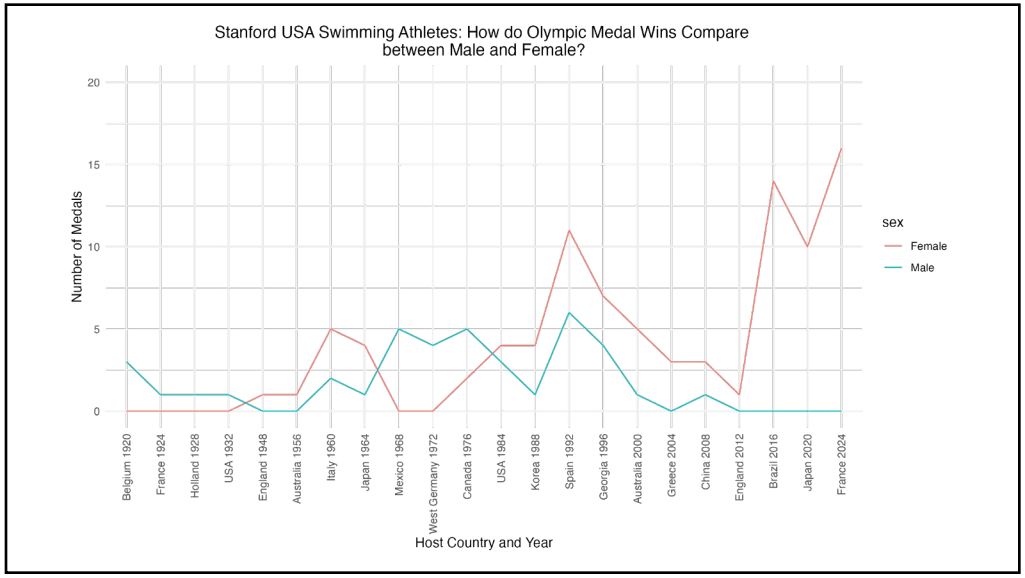
Stanford USA Swimming Athletes: How do Olympic Medal Wins Compare between Male and Female?
Number of Medals
20
15
10
5
0
Belgium 1920
France 1924
Holland 1928
USA 1932
England 1948
Australia 1956
Italy 1960
Japan 1964
Mexico 1968
West Germany 1972
Canada 1976
USA 1984
Korea 1988
Spain 1992
Georgia 1996
Australia 2000
Greece 2004
China 2008
England 2012
Brazil 2016
Japan 2020
France 2024
Host Country and Year
sex
Female
Male

