

Tableau Project:

Visual Analysis of Global Coffee via the Coffee Quality Institute

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INTRODUCTION

My favorite coffee hails from Ethiopia; as I took a sip of my daily morning coffee, I wondered what makes this coffee so unique. As my curiosity increased, I researched the different species of coffee. I came across a riveting dataset that could help me understand what makes each species so special. I used my analytics skillset to diagnose how each characteristic could help me understand my love for coffee. Most of the world's coffee production occurs in tropical regions close to the equator. This region between the tropic of Cancer and the tropic of Capricorn, the coffee belt, extends 23.5 degrees north and south of the equator. I learned that coffee is one of the most valuable global commodities traded through my investigation. The genus *Coffea* features two species traded worldwide (*Arabica* and *Robusta*). Most people prefer Arabica due to its superb quality and taste. The Arabica species directly affects the human sensory experience more significantly than Robusta. Robusta coffee features a less potent and more bitter taste. Robusta covers only 35% of the total world production, while Arabica covers 64%. A third species *Liberica* lacks much demand or production internationally. Describing the nature of coffee quality Chemistry Researcher Girmay Tsegay et al. (2020) asserts:

Coffee quality is defined by its sensorial aspects, which are developed by the chemical prototypes found in fresh grains. Quality and content of the chemical composition of coffee beans widely vary based on the species of coffee, altitude, soil, daily temperature variations, and the place of growing. Coffee taste is different due to the presence of different volatile and nonvolatile chemical constituents.(p.2)

Thus, we must infer that those attributes such as altitude, species, region, etc... play a vital role in the coffee cultivation process and final coffee bean quality. Our goal here includes making sense of the data surrounding coffee production methodology and developing relevant data visualizations for international coffee quality attributes. Our dataset originates from the Coffee

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Quality Institute (CQI). CQI aims to provide a standardized grading system for coffee producers across the globe while promoting market accessibility for local coffee farmers.

DATA DESCRIPTION

Data Set URL: https://www.kaggle.com/datasets/volpatto/coffee-quality-database-from-cqi?select=merged_data_cleaned.csv

Field Name	Description of Dimension
Species	Scientific Name: Biological Taxonomy
Owner	Owner of the Coffee Farm
Country of Origin	Country which Produced the Coffee
In Country Partner	Partner/Ambassadors for CQI (Facilitate Quality Evaluations Globally)
Variety	Subspecies via Breeding/Natural Selection
Processing Method	Methodology Utilized to Process Coffee
Washing Method	Methodology Utilized to Wash Coffee
Color	Color of the Processed Coffee Bean
Region	Locale where coffee plants are grown
Field Name	Description of Measure
Altitude Range	Range of Elevation where Coffee was grown
Number of Bags	Number of Bags Submitted for Grading
Bag Weight	Weight of each Coffee Bag Submitted
Harvest Year	Year Coffee was Harvested Format (YYYY)
Grading Date	Date when Coffee was Scored Format (Month, D, Yr)
Aroma	The smell of Coffee when Infused with Hot Water
Flavor	Mid-Range Notes Between First Impression and Aftertaste (Intensity, Quality, and Complexity)
Aftertaste	Taste and Aromas left in the mouth after Swallowing
Acidity	Brightness (Good) Sour (Bad)
Body	The viscosity of the Coffee on the Tongue
Balance	Balance of Flavor, Aftertaste, Acidity, and Body
Uniformity	The measure of Stable Behavior Across Cups (2 points over 5 cups)
Clean Cup	Coffee free from Taints or Defects (2 points over 5 cups)
Sweetness	Sugary Flavors (Good) Astringency Flavors (Bad)
Cupper Points	Holistic Score by Grader
Total Cup Points	Quality Scored Based on the Total of 10 Previous Metrics
Moisture	Humidity Level of the Coffee Bean
Altitude (Low)	Lowest Altitude where Coffee Plants grow per instance
Altitude (High)	Highest Altitude where Coffee Plants grow per instance
Altitude (Mean)	Average Altitude where Coffee Plants grow per instance

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DATA CLEANING

1. SPLIT COLUMN (Splitting Column Data into Multiple Columns)

PRE-CLEANED DATA

	O	P	Q	R	S
1	In Country Partner	Harvest Year	Grading Date	Variety	Processing Method
55	Uganda Coffee Development Authority		2013 June 30th, 2014	SL14	Natural / Dry
56	AlmacafÃ©		2013 July 26th, 2013	Caturra	Washed / Wet
57	Specialty Coffee Association of Costa Rica		2017 October 9th, 2017	Gesha	Washed / Wet
58	METAD Agricultural Development plc		2014 April 4th, 2015		Washed / Wet
59	Asociacion Nacional Del CafÃ©		2012 July 3rd, 2012	Bourbon	Washed / Wet
60	Asociacion Nacional Del CafÃ©		2012 June 5th, 2012	Catuai	Washed / Wet
61	METAD Agricultural Development plc		2017 June 23rd, 2017	Caturra	Natural / Dry
62	Specialty Coffee Association		2013 January 22nd, 2014		Washed / Wet
63	Specialty Coffee Association		2012 October 25th, 2012		Washed / Wet
64	Specialty Coffee Association		2013 March 18th, 2013	Bourbon	Washed / Wet
65	Specialty Coffee Association		2012 January 12th, 2013	Bourbon	Semi-washed / Semi-pulped
66	Specialty Coffee Association		2012 April 6th, 2012	Hawaiian Kona	Natural / Dry
67	Blossom Valley International		2014 May 23rd, 2015	Caturra	Natural / Dry
68	Blossom Valley International		2014 May 23rd, 2015	SL28	Natural / Dry
69	METAD Agricultural Development plc		2015 March 31st, 2015	Other	Natural / Dry
70	Uganda Coffee Development Authority		2013 June 26th, 2014	SL14	Washed / Wet
71	Asociacion Nacional Del CafÃ©		2013 February 26th, 2013	Bourbon	Washed / Wet
72	METAD Agricultural Development plc		2015 March 31st, 2015		Washed / Wet
73	Uganda Coffee Development Authority		2013 June 26th, 2014	SL14	Washed / Wet
74	Specialty Coffee Association		2012 April 6th, 2012	Hawaiian Kona	Natural / Dry
75	NUCOFFEE		2011 December 3rd, 2011	Bourbon	Semi-washed / Semi-pulped

POST-CLEANED DATA

	O	P	Q	R	S	T
1	In Country Partner	Harvest Year	Grading Date	Variety	Washing Method	Processing Method
55	Uganda Coffee Development Authority		2013 June 30th, 2014	SL14	Natural	Dry
56	AlmacafÃ©		2013 July 26th, 2013	Caturra	Washed	Wet
57	Specialty Coffee Association of Costa Rica		2017 October 9th, 2017	Gesha	Washed	Wet
58	METAD Agricultural Development plc		2014 April 4th, 2015		Washed	Wet
59	Asociacion Nacional Del CafÃ©		2012 July 3rd, 2012	Bourbon	Washed	Wet
60	Asociacion Nacional Del CafÃ©		2012 June 5th, 2012	Catuai	Washed	Wet
61	METAD Agricultural Development plc		2017 June 23rd, 2017	Caturra	Natural	Dry
62	Specialty Coffee Association		2013 January 22nd, 2014		Washed	Wet
63	Specialty Coffee Association		2012 October 25th, 2012		Washed	Wet
64	Specialty Coffee Association		2013 March 18th, 2013	Bourbon	Washed	Wet
65	Specialty Coffee Association		2012 January 12th, 2013	Bourbon	Semi-washed	Semi-pulped
66	Specialty Coffee Association		2012 April 6th, 2012	Hawaiian Kona	Natural	Dry
67	Blossom Valley International		2014 May 23rd, 2015	Caturra	Natural	Dry
68	Blossom Valley International		2014 May 23rd, 2015	SL28	Natural	Dry
69	METAD Agricultural Development plc		2015 March 31st, 2015	Other	Natural	Dry
70	Uganda Coffee Development Authority		2013 June 26th, 2014	SL14	Washed	Wet
71	Asociacion Nacional Del CafÃ©		2013 February 26th, 2013	Bourbon	Washed	Wet
72	METAD Agricultural Development plc		2015 March 31st, 2015		Washed	Wet
73	Uganda Coffee Development Authority		2013 June 26th, 2014	SL14	Washed	Wet
74	Specialty Coffee Association		2012 April 6th, 2012	Hawaiian Kona	Natural	Dry
75	NUCOFFEE		2011 December 3rd, 2011	Bourbon	Semi-washed	Semi-pulped

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EXPLANATION

The first data cleaning method that I utilized features a split column. The data cleaning for this entire report occurred in Microsoft Excel. The first step of split-column includes inserting an empty column after the column that contains the text data you want to split. In the Excel Ribbon, Select **Data > Text to Columns**. Next, the **Convert Text to Columns Wizard** will appear. Select **Delimited > Next**. For this dataset, we must select **Delimiters** for the data. I utilized forward slash (/) to separate relevant text data for this instance. Excel provides a **Data Preview**. Select **Next**. Then select **Destination** in your worksheet where you want the split data to appear—finally, select **Finish**. Once done with the wizard, rename column headings as appropriate.

2. EMBEDDED VALUES

(Inconsistent Date Values on the Instance Level for Grading Date Column/ Simplified Date Format on Grading Date Column)

PRE-CLEANED

O	P	Q	R	S	T
	Harvest Year	Grading Date	Variety	Washing Method	Processing Method
1 In Country Partner					
15 Specialty Coffee Association	Sept 2009 - April 2010	May 31st, 2010			
16 Ethiopia Commodity Exchange	Mar-10	August 31st, 2010			
17 Almacafé®	2014	March 13th, 2015	Other	Washed	Wet
18 Specialty Coffee Association	May-August	May 31st, 2010			
19 Ethiopia Commodity Exchange	2009/2010	June 16th, 2010			
20 Yunnan Coffee Exchange	2015	April 7th, 2016	Catimor	Washed	Wet
21 Blossom Valley International	2014	March 25th, 2015	Ethiopian	Natural	Dry
22 Almacafé®	2014	March 13th, 2015	Other	Washed	Wet
23 Specialty Coffee Association	2014	April 2nd, 2014	Caturra	Washed	Wet
24 AMECAFE	2012	July 26th, 2012	Other	Washed	Wet
25 Almacafé®	2014	March 13th, 2015	Other	Washed	Wet
26 Specialty Coffee Institute of Asia	2013	September 3rd, 2013		Natural	Dry
27 NUCOFFEE	2011	December 3rd, 2011	Bourbon	Natural	Dry
28 Ethiopia Commodity Exchange	2009/2010	June 16th, 2010	SL14	Washed	Wet
29 Uganda Coffee Development Authority	2013	June 26th, 2014	Caturra		
30 Instituto Hondureño del Café®	2016	May 18th, 2017	Sumatra	P脉ped natural	honey
31 Specialty Coffee Association	2015	May 18th, 2016			
32 Specialty Coffee Association		May 18th, 2010			
33 Specialty Coffee Institute of Asia	2012	September 3rd, 2013		Natural	Dry
34 NUCOFFEE	2011	December 3rd, 2011	Bourbon	Natural	Dry
35 Specialty Coffee Association of Costa Rica	2015/2016	December 3rd, 2015	Caturra	Washed	Wet
36 METAD Agricultural Development plc	2014	March 27th, 2015		Natural	Dry
37 Kenya Coffee Traders Association	2013	May 30th, 2014	SL34	Washed	Wet
38 Specialty Coffee Association	2012	April 6th, 2012	Hawaiian	Natural	Dry
39 Specialty Coffee Association	2010	January 28th, 2011			
40 Ethiopia Commodity Exchange	2009/2010	June 17th, 2010			

POST-CLEANED

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	N	O	P	Q	S	T
1	In Country Partner	Harvest Year	Grading Date	Variety	Washing Method	Processing Method
15	Specialty Coffee Association	2009	May 31, 2010			
16	Ethiopia Commodity Exchange	2010	August 31, 2010			
17	Almacafé®	2014	March 13, 2015	Other	Washed	Wet
18	Specialty Coffee Association	2010	May 31, 2010			
19	Ethiopia Commodity Exchange	2009	June 16, 2010			
20	Yunnan Coffee Exchange	2015	April 7, 2016	Catimor	Washed	Wet
21	Blossom Valley International	2014	March 25, 2015	Ethiopian Yirgacheffe	Natural	Dry
22	Almacafé®	2014	March 13, 2015	Other	Washed	Wet
23	Specialty Coffee Association	2014	April 2, 2014	Caturra	Washed	Wet
24	AMECAFE	2012	July 26, 2012	Other	Washed	Wet
25	Almacafé®	2014	March 13, 2015	Other	Washed	Wet
26	Specialty Coffee Institute of Asia	2013	September 3, 2013	Natural	Dry	
27	NUCOFFEE	2011	December 3, 2011	Bourbon	Natural	Dry
28	Ethiopia Commodity Exchange	2009	June 16, 2010	SL14	Washed	Wet
29	Uganda Coffee Development Authority	2013	June 26, 2014	Caturra		
30	Instituto Hondureño del Café®	2016	May 18, 2017	Sumatra	Pulped natural	honey
31	Specialty Coffee Association	2015	May 18, 2016			
32	Specialty Coffee Association	2010	May 18, 2010			
33	Specialty Coffee Institute of Asia	2012	September 3, 2013			
34	NUCOFFEE	2011	December 3, 2011			
35	Specialty Coffee Association of Costa Rica	2015	December 3, 2015			
36	METAD Agricultural Development plc	2014	March 27, 2015			
37	Kenya Coffee Traders Association	2013	May 30, 2014	SL34	Washed	Wet
38	Specialty Coffee Association	2012	April 6, 2012	Hawaiian Kona	Natural	Dry
39	Specialty Coffee Association	2010	January 28, 2011			
40	Ethiopia Commodity Exchange	2009	June 17, 2010			

