DATA VISUALISATION 2

FIT3179

IFSC WORLD CUPS 2015-2021

Dashboard

GitHub Repository

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Lab 15

Word Count

999

Domain and Audience

The domain is International Federation of Sports Climbing (IFSC) World Cup competition locations, demographics and results from 2015-2021, for all three disciplines: lead, boulder and speed. The visualisation (Figure 1) is aimed towards the general public (average English-speaker), introducing them to competitive sport climbing and educating them about competitions and athletes.

What

Data was sourced from the IFSC Official website (2021). It provided information on past World Cup competitions, demographics, athletes and results. Data from 2015-2021 was collected. Data came in table format, so it was collated, filtered and transformed using basic Excel calculations to find relevant attributes and remove unnecessary information. The map shapefile was found from Natural Earth (2021) and transformed to topojson using MapShaper (2021). Geographic longitude and latitude values of each competition location was found using Maps.ie (2021).

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Why and How

Entire visualisation

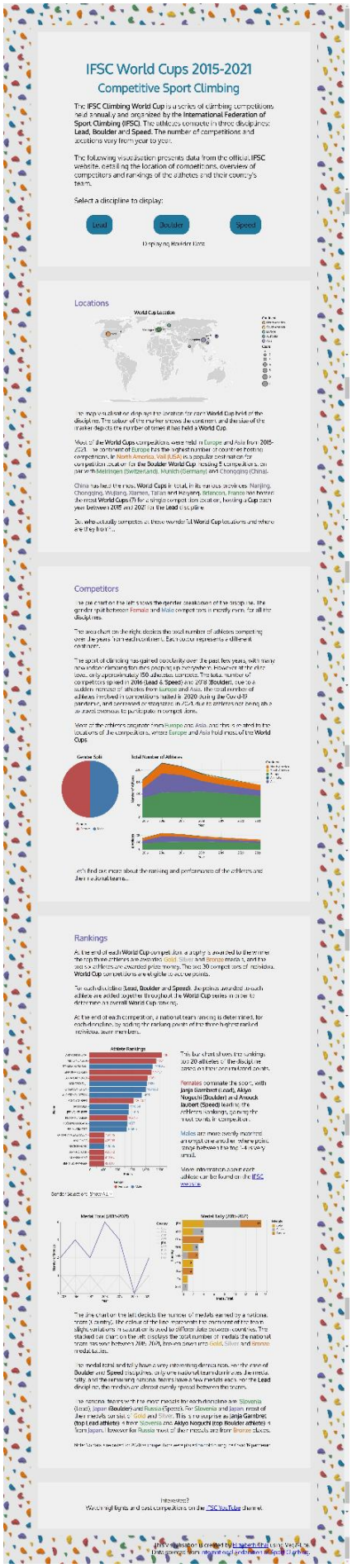

Figure 1 Entire view of IFSC World Cup dashboard

Inspiration for chart layouts came from Vega-Lite examples (Vega-Lite, 2021) and from FIT3179 Studios.

1. World Cup Location

This proportional symbol map idiom (Figure 2) allows the user to see the spatial distribution of IFSC World Cups. A point mark is located at longitude and latitude (qualitative) of the city (nominal). The size encodes the number of times (quantitative) the city has hosted (1-7), and the colours represent continent of the country. This reduced colours, making the chart easier to read. A world map was used for consistency, as other disciplines have competitions in other continents.

Figure 2 Proportional symbol map showing spatial distribution of IFSC World Cups

2. Gender Split

This pie chart (Figure 3) uses area, angle and colour to encode the percentage (quantitative) gender (categorical) breakdown of competing athletes. This visualisation can be used to lookup and compare proportion for gender.

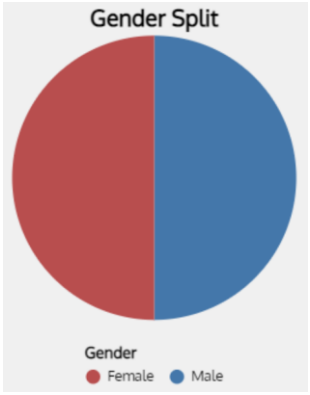

Figure 3 Pie chart to display gender breakdown of athletes for a specific discipline

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3. Total Number of Athletes

This area chart (Figure 4) displays number (qualitative) of athletes (categorical) competing at World Cups over time (ordinal), via area marks, colour channel and height of area. A smaller area chart is displayed underneath to allow for brushing over time, and linking is used for selection of continents displayed. This allows the user to analyse trends of athletes competing over time.

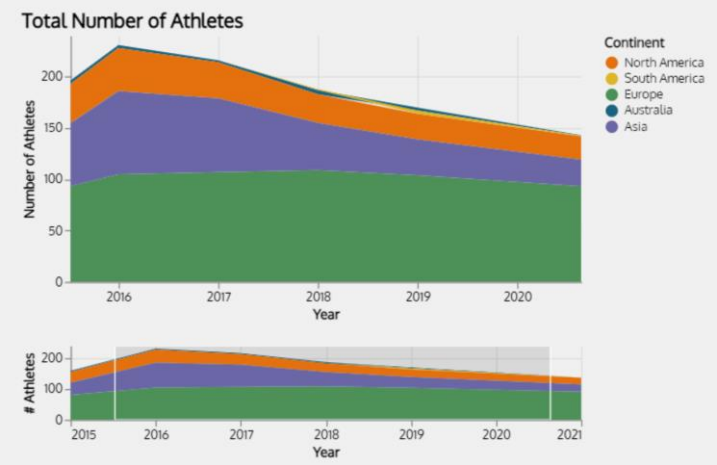

Figure 4 Area chart depicting total number of athletes participating in World Cups over time (2015-2021)

4. Athlete Rankings

This ranked bar chart (Figure 5) uses line marks and length channel to show number of points (quantitative) the top 20 athletes (horizontal position along framed common scale, nominal) have accumulated from competing. The colour channel is used to contrast female and male (categorical) competitors. The chart is sorted in descending order and a filter can be selected to display either female, male or both. This enables users to identify and compare the best athletes as described by annotations and text.