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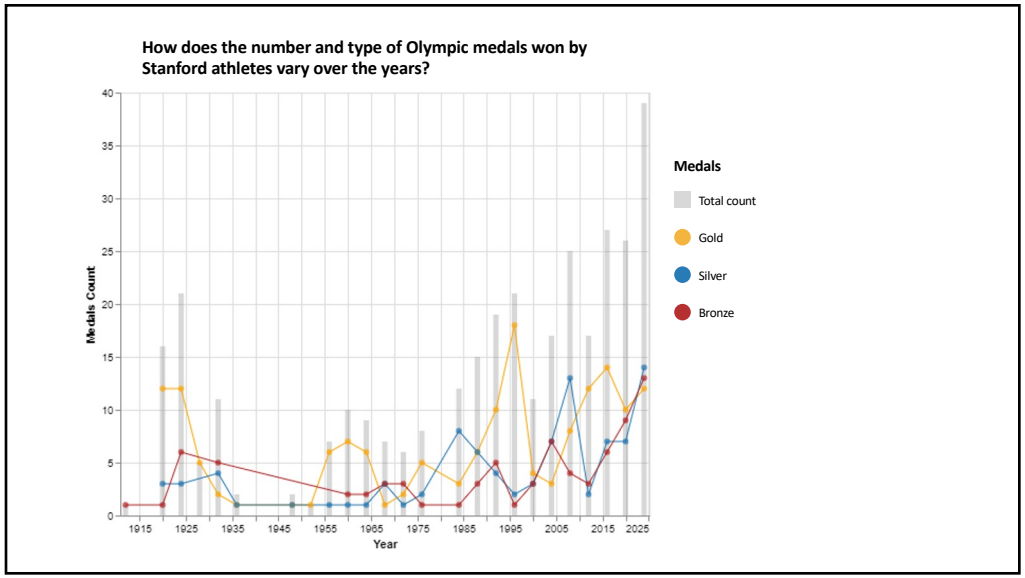
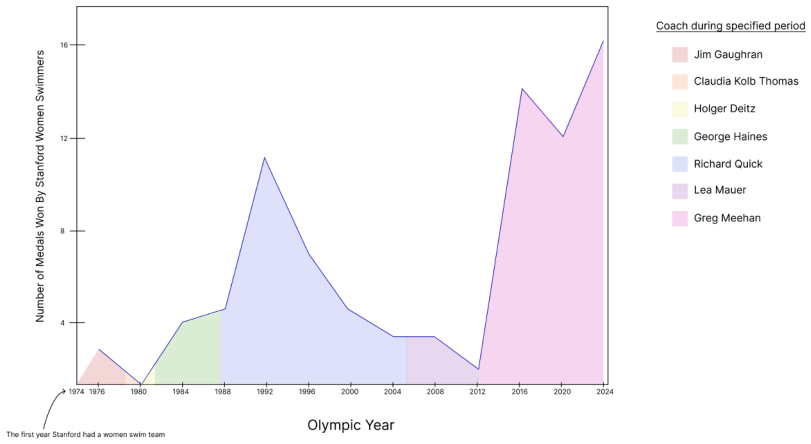

How does the number and type of Olympic medals won by Stanford athletes vary over the years?
Medals Count
40
35
30
25
20
15
10
5
0
1915
1925
1935
1945
1955
1965
1975
1985
1995
2005
2015
2025
Year
Medals
Total count
Gold
Silver
Bronze

24

AREA CHARTS

25

Which Stanford Women Swim Coach has been most successful at the Olympics?



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STACKED AREA CHARTS

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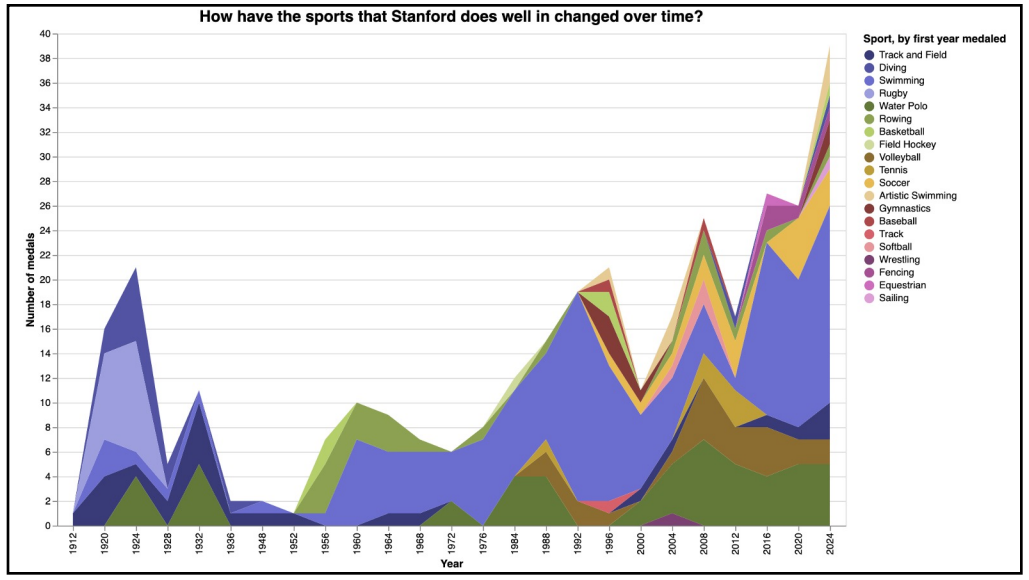