EXPLANATION

To fix the inconsistent values in the column Harvest Year, I first utilized the filter shortcut (Ctrl+Shift+L) and selected column values that were not in the Date Format (YYYY). Once all inconsistent values were filtered, I was able to edit the values accordingly. To update multiple similar inconsistent date types, I input (**Ctrl + F**) which causes the Find and Replace window to appear. For one varying date value under Harvest year T4/10, I ran a Find All + Replace All to update T4/10 to 2010. I repeated these steps for all inconsistent values till the Column was normalized. The next column grading date had an issue with the format. For example, the day part of the date had the ordinals in each field (May 31st, 2010). I ran a Find All and Replace All for each ordinal (**1st,2nd,3rd,4th etc..**), replacing it with nothing. Once removed, I selected the entire Grading Date, Column, from the header and right-click selected **Format Cell > Utilizing Date Format (Month, Day, Year)**

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3. MISSING VALUES

(Null Values on the Instance Level - Missing Year for Harvest Year)

PRE-CLEANED

I	J	K	M	N	O
Bag.Weigh	Harvest.Year	Grading.Date	Variety	Washing Method	Processing Method
1		May 31st, 2010	Bourbon		
4	1	May 18th, 2010			
32	6	May 17th, 2010			
97	0 lbs	February 24th, 2011			
106	100 lbs	November 2nd, 2016	Mundo Novo	Pulped natural	honey
129	1 kg	June 14th, 2011			
144	60 kg	January 11th, 2018	SL34	Washed	Wet
146	60 kg	June 14th, 2011			
191	132 lbs	January 11th, 2018	SL28	Washed	Wet
297	60 kg	June 29th, 2010			
315	1	March 14th, 2016			
322	69 kg	April 21st, 2011			
336	100 lbs	March 8th, 2011			
375	100 lbs	February 1st, 2011			
394	70 kg	April 13th, 2010	Peaberry		
396	1 lbs	September 20th, 2011			
416	100 lbs	February 24th, 2011			
417	100 lbs	November 11th, 2010			
497	69 kg	April 21st, 2011			
530	100 lbs	March 9th, 2011			
531	100 lbs	April 13th, 2010			
534	1 lbs	April 13th, 2010			
560	1 lbs	January 9th, 2018	Caturra	Washed	Wet
580	69 kg	June 29th, 2010			
608	1	September 20th, 2011			
631	100 lbs	July 23rd, 2010			
675	1	November 15th, 2011	Catuai	Washed	Wet
736	5 kg				

POST-CLEANED

I	J	K	M	N	O
Bag.Weigh	Harvest.Year	Grading.Date	Variety	Washing Method	Processing Method
1		May 31st, 2010	Bourbon		
4	1	May 18th, 2010			
32	6	May 17th, 2010			
97	0 lbs	February 24th, 2011			
106	100 lbs	November 2nd, 2016	Mundo Novo	Pulped natural	honey
129	1 kg	June 14th, 2011			
144	60 kg	January 11th, 2018	SL34	Washed	Wet
146	60 kg	June 14th, 2011			
191	132 lbs	January 11th, 2018	SL28	Washed	Wet
297	60 kg	June 29th, 2010			
315	1	March 14th, 2016			
322	69 kg	April 21st, 2011			
336	100 lbs	March 8th, 2011			
375	100 lbs	February 1st, 2011			
394	70 kg	April 13th, 2010	Peaberry		
396	1 lbs	September 20th, 2011			
416	100 lbs	February 24th, 2011			
417	100 lbs	November 11th, 2010			
497	69 kg	April 21st, 2011			
530	100 lbs	March 9th, 2011			
531	100 lbs	April 13th, 2010			
534	1 lbs	April 13th, 2010			
560	1 lbs	January 9th, 2018	Caturra	Washed	Wet
580	69 kg	June 29th, 2010			
608	1	September 20th, 2011			
631	100 lbs	July 23rd, 2010			
675	1	November 15th, 2011	Catuai	Washed	Wet
736	5 kg				

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EXPLANATION

To fix the missing values in the Harvest year, I filtered the column by blank values (**Ctrl+Shift+L**). For dates that were missing, I utilized Grading Date to approximate Harvest Year for previously Null Values

4. UNIT CONVERSION

(Bag Weight column not standardized – Unit Conversion LBS to KG)

PRE-CLEANED

K	L	M	N	O	P
Region	Number of Bags	Bag Weight	In Country Partner	Harvest Year	Grading Date
1 kona	1	1	Specialty Coffee Association	2009	May 31, 2010
15 oromiya	300	60 kg	Ethiopia Commodity Exchange	2010	August 31, 2010
16 antioquia	10	1 kg	Almacafé®	2014	March 13, 2015
18 sulawesi	1	2 kg/lbs	Specialty Coffee Association	2010	May 31, 2010
19 yirgacheffe	150	6 lbs	Ethiopia Commodity Exchange	2009	June 16, 2010
20 yunnan	3	60 kg	Yunnan Coffee Exchange	2015	April 7, 2016
21 gedio	250	60 kg	Blossom Valley International	2014	March 25, 2015
22 antioquia	10	1 kg	Almacafé®	2014	March 13, 2015
23 san ramon	250	3 lbs	Specialty Coffee Association	2014	April 2, 2014
24 xalapa	14	1 kg	AMECAFE	2012	July 26, 2012
25 antioquia	10	1 kg	Almacafé®	2014	March 13, 2015
26 sidamo	100	60 kg	Specialty Coffee Institute of Asia	2013	September 3, 2013
27 south of minas	3	60 kg	NUCOFFEE	2011	December 3, 2011
28 sidamo	150	6 lbs	Ethiopia Commodity Exchange	2009	June 16, 2010
29 kapchorwa eastern	100	60 kg	Uganda Coffee Development Authority	2013	June 26, 2014
30 comayagua	275	69 kg	Instituto Hondureño del Café®	2016	May 18, 2017
31 leye, alishan township, chiayi county	20	50 kg	Specialty Coffee Association	2015	May 18, 2016
32	275	6 lbs	Specialty Coffee Association	2010	May 18, 2010
33	100	60 kg	Specialty Coffee Institute of Asia	2012	September 3, 2013
34 vale da grama	29	60 kg	NUCOFFEE	2011	December 3, 2011
35 west and central valley	250	2 lbs	Specialty Coffee Association of Costa Rica	2015	December 3, 2015
36 oromia	320	60 kg	METAD Agricultural Development plc	2014	March 27, 2015
37 muranga	320	1 kg	Kenya Coffee Traders Association	2013	May 30, 2014
38 kona	10	100 lbs	Specialty Coffee Association	2012	April 6, 2012
39 kona	25	100 lbs	Specialty Coffee Association	2010	January 28, 2011
40 yirgacheffe	300	6 lbs	Ethiopia Commodity Exchange	2009	June 17, 2010

POST-CLEANED

K	L	M	O	P	Q
Region	Number of Bags	Bag Weight (kg)	In Country Partner	Harvest Year	Grading Date
1 kona	1	1	Specialty Coffee Association	2009	May 31, 2010
15 oromiya	300	60	Ethiopia Commodity Exchange	2010	August 31, 2010
16 antioquia	10	1	Almacafé®	2014	March 13, 2015
18 sulawesi	1	2	Specialty Coffee Association	2010	May 31, 2010
19 yirgacheffe	150	2.72	Ethiopia Commodity Exchange	2009	June 16, 2010
20 yunnan	3	60	Yunnan Coffee Exchange	2015	April 7, 2016
21 gedio	250	60	Blossom Valley International	2014	March 25, 2015
22 antioquia	10	1	Almacafé®	2014	March 13, 2015
23 san ramon	250	1.36	Specialty Coffee Association	2014	April 2, 2014
24 xalapa	14	1	AMECAFE	2012	July 26, 2012
25 antioquia	10	1	Almacafé®	2014	March 13, 2015
26 sidamo	100	60	Specialty Coffee Institute of Asia	2013	September 3, 2013
27 south of minas	3	60	NUCOFFEE	2011	December 3, 2011
28 sidamo	150	2.72	Ethiopia Commodity Exchange	2009	June 16, 2010
29 kapchorwa eastern	100	60	Uganda Coffee Development Authority	2013	June 26, 2014
30 comayagua	275	69	Instituto Hondureño del Café®	2016	May 18, 2017
31 leye, alishan township, chiayi county	20	50	Specialty Coffee Association	2015	May 18, 2016
32	275	2.72	Specialty Coffee Association	2010	May 18, 2010
33	100	60	Specialty Coffee Institute of Asia	2012	September 3, 2013
34 vale da grama	29	60	NUCOFFEE	2011	December 3, 2011
35 west and central valley	250	0.91	Specialty Coffee Association of Costa Rica	2015	December 3, 2015
36 oromia	320	60	METAD Agricultural Development plc	2014	March 27, 2015
37 muranga	320	1	Kenya Coffee Traders Association	2013	May 30, 2014
38 kona	10	45.36	Specialty Coffee Association	2012	April 6, 2012
39 kona	25	45.36	Specialty Coffee Association	2010	January 28, 2011
40 yirgacheffe	300	2.72	Ethiopia Commodity Exchange	2009	June 17, 2010

EXPLANATION

First, I inserted a blank column next to the column Bag Weight by Right-Clicking + Insert on In Country Partner Field. Then I input (**Ctrl + F**) to Find and replace lbs. with blank to remove lbs. denotation. I input the convert formula to convert the measurement from lb. to kg. The formula syntax includes = **CONVERT(M19,"lbm","kg")**. The first value is in lbs., and the second is kg the units for our results. CONVERT accepts the text values in quotes and converts them to a kg measurement. Next, I Drag and swap values with the created column (measurement in kg). Before swapping values, I had to filter and remove the fields with (#VALUE), which were already in kg, in the next column. Once I swapped the values of the appropriate pound with kg values, I removed kg from the entire column and labeled the heading in kg to simply store data.

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5. STRANGE/ CRYPTIC VALUES

(Some values in the region column are unrecognizable in English)