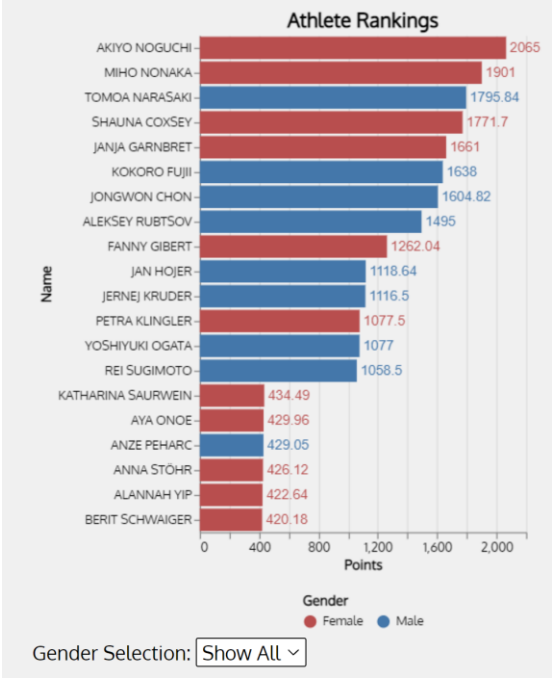

Figure 5 Bar chart illustrating the top 20 athlete point rankings for each discipline

5. Medal Total

This line chart (Figure 6) displays medal total (quantitative) of each country's national team (categorical) over time (ordinal). A point mark is used with line connections, where colour channel of the line indicates the continent the country belongs to. Slightly different saturations of continent hue are used to differentiate between countries from the same continent. Linking of the legend is used to allow users to highlight specific countries. This enables used to find trends and peaks for each country, and compare performance of each country.

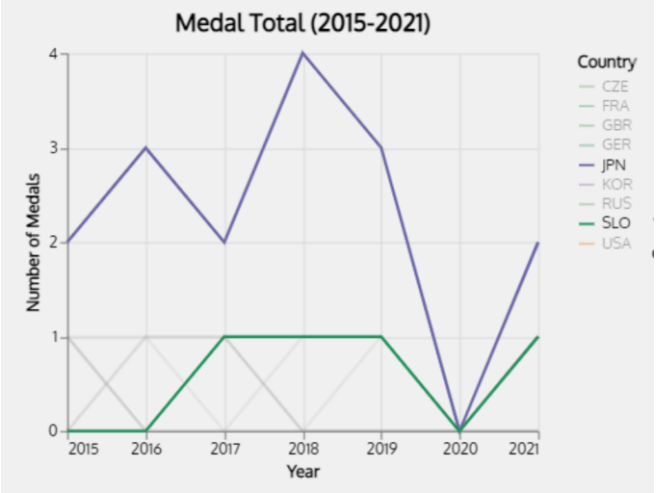

Figure 6 Line chart of medal total (2015-2021) which shows performance of each country's national team

6. Medal Tally

This stacked bar chart (Figure 7) illustrates a medal tally breakdown (line mark, length channel, quantitative) for each country (vertical position along framed common scale, nominal). Intuitive colours are used to represent the three categories of medal: Gold, Silver and Bronze. The countries are ordered in descending order and bar glyphs are ordered so that the bars are stacked in order of medal importance. Linking via the legend is also enabled. This allows users to compare countries and identify individual medal contributions.

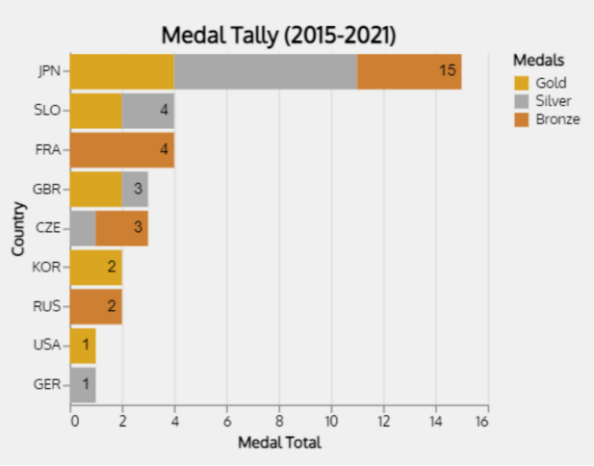

Figure 7 Stacked bar chart displaying the number of medals and type of medal each country has won

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Design

Layout

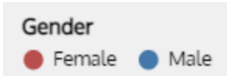
The vertical scrolling layout of the dashboard has a balanced layout and whitespace, and symmetrical layout. It is split horizontally using PureCSS, where some sections are 1:1, 1:2 or 1:3/2:3 to display elements. These sections were indicated using Gestalt principles of enclosure (by bounding elements in a box with a non-distracting background, and under same heading) and proximity (elements were grouped close together). Vertical sightlines are created via bounding boxes and text. Horizontal sightlines are indicated by enclosure and by aligning elements in HTML dividers.