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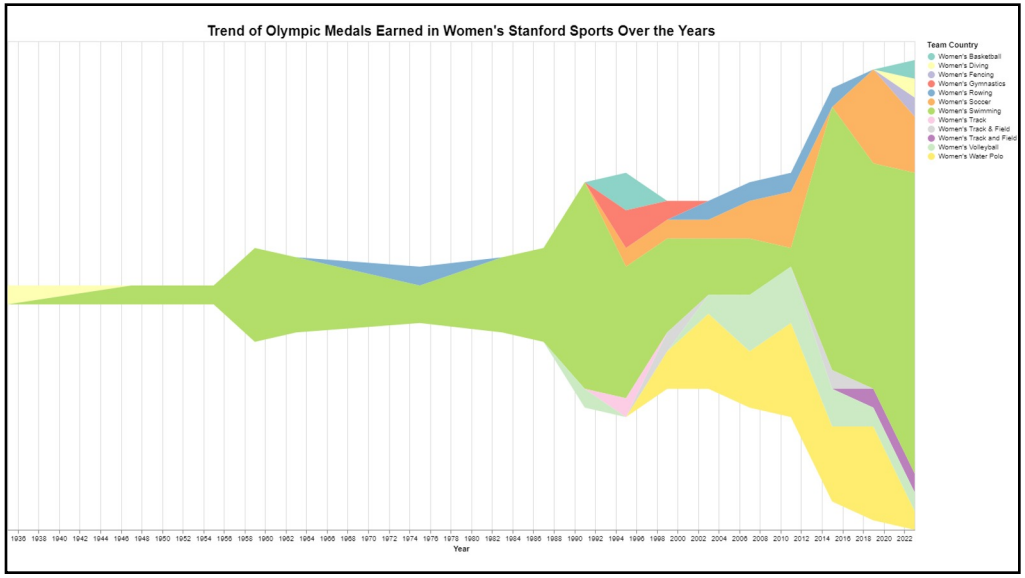
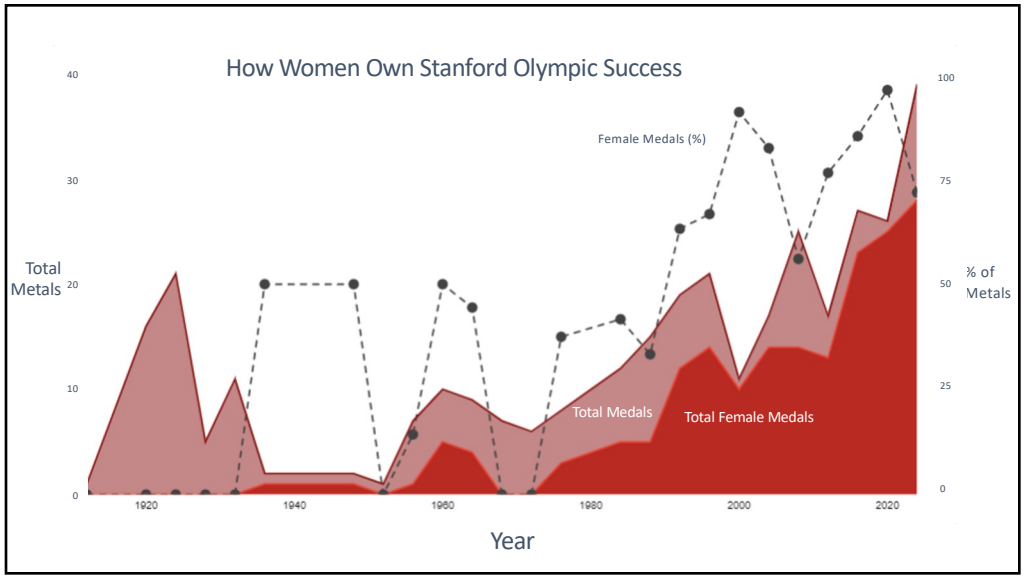