PRE-CLEANED

K	L	M	P	Q	R
Region	Number.of.Bags	Bag.Weight	In.Country.Partner	Harvest Year	Grading Date
137 taichung xinshe ㄉ~ㄤ,-ㄢ,,ㄞ~ㄔㄢ%ㄢ%	10	30	Blossom Valley International	2013	December 26, 2013
193 ㄉ~ㄦ~ㄭ~ㄤ,,% guoshing township	10	5	Specialty Coffee Association	2016	August 10, 2017
235 nanxi di., tainan city ㄉ~ㄤ~ㄢ,-ㄢ,,%ㄢ%	10	20	Specialty Coffee Association	2016	May 18, 2016
267 ㄉ~ㄔ%	1	2	Blossom Valley International	2014	November 7, 2015
271 ㄉ~ㄤ,-ㄢ,,ㄞ~ㄔ~ㄢ%	10	60	Blossom Valley International	2014	November 23, 2014
280 ㄉ~ㄔ%	167	30	Blossom Valley International	2016	February 23, 2016
300 ㄉ~ㄤ,-ㄢ,,ㄞ~ㄔ~ㄢ%(dongshan di., tainan city)	10	10	Specialty Coffee Association	2016	June 6, 2017
348 taichung xinshe ㄉ~ㄤ,-ㄢ,,ㄞ~ㄔㄢ%ㄢ%	10	30	Blossom Valley International	2013	December 26, 2013
370 chil~n	10	1	AMECAFE	2012	August 30, 2012
425 cuarente~n	11	2	Asociaci~n Mexicana De Caf~as y C	2015	July 14, 2015
427 ㄉ~ㄦ~ㄤ~ㄤ~ㄤ~	10	60	Blossom Valley International	2014	November 23, 2014
489 chiayi alishan ㄉ~ㄤ~ㄤ~ㄤ~ㄤ~	50	30	Blossom Valley International	2013	December 26, 2013
509 ㄉ~ㄤ~ㄤ~ㄤ~ㄤ~	10	60	Blossom Valley International	2014	November 23, 2014
540 ㄉ~ㄦ~ㄤ~ㄤ~ㄤ~	11	2	Blossom Valley International	2014	September 7, 2015
543 cuarente~n	11	2	Asociaci~n Mexicana De Caf~as y C	2015	July 14, 2015
587 ㄉ~ㄤ,-ㄢ,,ㄞ~ㄔ~ㄢ%(dongshan di., tainan city)	8	10	Specialty Coffee Association	2016	June 1, 2017
619 ㄉ~ㄤ~ㄤ~ㄤ~ㄤ~	10	60	Blossom Valley International	2014	November 23, 2014
622 chiayi alishan ㄉ~ㄤ~ㄤ~ㄤ~ㄤ~	10	30	Blossom Valley International	2013	December 26, 2013
636 ㄉ~ㄦ~ㄤ~ㄤ~ㄤ~	6	5	Specialty Coffee Association	2016	August 22, 2017
638 changhua baguashan ㄉ~ㄤ~ㄤ~ㄤ~ㄤ~	1	10	Blossom Valley International	2016	February 13, 2017
722 changhua baguashan ㄉ~ㄤ~ㄤ~ㄤ~ㄤ~	10	20	Blossom Valley International	2013	December 26, 2013
723 taichung xinshe ㄉ~ㄤ,-ㄢ,,ㄞ~ㄔㄢ%ㄢ%	10	30	Blossom Valley International	2013	December 26, 2013
771 yunlin ㄉ~ㄤ~ㄤ~ㄤ~ㄤ~	60	60	Blossom Valley International	2013	December 26, 2013
827 taichung xinshe ㄉ~ㄤ,-ㄢ,,ㄞ~ㄔ~ㄢ%	35	30	Blossom Valley International	2012	December 26, 2013
887 changhua baguashan ㄉ~ㄤ~ㄤ~ㄤ~ㄤ~	10	30	Blossom Valley International	2013	December 26, 2013
895 sac~n palma, municipio de chil~n	12	1	AMECAFE	2012	February 29, 2012
916 ㄉ~ㄤ~ㄤ~ㄤ~ㄤ~	123	2	Blossom Valley International	2015	September 17, 2015
924 taichung xinshe ㄉ~ㄤ,-ㄢ,,ㄞ~ㄔ~ㄢ%	5	30	Blossom Valley International	2013	December 26, 2013
940 ㄉ~ㄤ~ㄤ~ㄤ~ㄤ~	10	60	Blossom Valley International	2014	November 23, 2014
964 dongshan di., tainan city ㄉ~ㄤ~ㄤ~ㄤ~ㄤ~	20	50	Specialty Coffee Association	2015	May 18, 2016
1023 ㄉ~ㄤ,-ㄢ,,ㄞ~ㄔ~ㄢ%	10	60	Blossom Valley International	2014	November 23, 2014
1027 taichung taiping ㄉ~ㄤ,-ㄢ,,ㄞ~ㄤ~ㄤ~ㄤ~	35	30	Blossom Valley International	2013	December 26, 2013
1029 new taipei zhonghe ㄉ~ㄤ~ㄤ~ㄤ~ㄤ~	10	20	Blossom Valley International	2013	December 26, 2013
1082 ㄉ~ㄦ~ㄤ~ㄤ~ㄤ~	10	60	Blossom Valley International	2014	November 23, 2014
1091 taichung xinshe ㄉ~ㄤ,-ㄢ,,ㄞ~ㄔ~ㄢ%	10	30	Blossom Valley International	2013	December 26, 2013
1093 chil~n	10	1	AMECAFE	2012	August 30, 2012
1104 chiayi fanluo ㄉ~ㄤ~ㄤ~ㄤ~ㄤ~	5	30	Blossom Valley International	2013	December 26, 2013
1117 ㄉ~ㄤ~ㄤ~ㄤ~ㄤ~	10	60	Blossom Valley International	2014	November 23, 2014
1119 yunlin gukeng he bao ㄉ~ㄤ~ㄤ~ㄤ~ㄤ~	10	30	Blossom Valley International	2013	December 26, 2013
1120 changhua baguashan ㄉ~ㄤ~ㄤ~ㄤ~ㄤ~	10	30	Blossom Valley International	2013	December 26, 2013
1121 changhua baguashan ㄉ~ㄤ~ㄤ~ㄤ~ㄤ~	10	30	Blossom Valley International	2013	December 26, 2013
1127 changhua baguashan ㄉ~ㄤ~ㄤ~ㄤ~ㄤ~	10	30	Blossom Valley International	2013	December 26, 2013
1148 baihe di., tainan city ㄉ~ㄤ~ㄤ~ㄤ~ㄤ~	50	20	Specialty Coffee Association	2013	July 28, 2014
1237 ㄉ~ㄤ~ㄤ~ㄤ~ㄤ~	8	10	Specialty Coffee Association	2016	June 6, 2017

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POST-CLEANED

	K	L	M	P	Q	R
1	Region	Number.of.Bags	Bag.Weight	In.Country.Partner	Harvest Year	Grading Date
137	taichung xinshe	10	30	Blossom Valley International	2013	December 26, 2013
193	guoshing township	10	5	Specialty Coffee Association	2016	August 10, 2017
235	hanxi di, tainan city	10	20	Specialty Coffee Association	2016	May 18, 2016
267	taichung xinshe	1	2	Blossom Valley International	2014	November 7, 2015
271	taichung xinshe	10	60	Blossom Valley International	2014	November 23, 2014
280	taichung xinshe	167	30	Blossom Valley International	2016	February 23, 2016
300	(dongshan di, tainan city)	10	10	Specialty Coffee Association	2016	June 6, 2017
348	taichung xinshe	10	30	Blossom Valley International	2013	December 26, 2013
370	chilán	10	1	AMECAFE	2012	August 30, 2012
425	cuarente±o	11	2	AsociaciÃ³n Mexicana De CafÃ©s y C	2015	July 14, 2015
427	¶	10	60	Blossom Valley International	2014	November 23, 2014
489	chiayi alishan	50	30	Blossom Valley International	2013	December 26, 2013
509	chiayi alishan	10	60	Blossom Valley International	2014	November 23, 2014
540	chiayi alishan	11	2	Blossom Valley International	2014	September 7, 2015
543	cuarente±o	11	2	AsociaciÃ³n Mexicana De CafÃ©s y C	2015	July 14, 2015
587	dongshan di, tainan city	8	10	Specialty Coffee Association	2016	June 1, 2017
619	chiayi alishan	10	60	Blossom Valley International	2014	November 23, 2014
622	chiayi alishan	10	30	Blossom Valley International	2013	December 26, 2013
636	guoshing township	6	5	Specialty Coffee Association	2016	August 22, 2017
638	changhua baguashan	1	10	Blossom Valley International	2016	February 13, 2017
722	changhua baguashan	10	20	Blossom Valley International	2013	December 26, 2013
723	taichung xinshe	10	30	Blossom Valley International	2013	December 26, 2013
771	yunlin	60	60	Blossom Valley International	2013	December 26, 2013
827	taichung xinshe	35	30	Blossom Valley International	2012	December 26, 2013
887	changhua baguashan	10	30	Blossom Valley International	2013	December 26, 2013
895	sacÃ³n palma, municipio de chil	12	1	AMECAFE	2012	February 29, 2012
916	dongshan di, tainan city	123	2	Blossom Valley International	2015	September 17, 2015
924	taichung xinshe	5	30	Blossom Valley International	2013	December 26, 2013
940	¶	10	60	Blossom Valley International	2014	November 23, 2014
964	dongshan di, tainan city	20	50	Specialty Coffee Association	2015	May 18, 2016
1023	¶	10	60	Blossom Valley International	2014	November 23, 2014
1027	taichung taiping	35	30	Blossom Valley International	2013	December 26, 2013
1029	new taipei zhonghe	10	20	Blossom Valley International	2013	December 26, 2013
1082	¶	10	60	Blossom Valley International	2014	November 23, 2014
1091	taichung xinshe	10	30	Blossom Valley International	2013	December 26, 2013
1093	chilán	10	1	AMECAFE	2012	August 30, 2012
1104	chiayi fanluâ	5	30	Blossom Valley International	2013	December 26, 2013
1117	¶	10	60	Blossom Valley International	2014	November 23, 2014
1119	yunlin gukeng he bao	10	30	Blossom Valley International	2013	December 26, 2013
1120	changhua baguashan	10	30	Blossom Valley International	2013	December 26, 2013
1121	changhua baguashan	10	30	Blossom Valley International	2013	December 26, 2013
1127	changhua baguashan	10	30	Blossom Valley International	2013	December 26, 2013
1148	baihe di, tainan city	50	20	Specialty Coffee Association	2013	July 28, 2014
1237	dongshan di, tainan city	8	10	Specialty Coffee Association	2016	June 6, 2017

EXPLANATION

(Some of the values from the Taiwanese Coffee Producers have been stored in Unicode Chinese text, which is illegible. I filtered the column (**Ctrl+Shift+L**) and selected all strange character

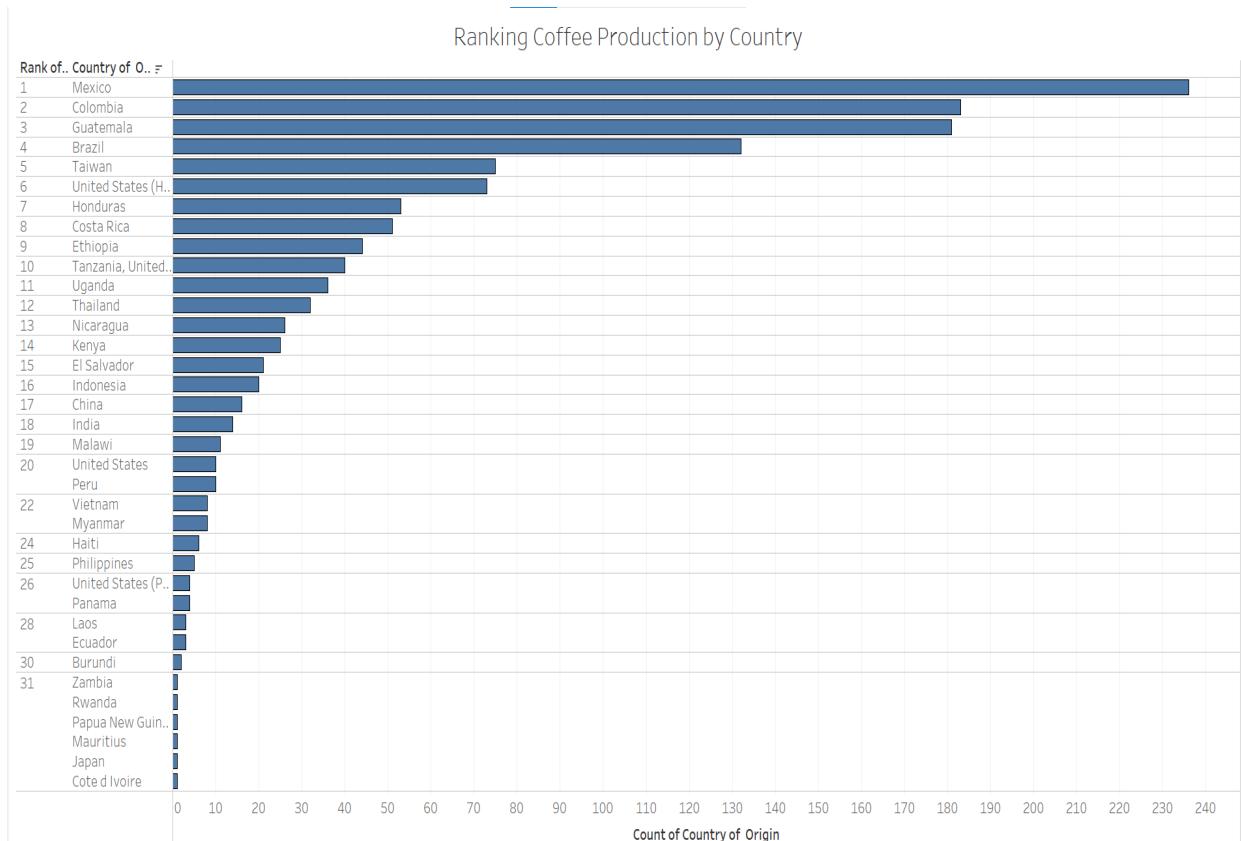
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fields. Then I deleted the unreadable text. Note that five columns could not be deciphered due to lack of context of Chinese Unicode lettering.)

DATA VISUALIZATIONS

BAR GRAPH (Rank)

What is the rank of countries' coffee production for grading by CQI?