Figure-Ground

The visual centre of dashboard is the map, which is the biggest element, centred near towards the top of the dashboard. Other visualisations are also comparatively large and coloured, so that they remain in the figure. Headings and chart titles are large and coloured to also allow them to standout. Narrative text is also large, with some words bolded and coloured to draw attention. Smaller, lighter fonts are used for chart labels, annotations and other less important ground elements.

Colour

Aesthetic and intuitive colour hues from the Paul Tol's colour schemes (2021) were used to represent country, gender and medal categorical attributes.

<table>
<tr><td> 
</td><td><table>
<tr><td>North America</td><td>#e4710e</td></tr>
<tr><td>South America</td><td>#dfb52b</td></tr>
<tr><td>Europe</td><td>#4d9159</td></tr>
<tr><td>Australia</td><td>#1a6381</td></tr>
<tr><td>Asia</td><td>#6b67a7</td></tr>
</table></td></tr>
<tr><td> 
</td><td><table>
<tr><td>Female</td><td>#b84e4e</td></tr>
<tr><td>Male</td><td>#4477AA</td></tr>
</table></td></tr>
<tr><td> 
</td><td><table>
<tr><td>Gold</td><td>#DAA520</td></tr>
<tr><td>Silver</td><td>#A9A9A9</td></tr>
<tr><td>Bronze</td><td>#cd7f32</td></tr>
</table></td></tr>
</table>

These colours were kept consistent throughout, wherever a category is mentioned in a chart or text. The background was a tiled image (Figure 8) and was edited so the holds match colour hue of each continent. Light grey boxes are used to 'box' sections together, following the Gestalt principle of Enclosure. Black was used for text, and hue or saturation varied with importance of the text.

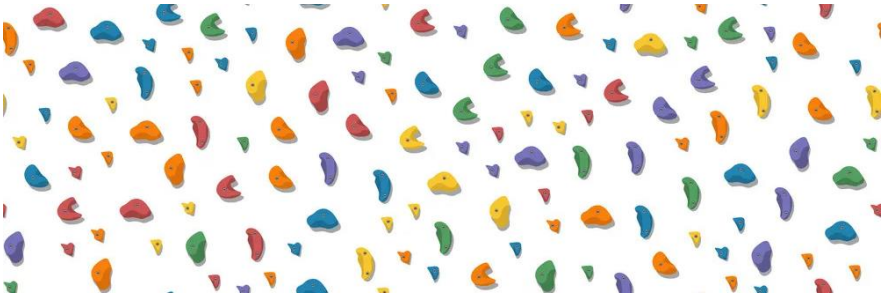


Figure 8 Tiling background of climbing holds (VectorStock, 2021)

These colours were checked for colour-blindness using a simulator (Wickline, 2001), depicted in Figure 9. Even with severe red-green blindness, different categories can be distinguished via different hues and shades. The red from the pie chart versus the green from the area chart maybe hard to distinguish, but they are encoding different attributes from separate data.

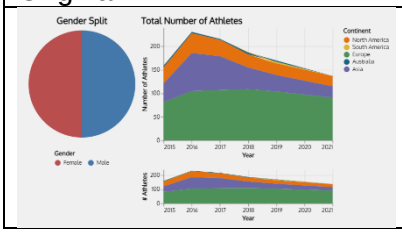
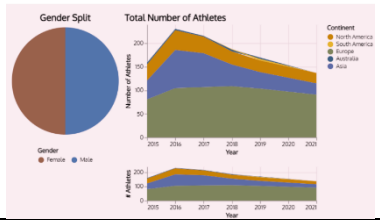
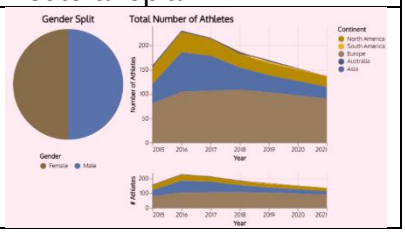
Original	Deuteranomaly	Deuteranopia
		

Figure 9 Visualising dashboard with different colour blindness lens

Typography

A Google sans serif typeface, Oxygen (Google Fonts, 2021), was chosen based on aesthetics and readability. A hierarchy was used to make the visualisation readable by varying size, weight, font style and colour when required. Font size was based off a percentage of the containing block. The heading (300%) and subheadings (250%, 175%) are large in size, text (125%) was average-sized, visualisation headings (16pt) and visualisation annotations/text was smaller (11pt).

The title is centre aligned, and headings, informative text and annotations are left aligned for readability. Narrative text is also kept to less than 10 words per line (via padding) with line spacing for readability. Annotations and text were laid out so that nothing was overlapping.

Storytelling

Genres of annotated chart and partitioned poster were used for the dashboard (Figure 1). Storytelling text (Figure 10) is scattered throughout the dashboard to maintain narrative and explain visualisations. Tooltips, annotations, brushing, linking and filtering were added onto visualisations to help the user read and enjoy the data.