Trend of Olympic Medals Earned in Women's Stanford Sports Over the Years
Team Country
Women's Basketball
Women's Diving
Women's Fencing
Women's Gymnastics
Women's Rowing
Women's Soccer
Women's Swimming
Women's Track
Women's Track & Field
Women's Track and Field
Women's Volleyball
Women's Water Polo
Year

29


How Women Own Stanford Olympic Success
Female Medals (%)
Total Metals
% of Metals
Total Medals
Total Female Medals
Year

30

OTHER DESIGNS

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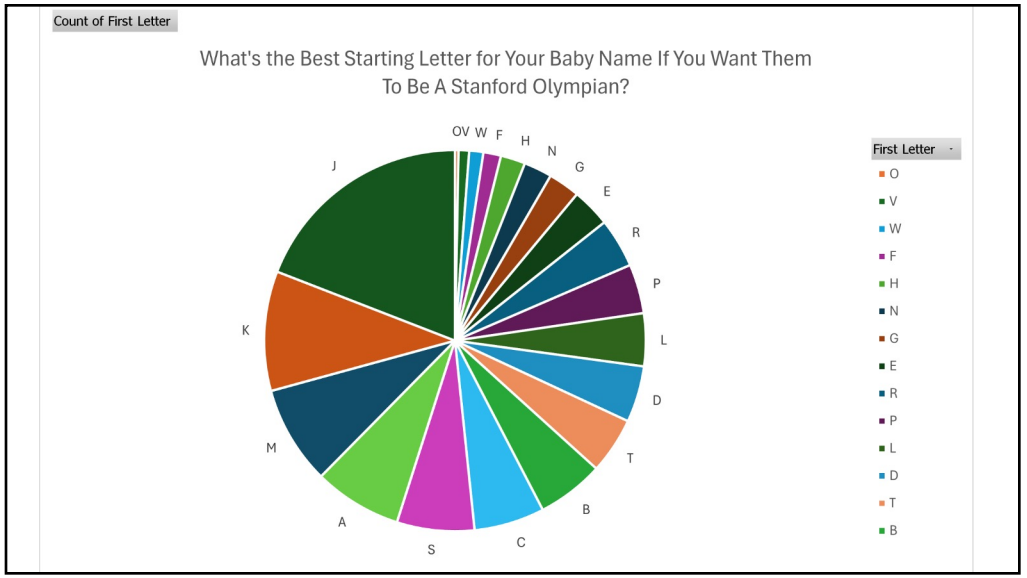