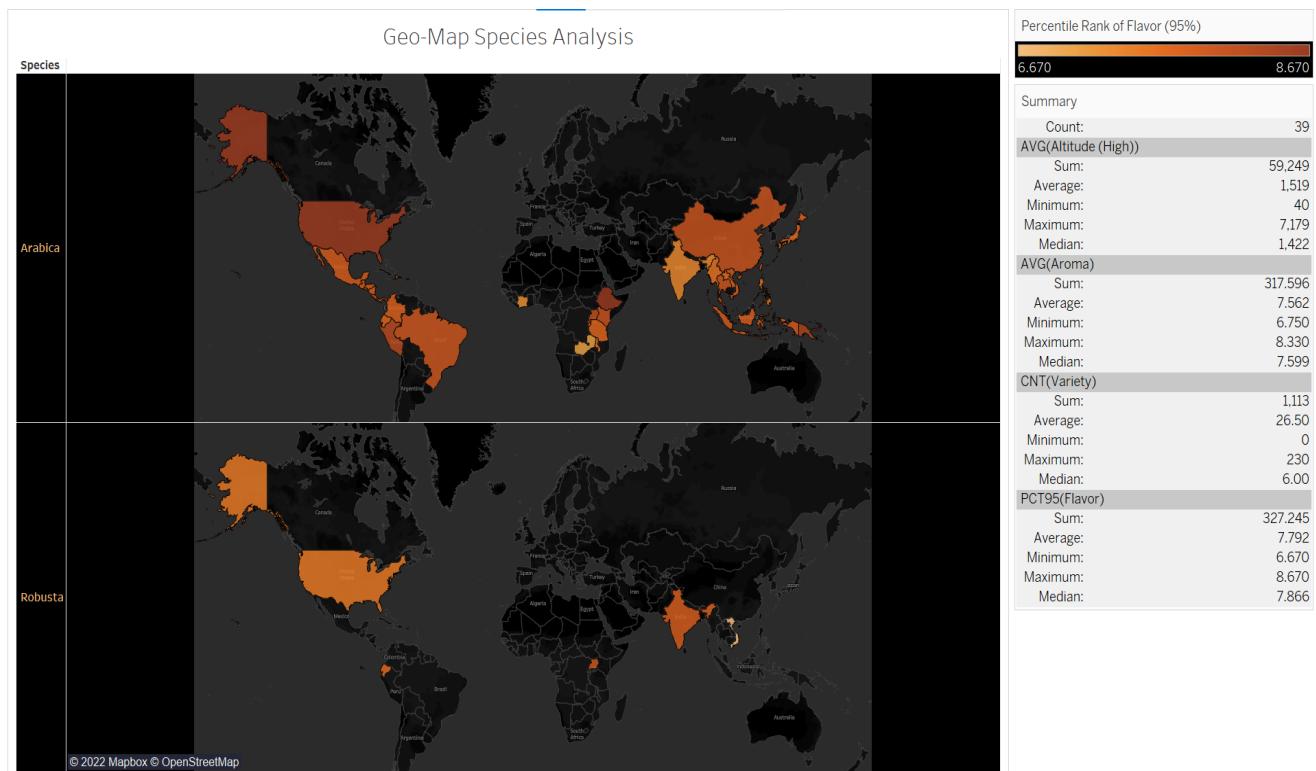
The bar graph shows the top ten coffee-producing countries, including Mexico, Colombia, Guatemala, Brazil, Taiwan, United States (Hawaii), Honduras, Costa Rica, Ethiopia, and Tanzania. These countries account for the highest amount of coffee produced worldwide. In contrast, countries such as Zambia, Rwanda, Mauritius, Papua New Guinea, Mauritius, Japan, and Ivory Coast produce the least coffee globally. However, low coffee production does not equate to a lack of quality. Japan has an average Total Cup Points score of 84.67 on a scale of

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100. I dragged the dimension Country of Origin to the Rows field and Count (Country of Origin) on the Column Field for the above bar graph. I selected the drop down from CNT(Country of Origin) > Quick Table Calculation > Rank to build the rank. On the Rows field, I put the rank CNT(Country of Origin) first so that the rank is displayed before the country of origin. I applied the rank category for the table down. This view filters out Null values for Country of Origin. I added a rank on the chart by using the marks card.

GEOGRAPHICAL-MAP SPECIES ANALYSIS (**Geographical Map**)

How do we understand the differences in Arabica and Robusta's production globally?



The above geographical map chart shows the global production worldwide for two species of coffee Arabia and Robusta. The demand worldwide for Arabica overshadows the market for Robusta, as clearly depicted by the difference in production regions for each species. Arabica is produced in high quantity throughout Asia and Africa; however, Robusta is produced

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much less in the same continents. Only one country in Africa (Uganda) produces Robusta coffee for our dataset, and only two countries in Asia produce Robusta (India and Vietnam). It is interesting to note that India's Robusta coffee scores for the 95th percentile equal 7.86, while Indian Arabica scores were moderately less at 7.33. Vietnam's scoring reflects the inverse, with 7.9 for Arabica and 6.75 for Robusta. Further inspecting Arabica coffee, we must recognize that Ethiopia has the highest 95 percentile score with 5% of scores above 8.67, with the United States not far behind, scoring 8.61. The map also confirms coffee growth (in tropical regions near the equator) Adequate sun and shade trees are equally important for growth of coffee plants.

SCATTER PLOT (Scatter Plot Linear Regression Trend Line)

What is the correlation between the total coffee quality score and the altitude (high) where coffee is grown?

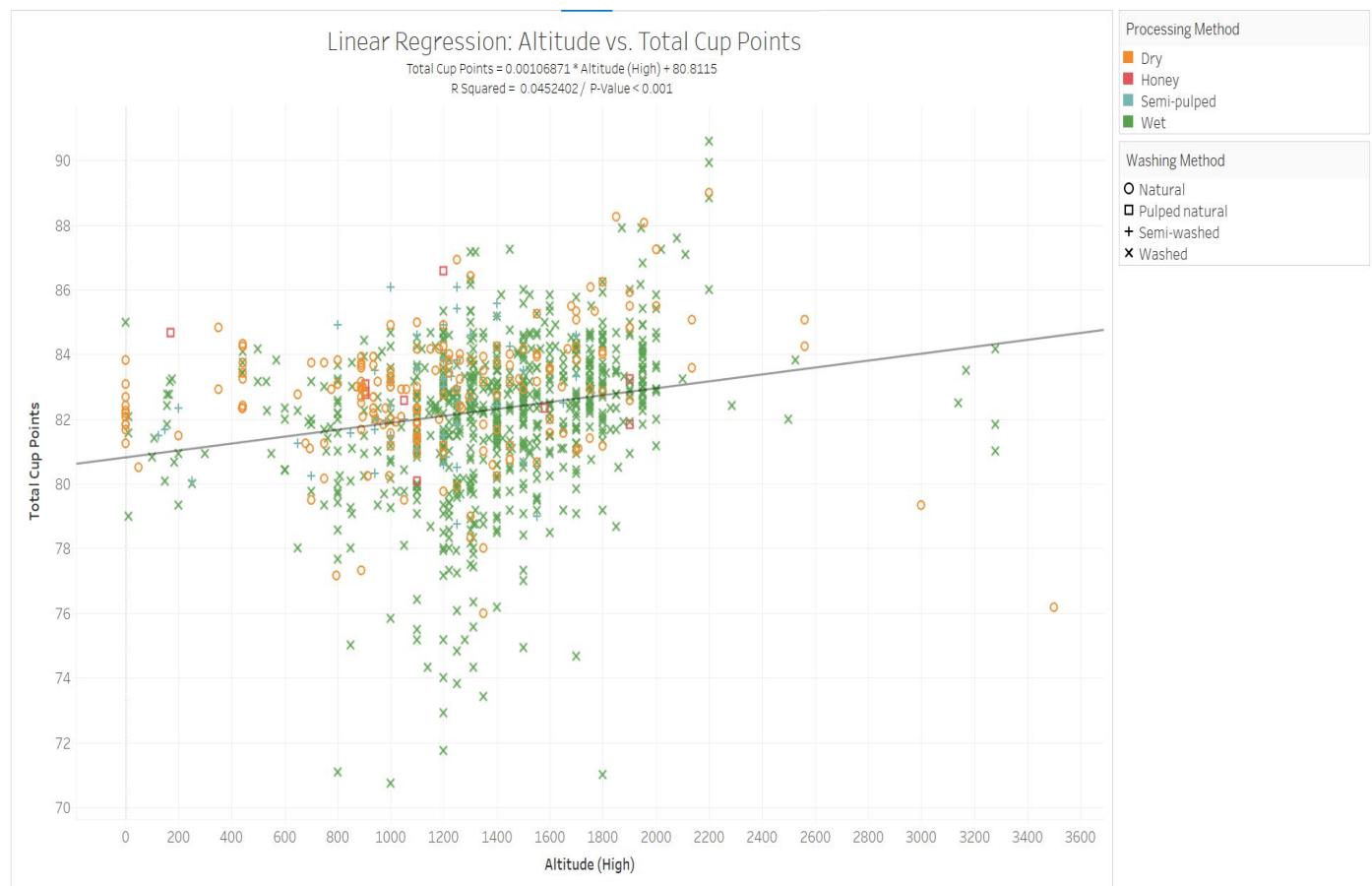
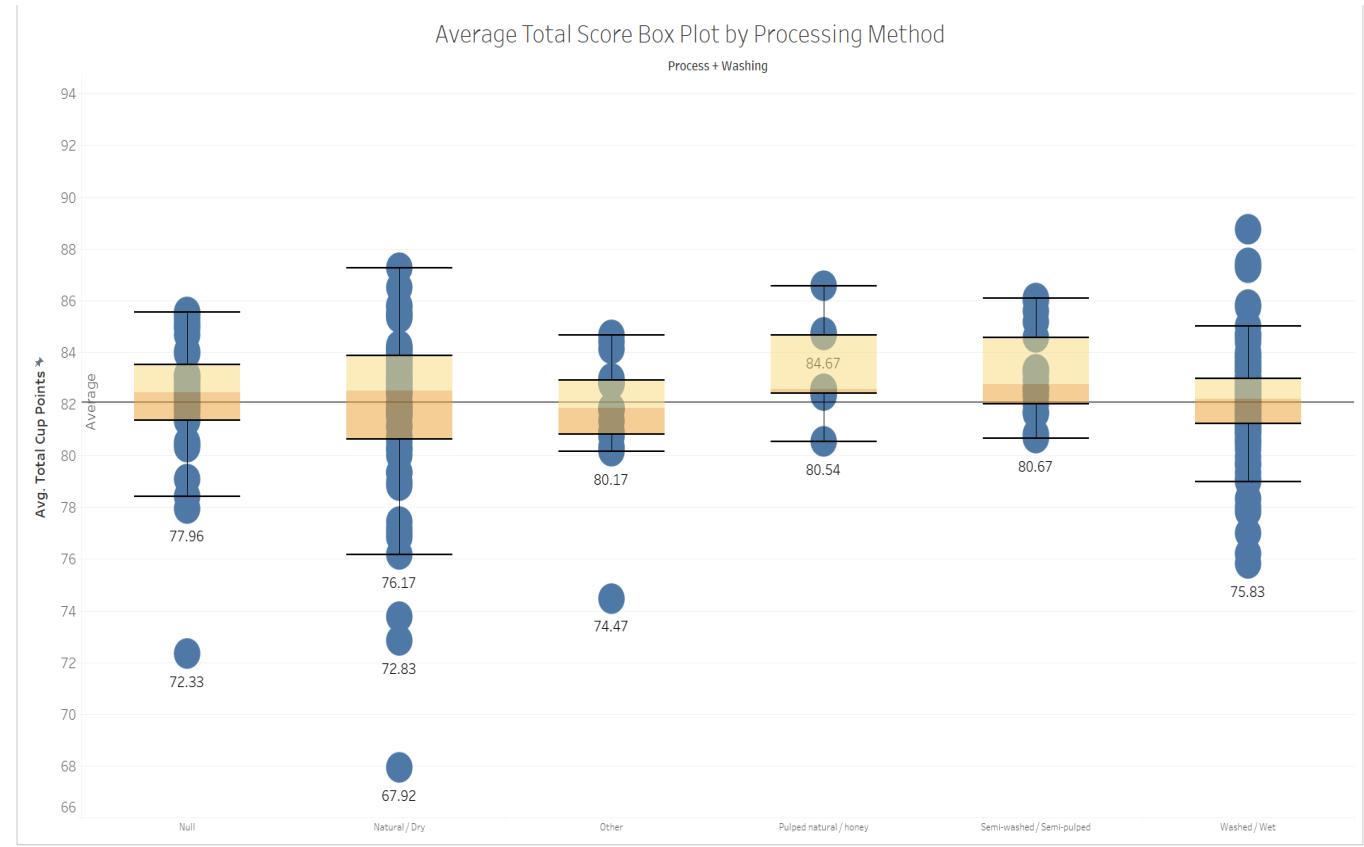


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The above scatter plot displays a linear regression trend line showing altitude and total cup points. From my research, there exists a relationship between altitude and coffee quality. To test if this correlation was true, I input the measure Altitude (High) data on the column field and the measure Total Cup Points on the Row field. I added the Processing Method on the marks card and selected colors to build the scatter I plot. Next, I added Washing Method by Shape. I added the Details for Country of Origin, Owner, Species, Region, Aroma, Aftertaste, Acidity, Body, Balance, Clean Cup, Cupper Points, Flavor, Sweetness, Uniformity and Moisture . I excluded instances that were outliers beyond 4000 ft and below Cup Score 70. There was also a strange value at 16,000+ feet elevation, which I excluded to maintain data integrity. We see a moderately correlation between altitude and total cup points from the trend line. The linear regression proves our theory that altitude does have an effect on total coffee cup points and thus the final quality of the coffee. Tableau produced the following formula: Total Cup Points = 0.00104672*Altitude (High) + 80.8245. The P-Value of Significance was less than 0.0001. The R-Squared Value of 0.45 shows a moderate correlation between the two variables.

BOX & WHISKER PLOT (Box & Whisker Plot, Reference Line)

What variation exists between the average total score and specific coffee processing methods?