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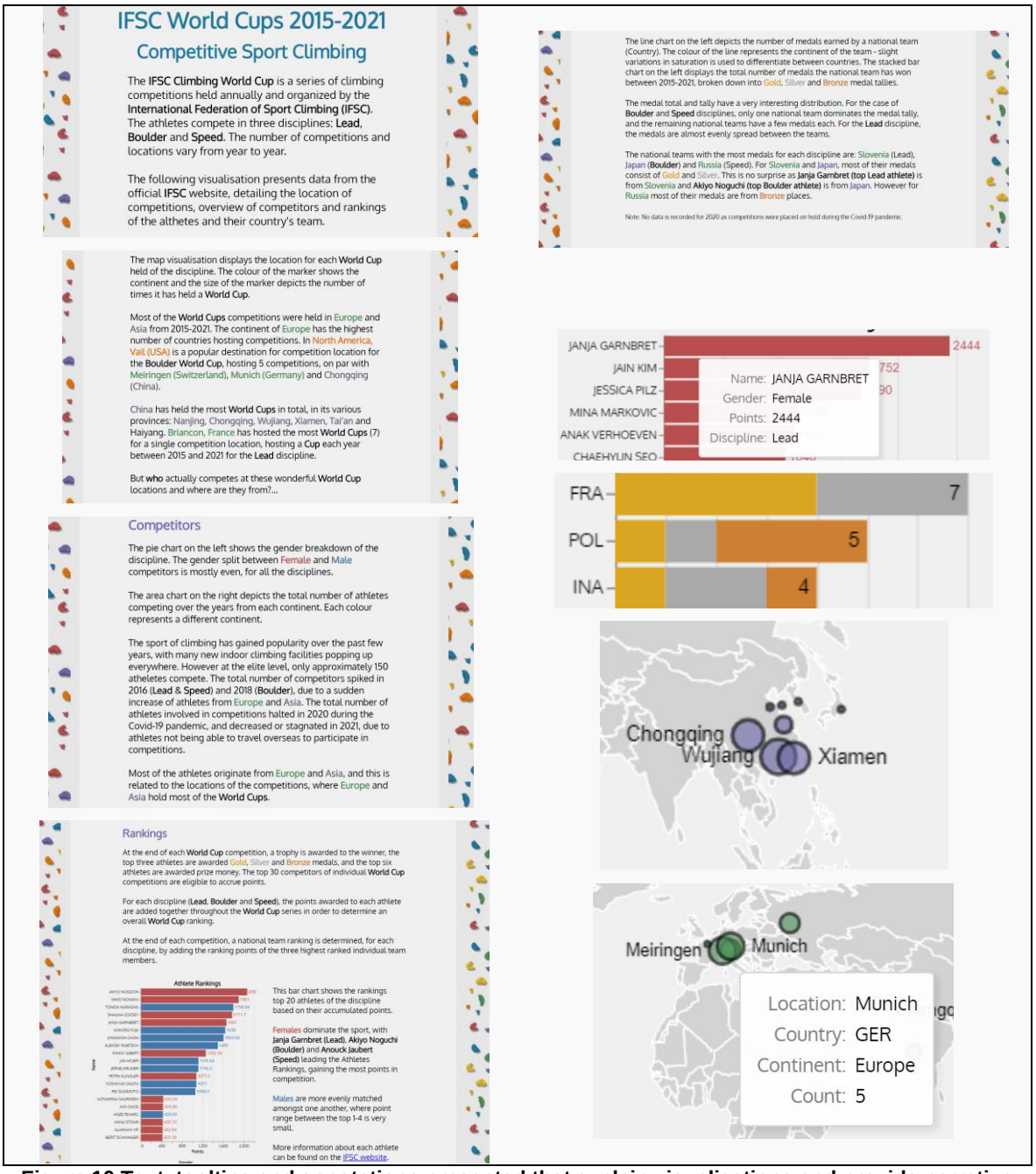


Figure 10 Text, tooltips and annotations presented that explain visualisations and provide narrative

A button filter for each discipline (Figure 11) is used at the top of the dashboard, increases interactivity, as well as provides 'details on demand'. When selected, the button colour is changed to purple until another event happens.

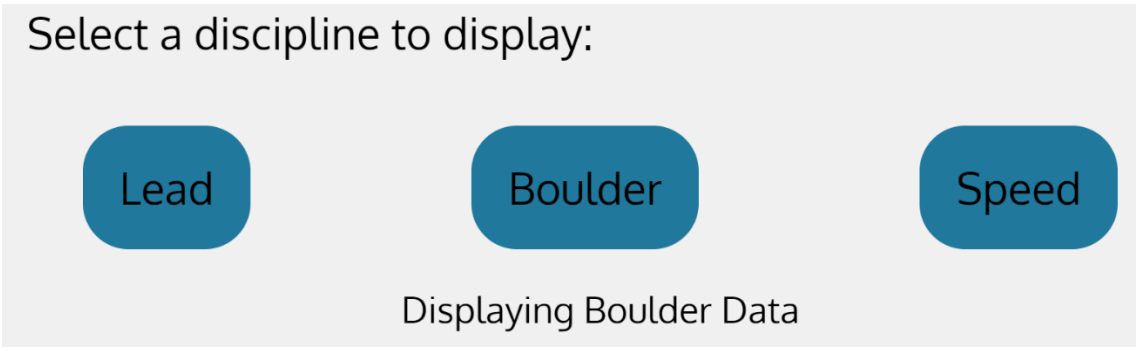


Figure 11 Interactive element for user to filter between Lead, Boulder and Speed disciplines to aid narrative