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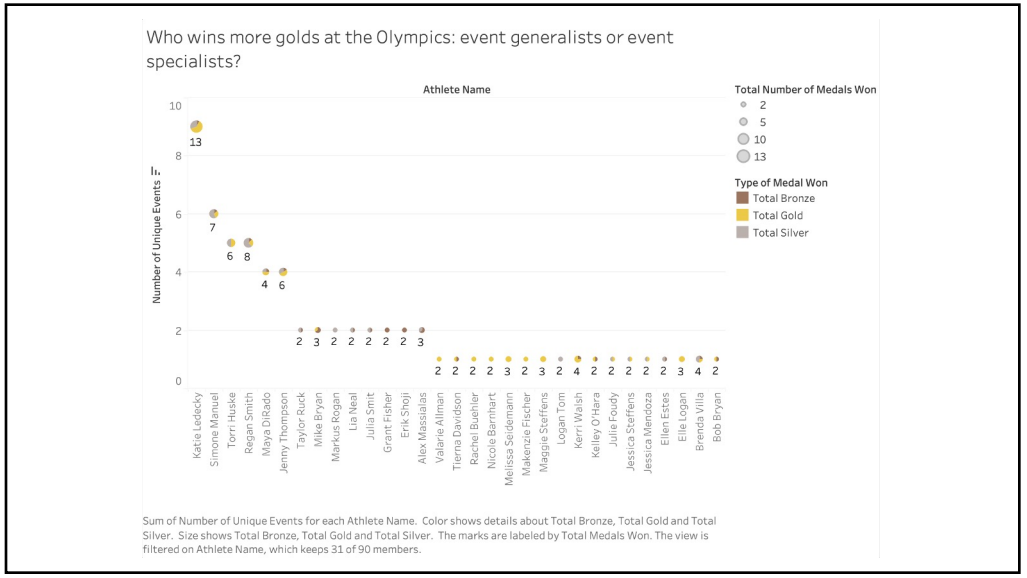
Who wins more golds at the Olympics: event generalists or event specialists?
Athlete Name
Total Number of Medals Won
2
5
10
13
Type of Medal Won
Total Bronze
Total Gold
Total Silver
Number of Unique Events
Katie Ladecky
Simone Manuel
Torri Huske
Regan Smith
Maya DiRado
Jenny Thompson
Taylor Ruck
Mike Bryan
Markus Rogan
Lia Neal
Julia Smit
Grant Fisher
Erik Shoji
Alex Massialas
Valarie Allman
Tierna Davidson
Rachel Buehler
Nicole Barnhart
Melissa Seidemann
Makenzie Fischer
Maggie Steffens
Logan Tom
Kerri Walsh
Kelley O'Hara
Julie Foudy
Jessica Steffens
Jessica Mendoza
Ellen Estes
Elle Logan
Brenda Villa
Bob Bryan
Sum of Number of Unique Events for each Athlete Name. Color shows details about Total Bronze, Total Gold and Total Silver. Size shows Total Bronze, Total Gold and Total Silver. The marks are labeled by Total Medals Won. The view is filtered on Athlete Name, which keeps 31 of 90 members.