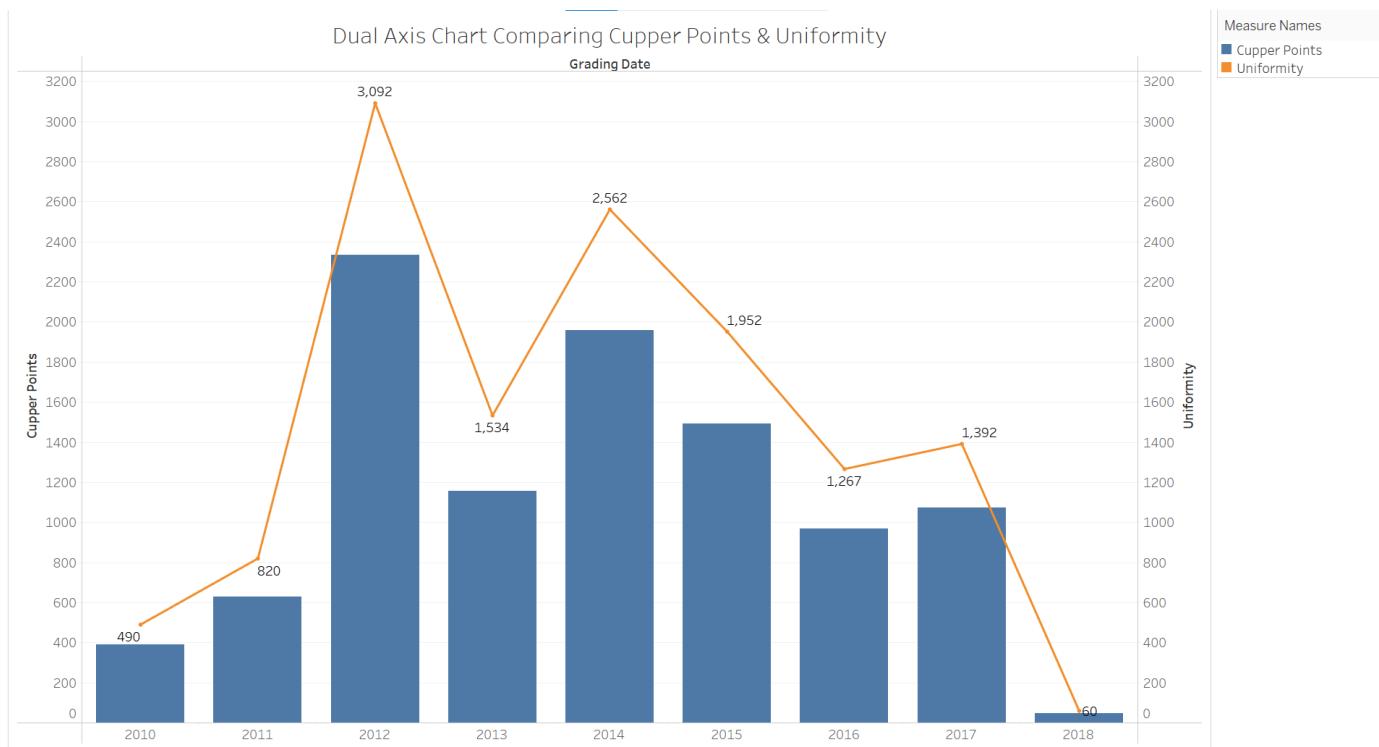
The Box & Whisker plot displays the Average of Total Cup Points for each Process + Washing. Details are provided for Species, Variety, and Country of Origin. Our visual for this data is interesting because not much variance exists between each process and washing methodology. The plot shows the maximum, minimum, and median for each category of process and washing. I have added a reference line to show the similarity of each box and whisker plot as well as show marks to reveal the numerical values of the box plot averages. A few categories have a rather small sample size like pulped/honey and others. However, we can highlight that

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natural/dry had the highest average score, and others had the lowest average score. Our analysis reveals not much difference between the categories.

DUAL-AXIS CHART LINE & BAR GRAPH (Dates, Dual Axis Chart)

What inferences about grading processes can be made by comparing Cupper Points and Uniformity Score per year?

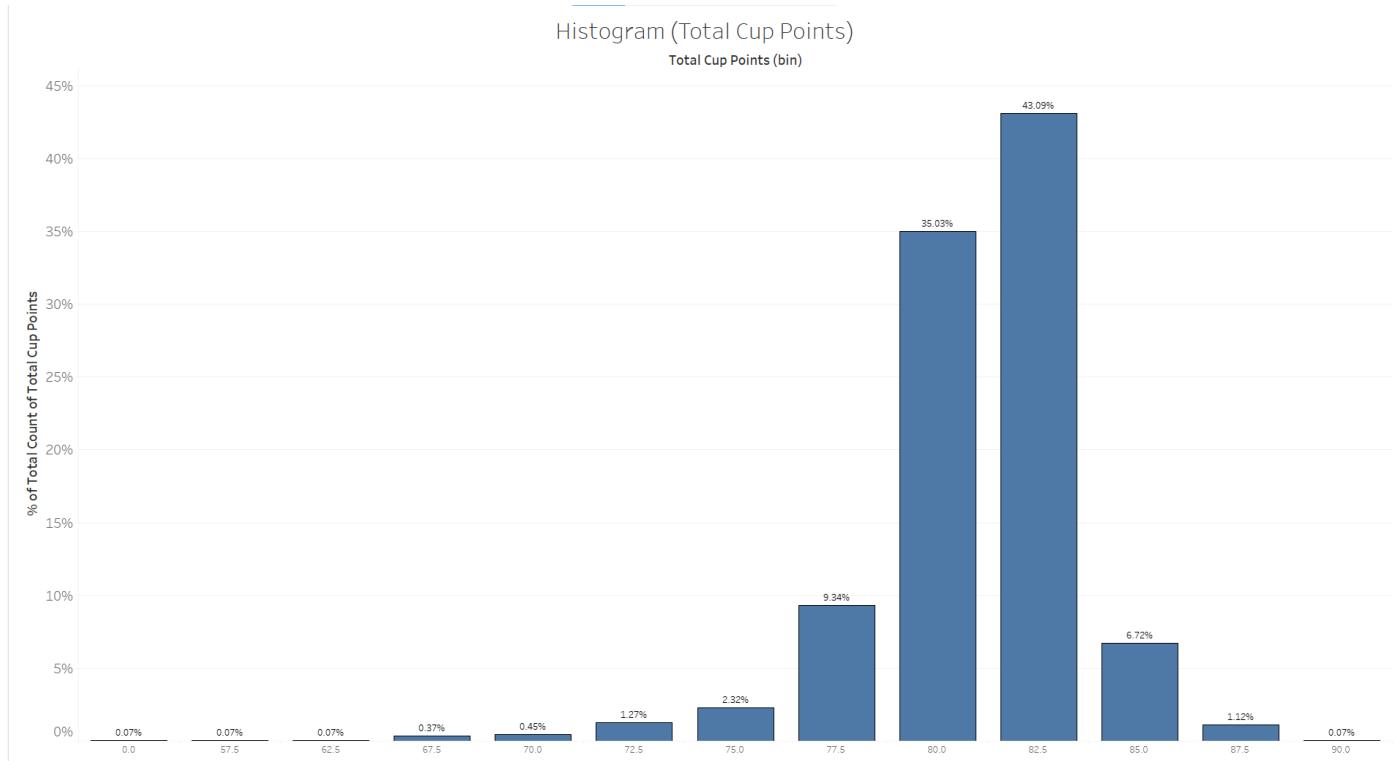


The above dual-axis chart provides some valuable insight into the nature of coffee quality scoring performed by the Coffee Quality Institute. When comparing Cupper Points with Uniformity, we see higher totals throughout the years. For example, in 2012, Uniformity totaled 3,092 while Cupper Points totaled 2,335. The difference in total is reflected in the manner of grading. It is much harder to get a 10 in Cupper Points because it is graded much more stringently. If we analyze the data for the entire range of years, we see many perfect ten scores for uniformity (1,337); however, Cupper Points only received (4) perfect ten scores.

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HISTOGRAM (Histogram)

What information about total cup points (quality score) can be delineated by analyzing the percentage distribution of these scores?



The above graph features a histogram looking at the single variable total cup points (a measure of coffee quality). This histogram analyzes the distribution of scores as a percentage. I had to create a bin column of total cup points to make this histogram. I set the interval to 2.5 to provide a clear graph. For this dataset, we see that most of the significant values are between 67.5 and 87.5. Most scores were around 82.5, with 80.0 totaling approximately 30% of all scores. From this data, we can infer that the coffee produced overall is very high quality as many scores were over the 70% mark yet achieving the 90 mark was rare as only less than 1% of coffees graded received a 90 or over.

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SCREENSHOTS OF VISUALS: FULL DESKTOP

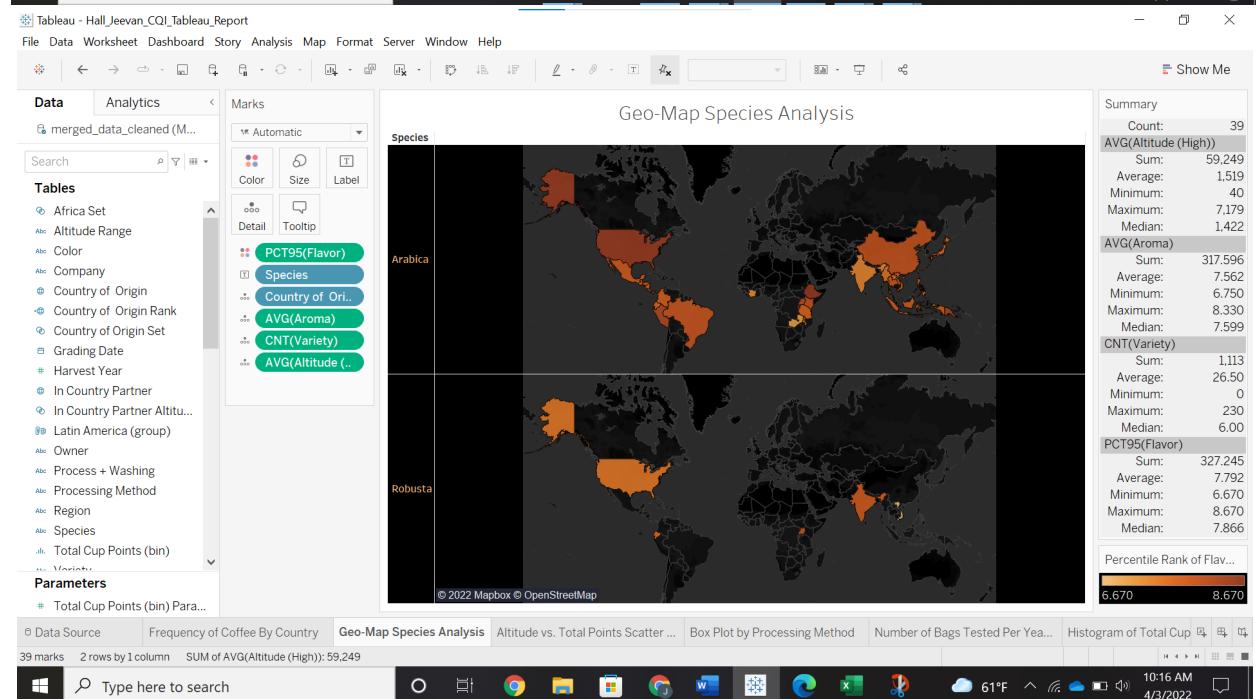
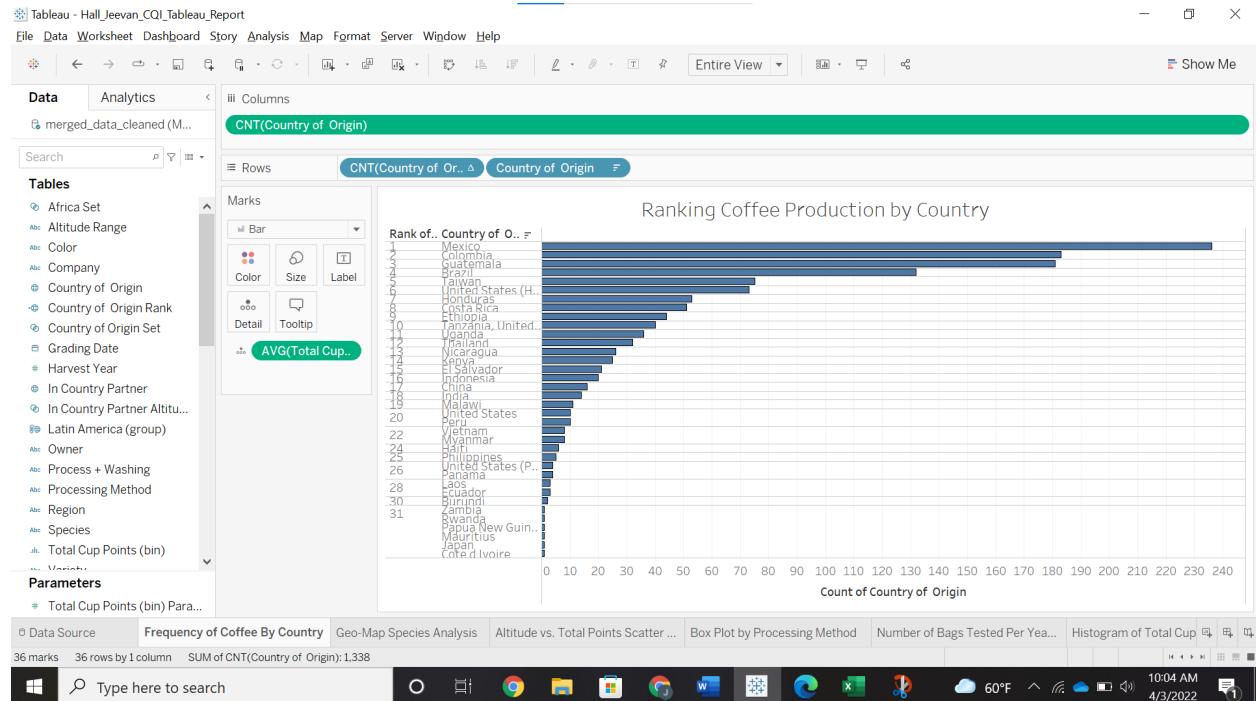