Bibliography

Google Fonts (2021). *Oxygen – Google Fonts*. Retrieved 21 September 2021, from https://fonts.googleapis.com/css2?family=Oxygen&display=swap

Maps.ie (2021). *GPS Coordinates on Google Maps*. Retrieved 12 September 2021, from https://www.maps.ie/coordinates.html

International Federation of Sport Climbing (2021). *Competitions*. Retrieved 12 September 2021, from https://www.ifsc-climbing.org/

Mapshaper (2021). *Mapshaper*. Retrieved 17 September 2021, from https://mapshaper.org/

Natural Earth (2021). *Downloads*. Retrieved 17 September 2021, from https://www.naturalearthdata.com/

Tol, P. (2021). *Colour schemes and templates*. Retrieved 20 September 2021, from https://personal.sron.nl/~pault/#sec:qualitative

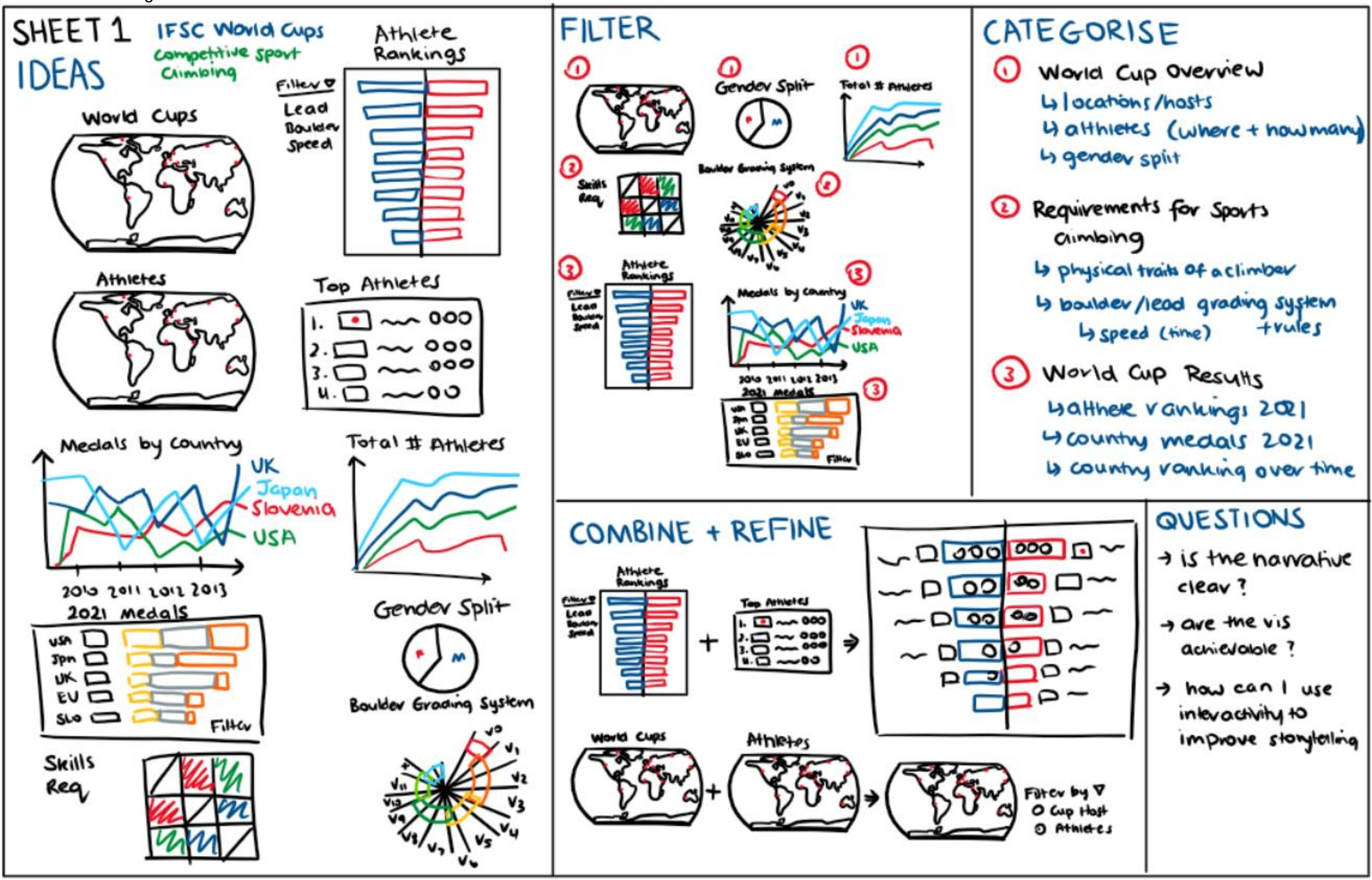
VectorStock (2021). *Holds for Rock Climbing Vector* [Image]. Retrieved 20 September, from https://cdn.vectorstock.com/i/1000x1000/45/07/holds-for-rock-climbing-vector-21934507.webp

Vega-Lite. (2021). Example Gallery | Vega-lite. Retrieved 12 September 2021, from https://vega.github.io/vega-lite/examples/

Wickline, M. (2001). *Color Blindness Simulator*. Retrieved 12 September 2021, from https://www.color-blindness.com/coblis-color-blindness-simulator/