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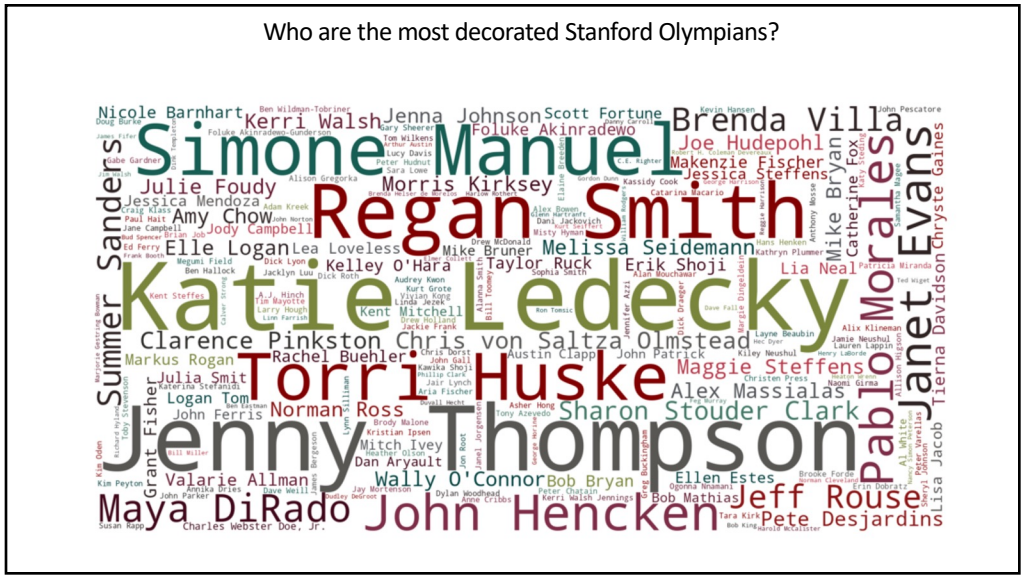
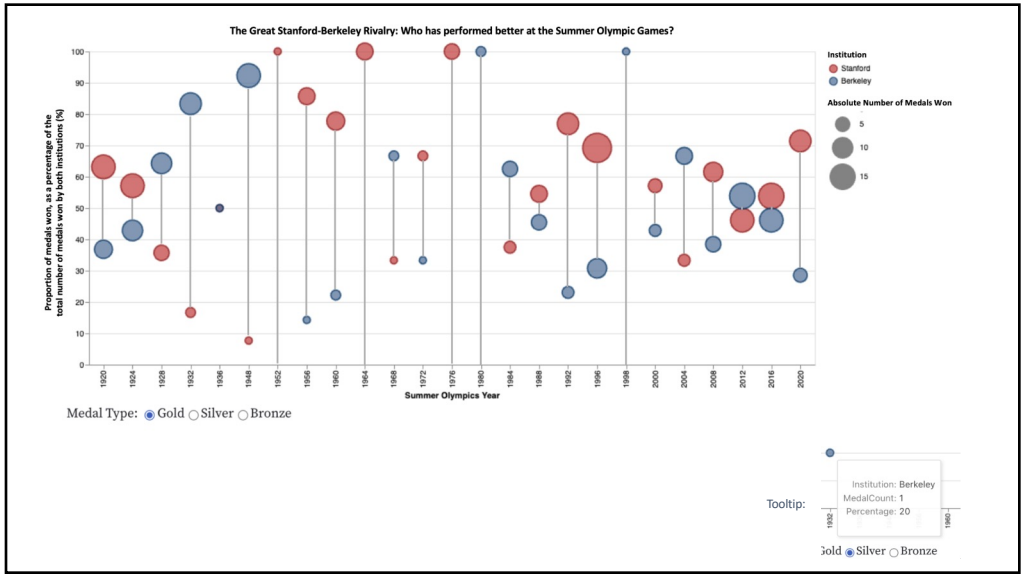
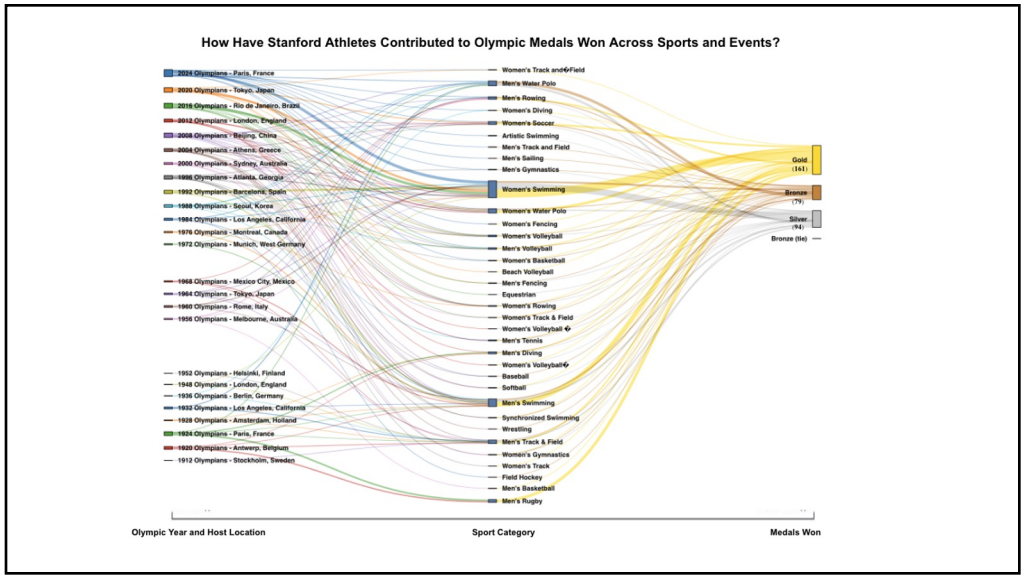