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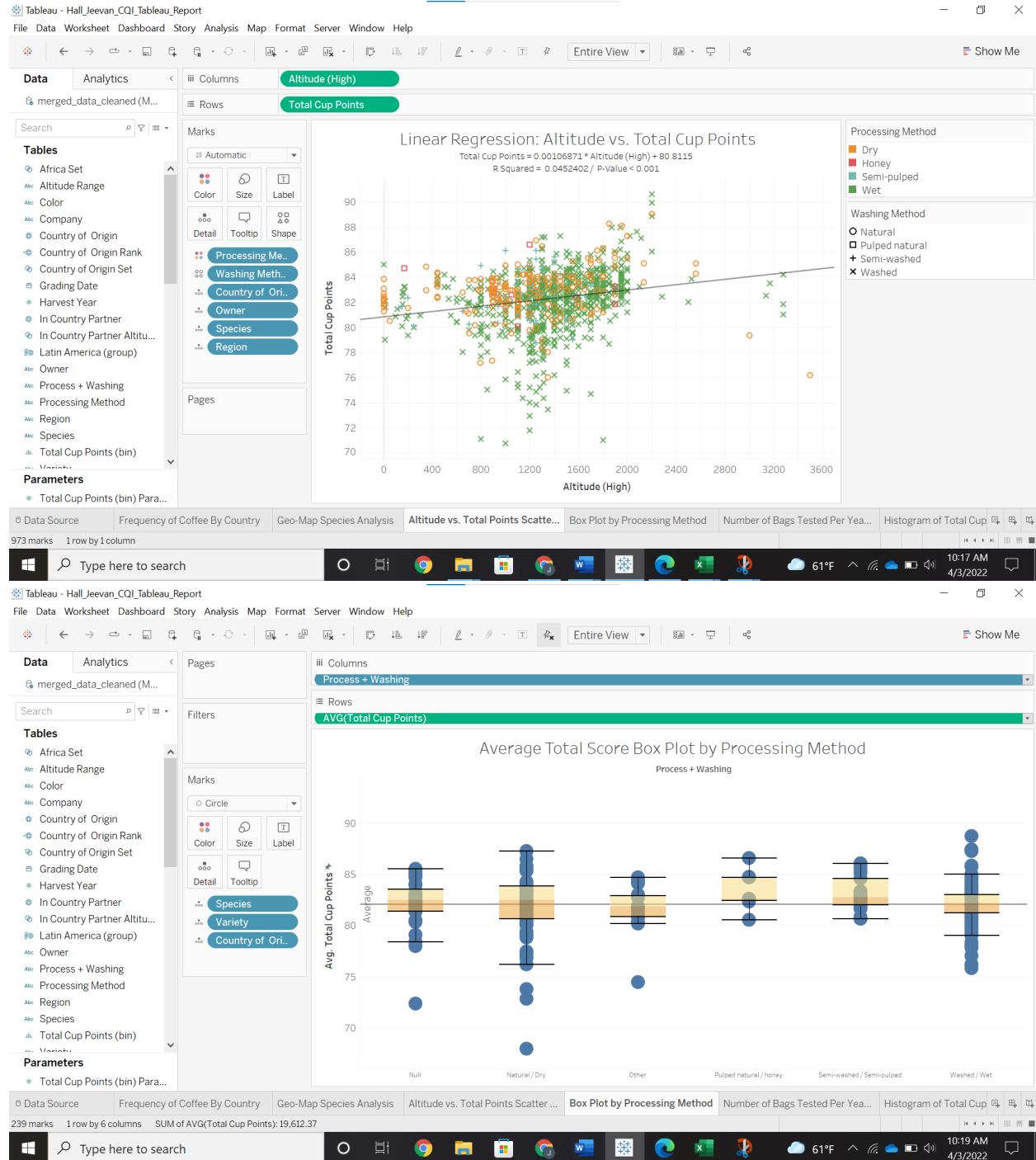


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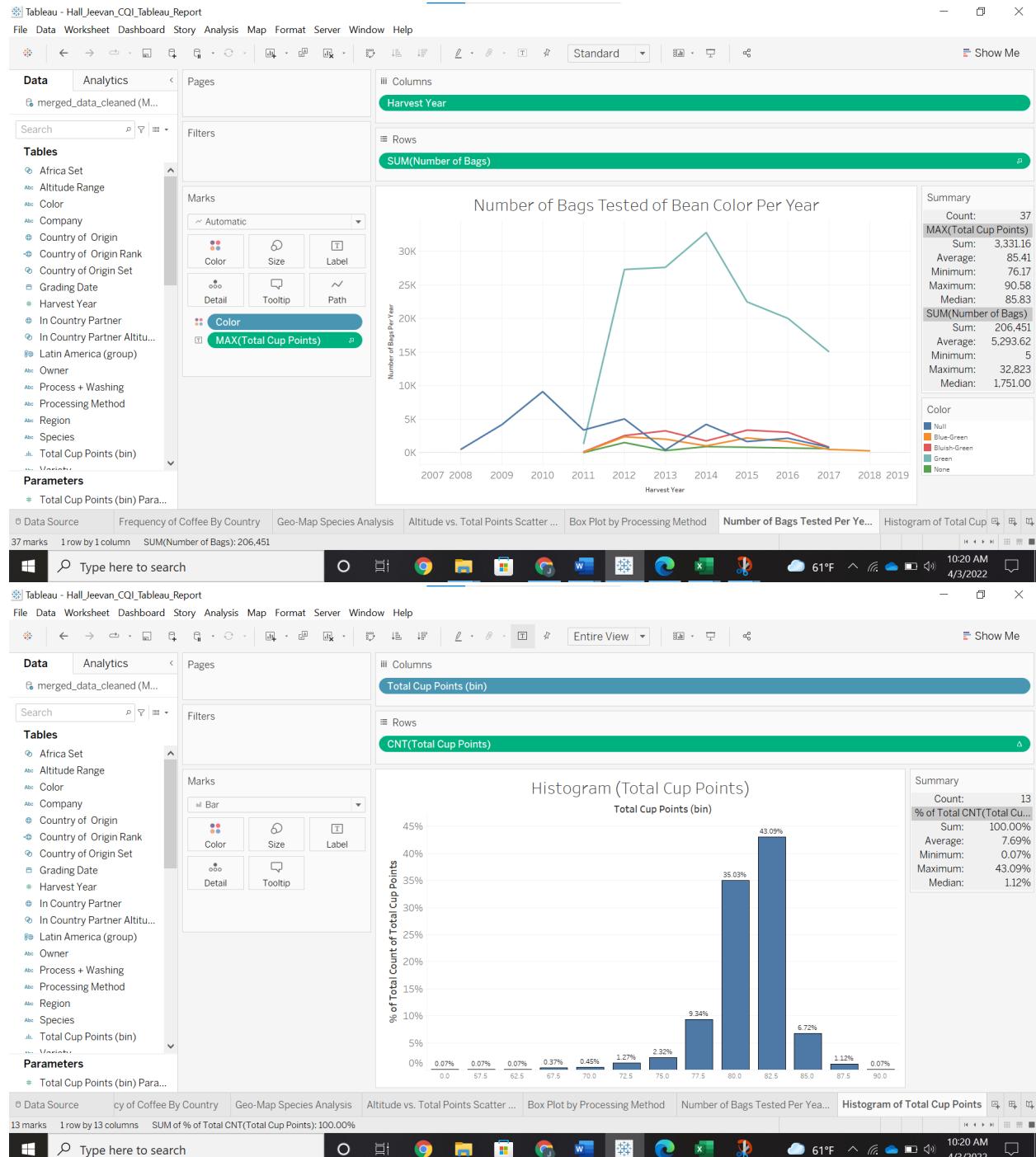
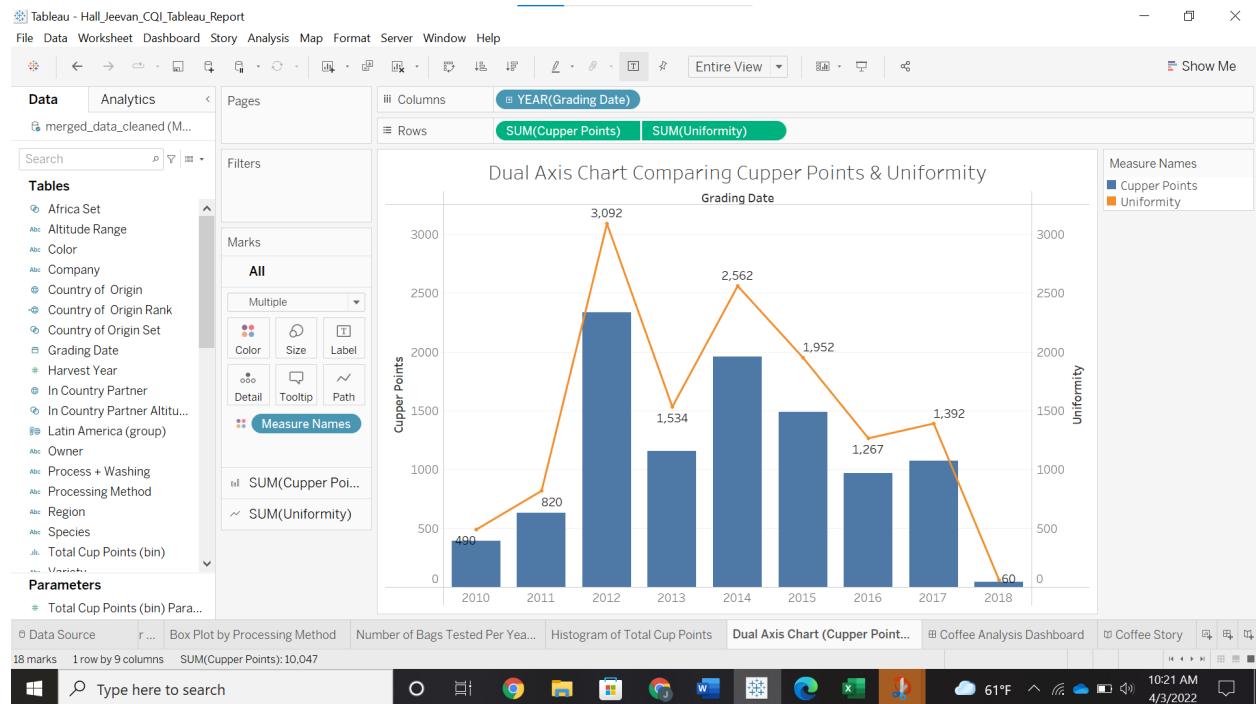
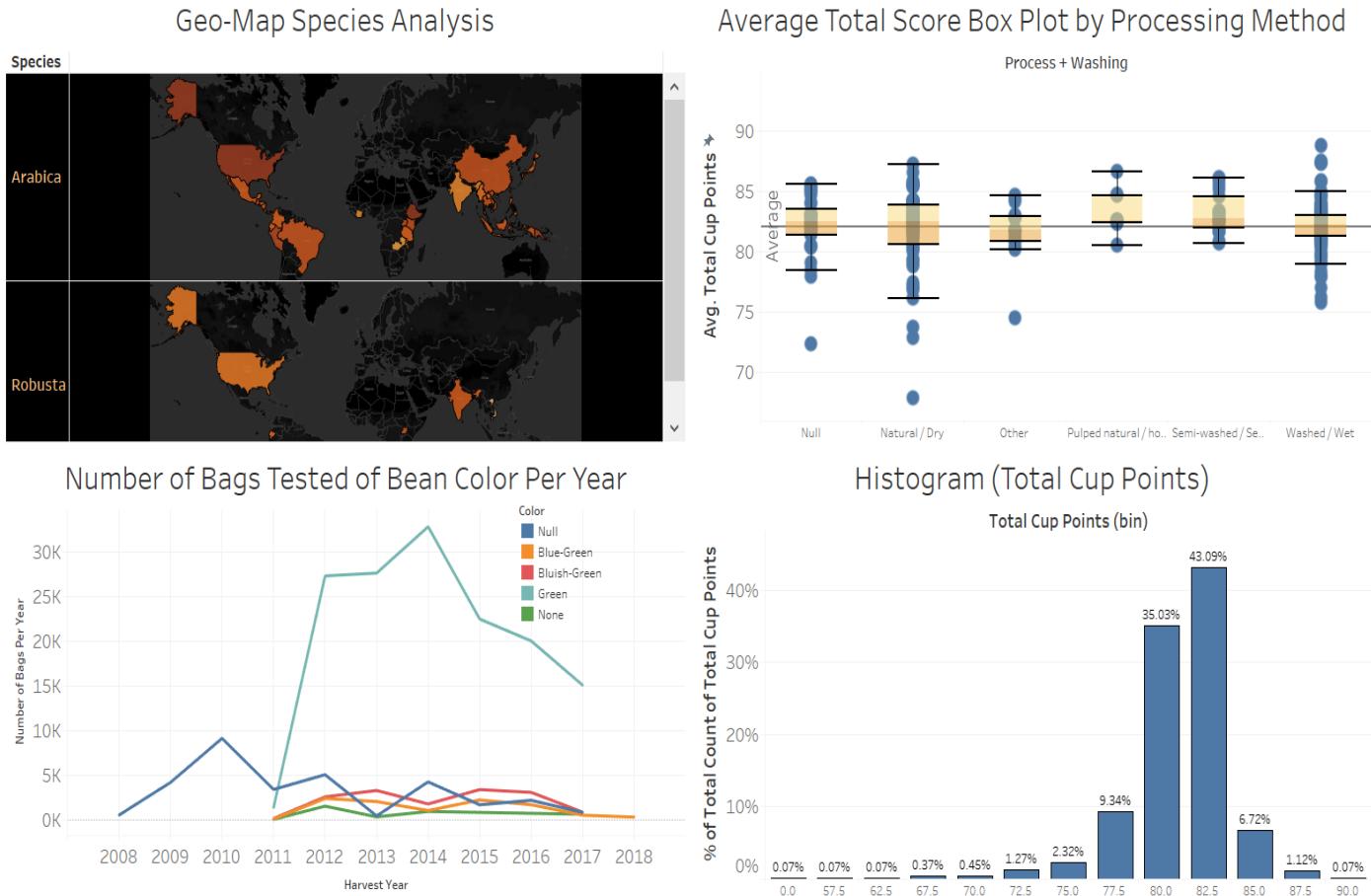