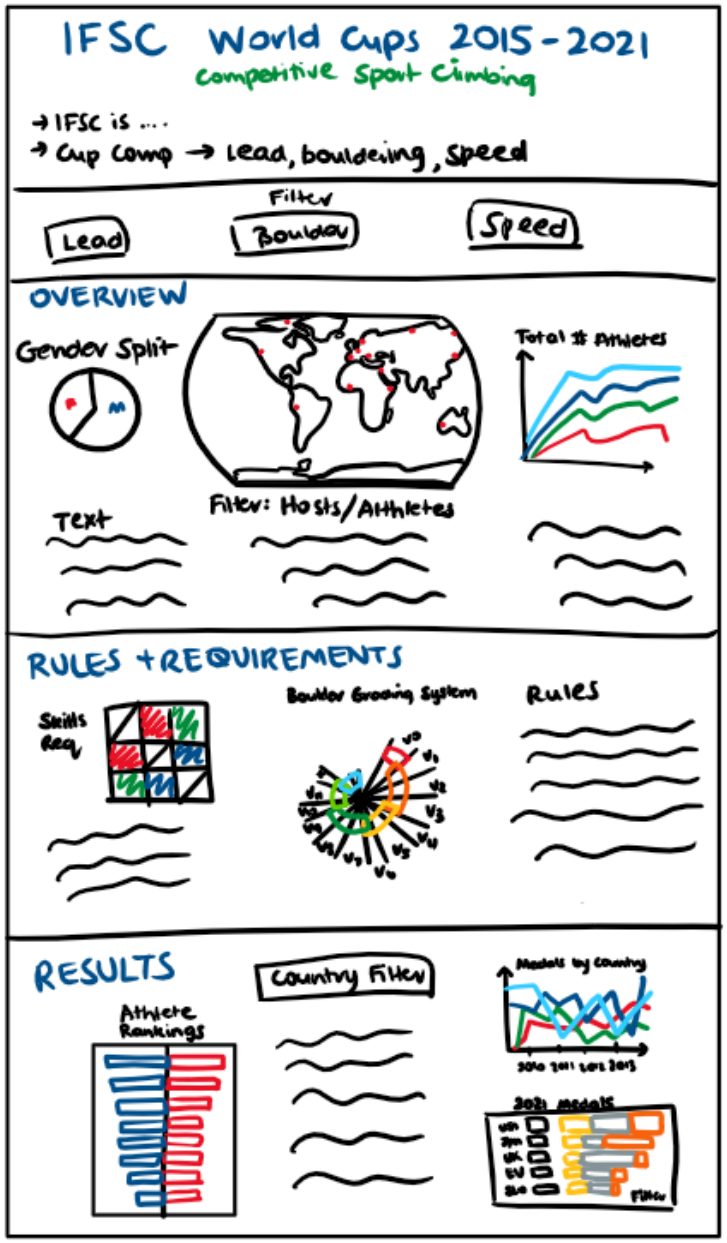
Appendix

Five Design Sheets



SHEET 2

LAYOUT



FOCUS

Filters between hosts & athletes

Map is visual centre
- ↳ shows the extent of competitive sport climbing over 2015-2021
- ↳ many different countries/athletes/disciplines
- ↳ very visually interesting
  - ↳ size of dot ⇒ # athletes/ # times hosted
  - ↳ colour of dot ⇒ continent

Overview / Rules + Requirements / Results
- ↳ sections breakdown vis into smaller more manageable pieces
- ↳ user can focus on parts

OPERATION

Filter between 3 main disciplines
- ↳ lead
- ↳ boulder
- ↳ speed

← click on 1 ⇒ filter applied

→ affects gender split, map, total # athletes, athlete rankings, country medals/ rankings.

Filter for country in results section
→ affects athlete rankings, medal country / rankings.

DISCUSSIONS

→ vertical scroll provides visual order and allows user to focus on each section individually