Who are the most decorated Stanford Olympians?
Simone Manuel
Katie Ledecky
Regan Smith
Jenny Thompson
Torri Huske
Maya DiRado
John Hencken
Jeff Rouse
Pete Desjardins
Nicole Barnhart
Kerri Walsh
Jenna Johnson
Scott Fortune
Foluke Akinradewo
Brenda Villa
Joe Hudepohl
Makenzie Fischer
Jessica Steffens
Julie Foudy
Morris Kirksey
Jessica Mendoza
Amy Chow
Jody Campbell
Elle Logan
Lea Loveless
Mike Bruner
Melissa Seidemann
Kelley O'Hara
Taylor Ruck
Erik Shoji
Lia Neal
Kent Mitchell
Clarence Pinkston
Chris von Saltza
Olmstead
Markus Rogan
Rachel Buehler
Austin Clapp
John Patrick
Julia Smit
Maggie Steffens
Alex Massialas
Logan Tom
John Ferris
Norman Ross
Sharon Stouder Clark
Mitch Ivey
Dan Aryault
Valarie Allman
Wally O'Connor
Bob Bryan
Ellen Estes
Bob Mathias
Summer Sanders
Janet Evans
Pablo Morales
Mike Bryan
Catherine Fox
Tierna Davidson
Chryste Gaines
Lisa Jacob
Grant Fisher

34


The Great Stanford-Berkeley Rivalry: Who has performed better at the Summer Olympic Games?
Proportion of medals won, as a percentage of the total number of medals won by both institutions (%)
Summer Olympics Year
Institution
Stanford
Berkeley
Absolute Number of Medals Won
5
10
15
Medal Type: Gold Silver Bronze
Tooltip:
Institution: Berkeley
MedalCount: 1
Percentage: 20
Gold Silver Bronze

35


How Have Stanford Athletes Contributed to Olympic Medals Won Across Sports and Events?
Olympic Year and Host Location
Sport Category
Medals Won
Gold (161)
Bronze (79)
Silver (94)
Bronze (tie)

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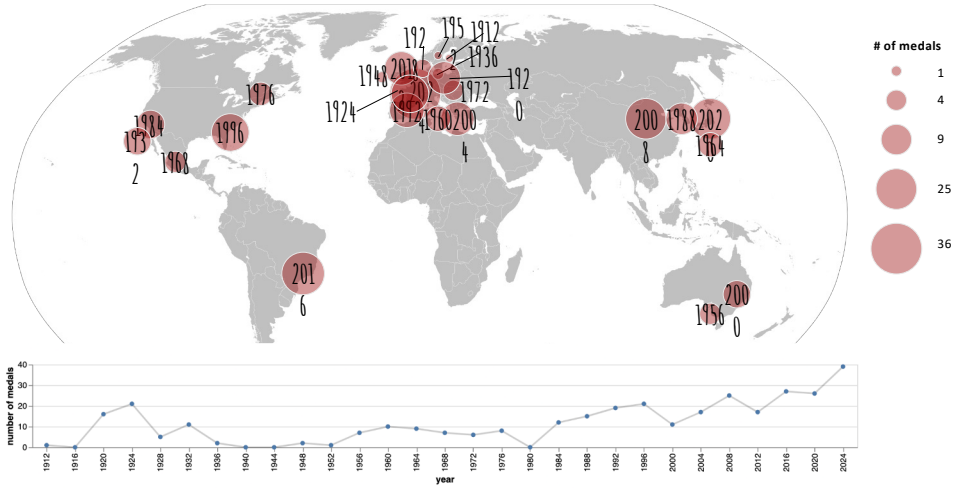
How many Olympic medals have Stanford students and alumni won, and when & where?



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