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DASHBOARD



The third graph for this dashboard displays a line chart. It shows information about the color of beans and the number of bags tested chronologically by year date . Green beans were tested at a much higher rate than the other colored beans. Beans with no color were tested at the lowest rate. There is some data regarding green coffee beans, especially from within local regions of Ethiopia. These beans are heralded for their coffee flavor and taste. The international demand for highest quality and flavor suggests the reason for the significant number of green coffee beans being submitted for grading.

STORYTELLING

Coffee: A World Commodity

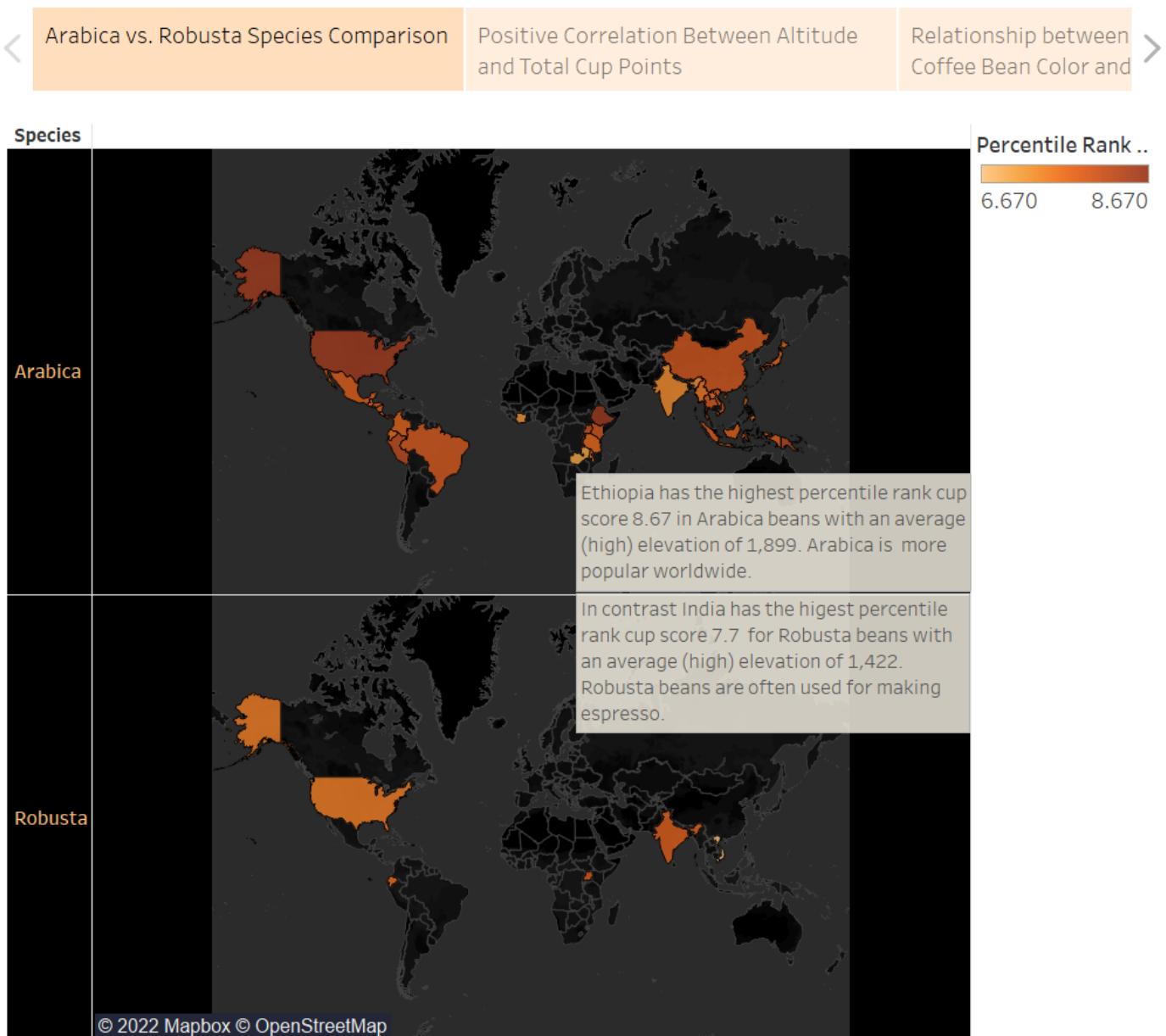


Figure 1

Coffee: A World Commodity



Figure 2

Coffee: A World Commodity



Figure 3

Tableau Project: Visual Analysis of Coffee Data via the Coffee Quality Institute

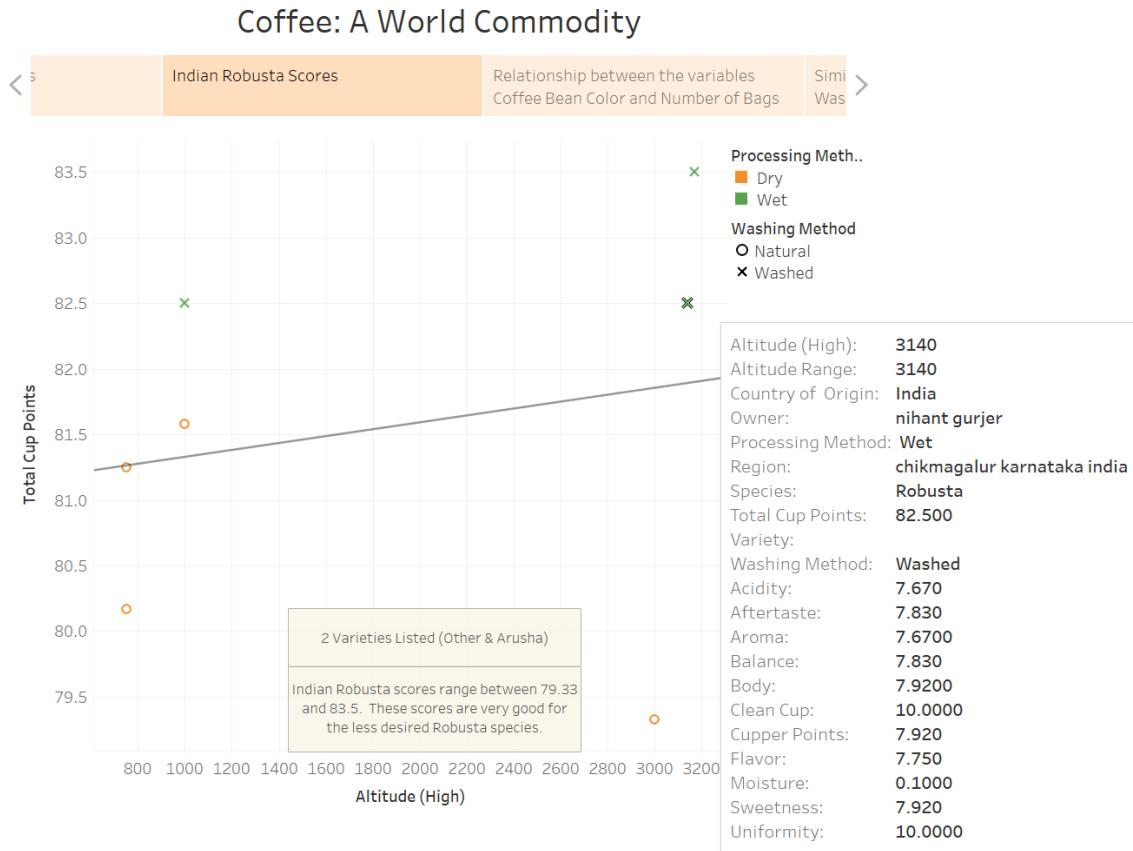


Figure 4

Coffee: A World Commodity

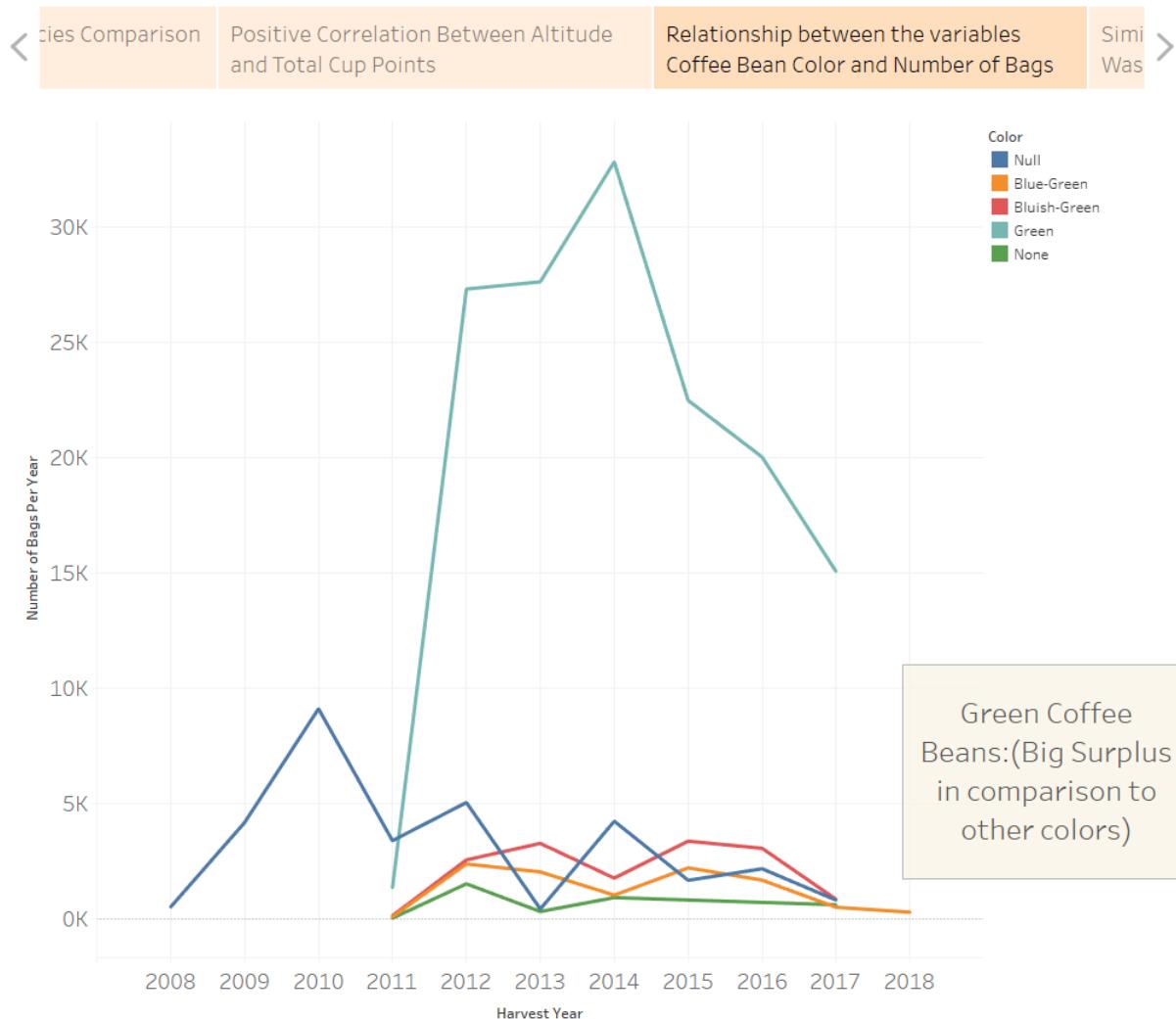


Figure 5

Coffee: A World Commodity

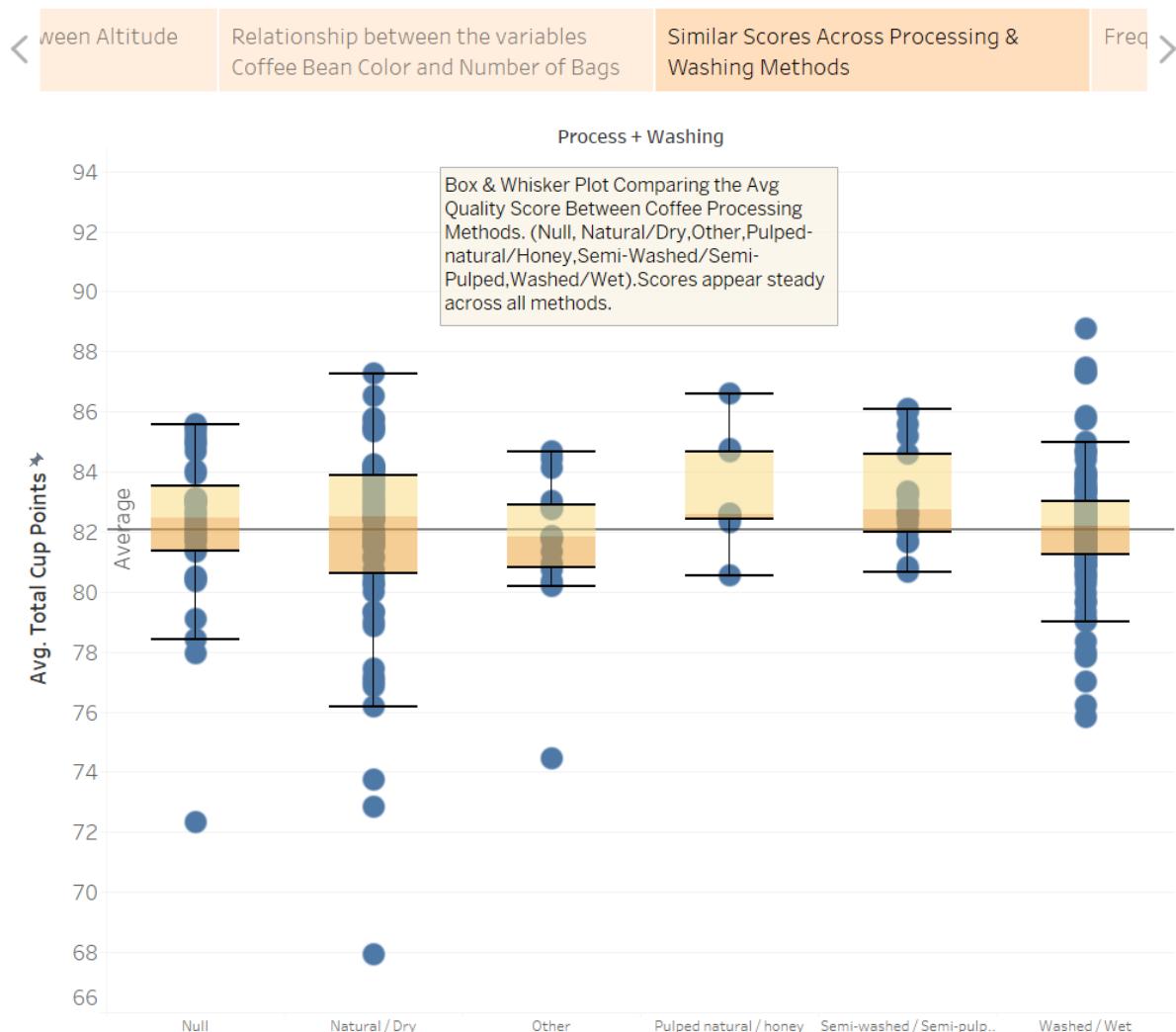


Figure 6

Coffee: A World Commodity

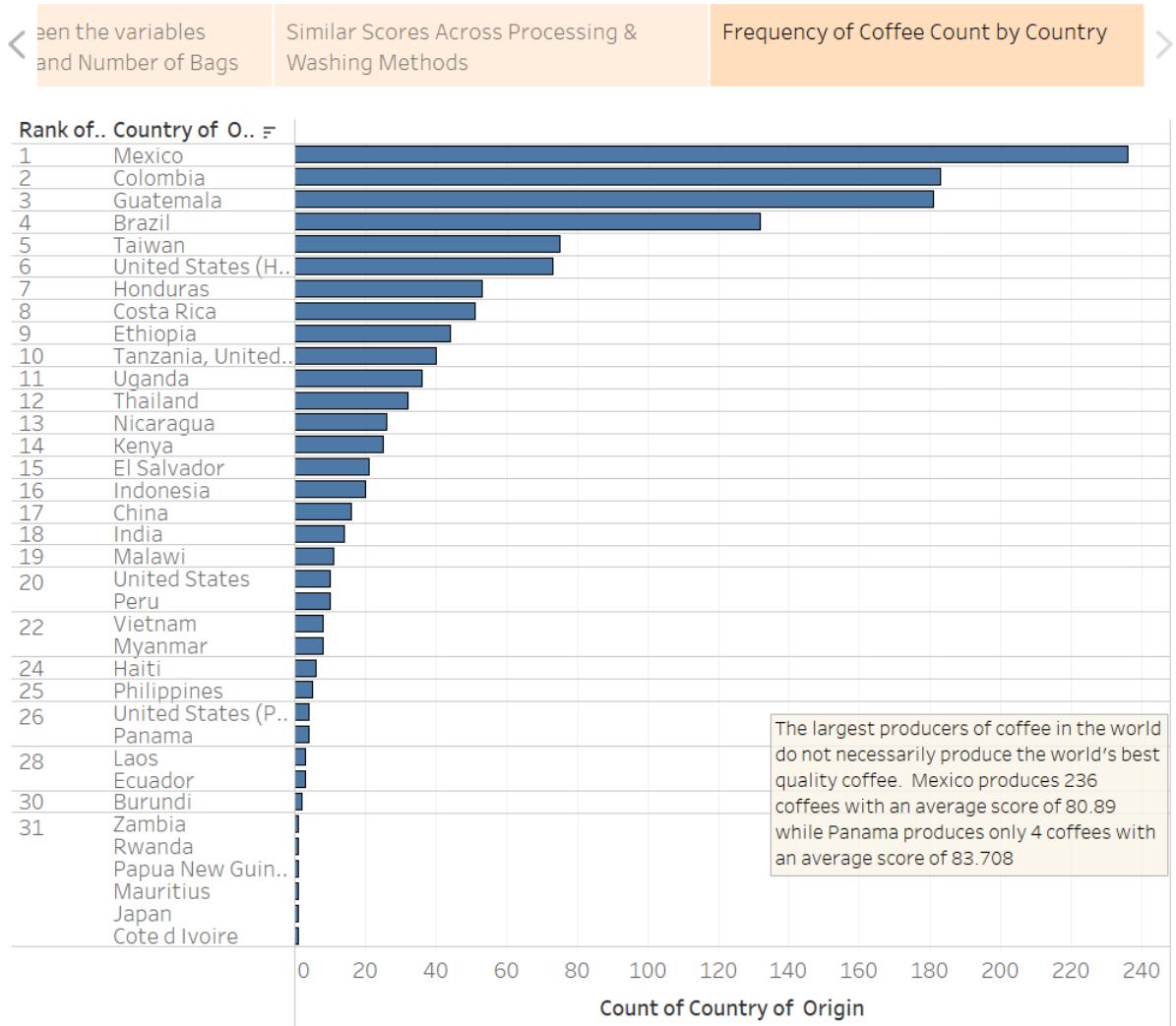


Figure 7

Tableau Project: Visual Analysis of Coffee Data via the Coffee Quality Institute

In our daily grind, we hardly think about where our coffee originates. Pre-packaged Keurig One Cup pods fill homes and businesses nationwide. Ease of access to this global commodity has desensitized Western civilization's tastes and standards. However, throughout the globe, we can still find ancient methods of coffee cultivation, processing, and preparation. Oral tradition proclaims Ethiopia as the birthplace of coffee; as sheepherders from the region of Kaffa found their goats chewing on coffee cherries. Approximately 500 meters away from Kaffa, the elevated mountain region of Guji-hambela (2,200 meters or 7,217 feet above sea level) produces some of the world's best coffee. These elevated regions process their coffee in two different methods. Some farms prefer a washed/wet method, while others prefer a natural/dry, more traditional washing and processing. According to Figure 3 R² value of 0.50, a moderate correlation exists between altitude and quality score of Ethiopia coffee from Guji-hambela, Oromia, Kaffa, Gedo, Yirgacheffe, Idamo, Aricha. Figure 3 also suggests that many of these higher altitude farms also maintain more traditional methods of processing coffee naturally without washing in water. Ethiopian plant scientists Adugnaw Mintesnot and Nigussie Dechassa shed light on the implications of coffee processing methods. Mintesnot and Dechassa (2018) explain:

Two processing methods were applied, including washed coffee (green coffee prepared by wet processing of the fruit) and unwashed coffee (green coffee prepared by dry processing of the fruit). Unwashed coffee had superior values for primary defect, secondary defect, odour, total-point, and preliminary grade, while washed coffee showed a better score for acidity, body, and flavour attributes which have a distinguishing influence on the ultimate taste profile of coffee origins.(p.97)

These findings support the notion that unwashed coffee from Ethiopia receives high demand throughout the world for its aroma and overall quality, while washed coffee features better acidity, flavor, and body traits. Figure 3 depicts the nuances between washed and unwashed samples. The top-scoring coffee originates in the Guji-Habela region and totals a high score of

Tableau Project: Visual Analysis of Coffee Data via the Coffee Quality Institute

90.59. The coffee received scores of 8.830 for flavor, 8.750 for acidity, and 8.50 for body.

African scientists suggest that "growing coffee plants in the highlands and midlands rather than in the lowlands as well as washing the beans results in the production of coffee beans with high-quality attributes and chlorogenic acid contents that could meet the rising international market demands for high cup quality." According to Figure 3, Ethiopian Arabica scores ranged from 83.6 to 90.6. This data confirms the worldwide notion that Ethiopia produces coffee of the highest standards and quality.