→ ample space for storytelling

→ balanced layout & whitespace

→ simple interactive elements

→ boulder grading polar chart may be difficult to implement in vegaLite

META INFORMATION

Title: IFSC World Cups 2015-2021

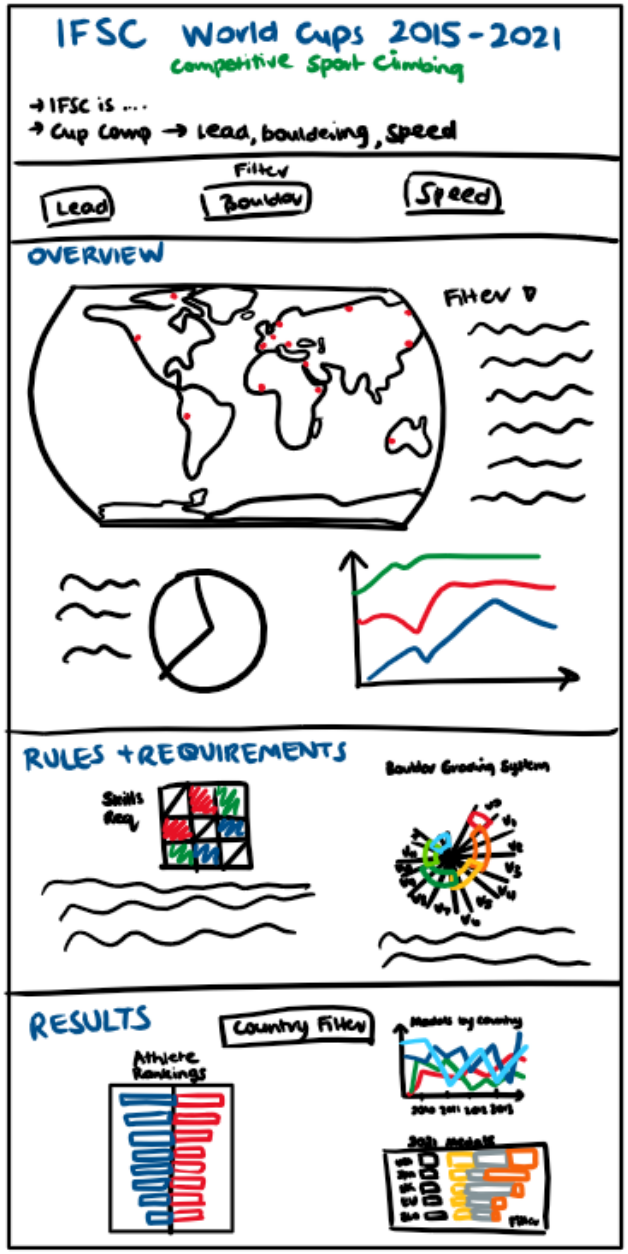
Author: Elizabeth Chai

Date: 12/09/21

Sheet: 2

Task: Draft

SHEET 3
LAYOUT



FOCUS

Filters between hosts & athletes

Map is visual centre
↳ shows the extent of competitive sport climbing over 2015-2021
↳ many different countries / athletes / disciplines
↳ very visually interesting

↳ size of dot ⇒ # athletes / # times hosted
↳ colour of dot ⇒ continent

Overview / Rules + Requirements / Results
↳ sections breakdown vis into smaller more manageable pieces
↳ user can focus on parts

OPERATION

Filter for country in results section
→ affects athlete rankings, medal country / rankings.

Filter between 3 main disciplines
↳ lead
↳ boulder
↳ speed
← click on 1 ⇒ filter applied

→ affects gender split, map, total # athletes, athlete rankings, country medals / rankings.

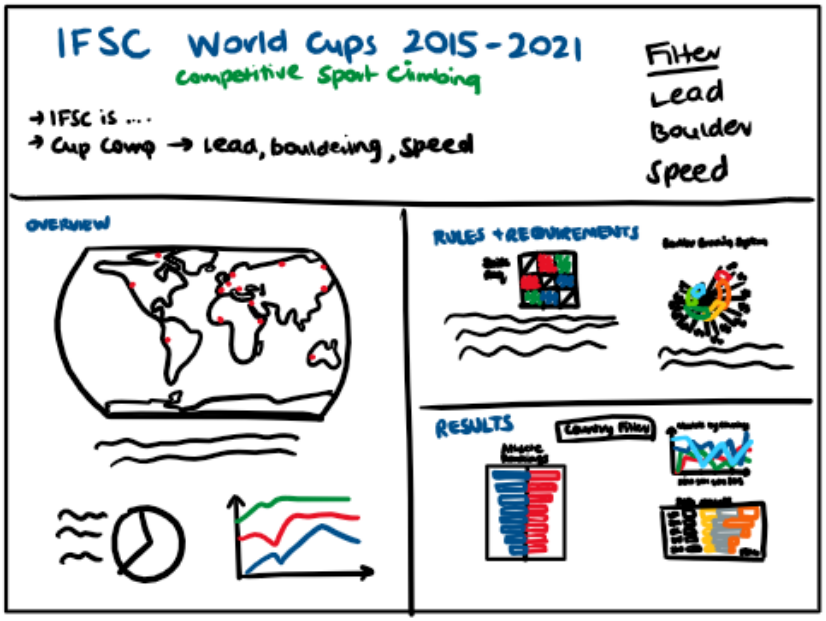
DISCUSSIONS

→ larger map allows for better visual centre + attention
→ two column layout causes a longer vis ⇒ more scrolling + whitespace
→ balanced & symmetrical layout
→ simple interactive elements
→ layout easy to code

META INFORMATION

Title: IFSC World Cups 2015-2021
Author: Elizabeth Chai
Date: 12/09/21
Sheet: 3
Task: Draft

SHEET 4
LAYOUT



FOCUS

Filters between hosts & athletes

Map is visual centre
- ↳ shows the extent of competitive sport climbing over 2015-2021
- ↳ many different countries / athletes / disciplines
- ↳ very visually interesting
- ↳ size of dot ≠ # athletes / # times hosted
- ↳ colour of dot ⇒ continent

Overview / Rules + Requirements / Results
- ↳ sections breakdown vis into smaller more manageable pieces
- ↳ user can focus on parts
- ↳ left/right layout gives more emphasis to overview section

OPERATION

Filter between 3 main disciplines
- ↳ lead
- ↳ boulder
- ↳ speed

← click on 1 ⇒ filter applied

→ affects gender split, map, total # athletes, athlete rankings, country medals / rankings.

Filter for country in results section
→ affects athlete rankings, medal country / rankings.

DISCUSSIONS

→ map is ~~no longer in visual centre~~

→ ~~harder to fit~~ 4 vis charts across landscape window & make it look nice

→ a ~~lot of whitespace~~ near title

→ layout very clean

META INFORMATION

Title: IFSC World Cups 2015-2021
Author: Elizabeth Chai
Date: 12/09/21
Sheet: 4
Task: Draft

SHEET 5 FINAL LAYOUT + NOTES

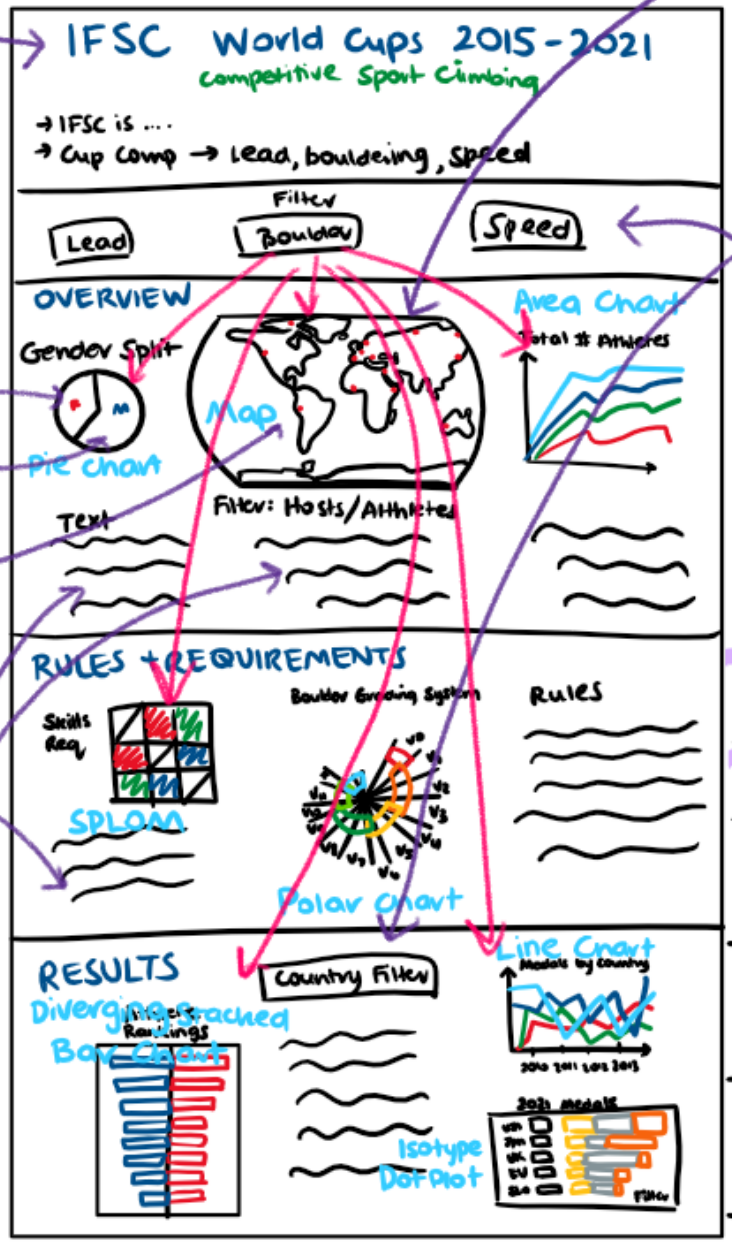
TYPOGRAPHY
→ sans-serif
→ caps + bold + big for title
→ medium + bold for subtitles / subheadings
→ small + desaturated colour for annotations + other text + tooltips

COLOURS
→ warm → female
→ cool → male
→ colour hues picked for countries
  ↳ maintained throughout vis
→ check for colour-blindness / better palettes

TEXT/ANNOTATIONS
→ added to describe + explain graphs & for narrative

TOOLTIPS
→ used throughout vis to provide more detail on hover

VISUALISATION
→ to be completed using HTML/CSS/Javascript & VegaLite in VSCode/Google Chrome



FOCUS
→ shows the extent of professional / comp sport climbing globally
→ IFSC is a prominent international governing body for sport climbing

FILTERS + LINKING
→ interactive elements to allow filtering + highlighting + button / drop down menu:
  ↳ discipline (lead, boulder, speed) for main vis
  ↳ country for Results section

COMPATABILITY
→ laptops, monitors + tablets

DEPENDENCIES & ESTIMATES
→ data pre-processing
  ↳ time: 1-2 hrs
  ↳ effort: medium
  ↳ software: Excel
→ create visualisations
  ↳ time: 5-8 hrs
  ↳ effort: high
  ↳ software: VS code/Chrome
→ create/arrange dashboard & add annotations
  ↳ time: 2-3 hrs
  ↳ effort: medium
  ↳ software: VS code/Chrome
→ cleaning up vis
  ↳ time: 1-2 hrs
  ↳ effort: low
  ↳ software: VS code/Chrome

META INFORMATION

Title: IFSC World Cups 2015-2021
Author: Elizabeth Chai
Date: 12/09/21
Sheet: 5
Task: Draft

DATASETS

https://www.ifsc-climbing.org/index.php/world-competition/ranking → IFSC Comps + Rankings

https://www.naftaliharris.com/blog/climbing-statistical-analysis/ → Analysis of Climbing Techniques

https://www.sciencedirect.com/science/article/pii/S1728869X19300723 → Comparison of Climbing Ranking

TIMELINE

Session 1: 14/09/21 Tues Wk 8
  ↳ data-processing
  ↳ create vis
Session 2: 21/09/21 Tues Wk 9
  ↳ continue with vis
  ↳ create dashboard + cleanup
Due: 18/10/21 Mon Wk 12