Moving across the ocean to the continent of Asia, a niche of excellent quality Robusta has developed in the Indian region of Chickmaglur, Karnataka. Similar to the Guji-Habela region, Chickmaglur features a mountainous terrain with high elevation. The scores of the Robusta coffee grown in Karnataka range from 750 to 3000 meters in elevation. Such growing ranges confirm the thriving aspect of "lowland" Robusta in lower to moderate elevations due to the chemistry of Robusta coffee. Indian coffee farmers have focused on producing large amounts of coffee, which grows Robusta to facilitate high yield and fast growth as opposed to Arabica, which takes longer to mature. Figure 1 shows India's preeminence in Robusta production. Most of the higher scores are in the middle to lower elevation ranges where Robusta grows well. Prakash et al.(2005), Indian scientists, describe this phenomenon as follows:

Coffea is mainly under cultivation in Chickmaglur and Kodagu districts of Karnataka and at some places in Kerala, Tamil Nadu, Andhra Pradesh, and Orissa. The climate and altitude at which coffee is grown plays a major influential role in determining the quality of the bean. Coffee trees grown at high elevations take longer periods to mature than those grown at low elevation as there is less oxygen at high altitudes that produces a more intense flavor.(p.1)

Although Robusta does not have the same demand worldwide, it is essential to note that there is a market for Robusta at about 36% of the coffee market share. Indian coffee from Karnataka (primarily Robusta) is grown in different elevations than Ethiopian coffee(primarily Arabica)

Tableau Project: Visual Analysis of Coffee Data via the Coffee Quality Institute

due to the preferences of local farmers in each region. Unfortunately, our dataset does not have a high number of entries of Robusta coffee, but the records that exist contain notable scores.

Another in-demand aspect of coffee, especially from Africa, features green coffee beans. Scientists have performed much research on the chemistry of the green coffee bean. Figure 5 displays a considerable surplus of green coffee graded compared to other colors. Also, Figure 3 posits top-ranking scores from green coffee beans of Ethiopian origin. This data corresponds to Mintesnot and Dechassa's assertion that "The general trend of attributes indicated that most highland samples [of green coffee beans] scored better values than lowland and midland samples." They also describe the quality of green coffee as follows "Higher elevations produce hard, dense beans (higher quality than soft beans) that are more sought-after than beans grown at lower elevations because they have a higher concentration of sugars, which produce more desired and nuanced flavors" Figure 5 reassures us that our data points us in the right direction regarding green coffee quality. In 2014, a significant number of green coffee bags were submitted, 32,823, with a maximum total cup quality score of 90.58 a mark from Ethiopia. This was the highest score from any color bean.

The data in this report reflects the quality scoring of two species of coffee Arabica and Robusta. The visuals provide vital information about the geographical background of coffee production worldwide and significance of processing methods upon coffee quality. Natural/Dry processing posted the second highest average score of all methods) These natural/dry processed coffees originate in higher altitudes as confirmed in Figure 3. Washed/Wet processing methods also presented high scores corresponding to high altitude. Other posts the lowest average score of all processing methods, however this average does not fall to a mediocre range. This report broadened my perspective on how data could be applied towards the world of coffee.

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