

GRAVY

Insight Team Analysis and
Recommendations

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Agenda

1 Introduction and Problem Statement

2 Dataset and Transformations

3 Graphs and Analysis

4 Genetic Algorithms

5 Next Steps

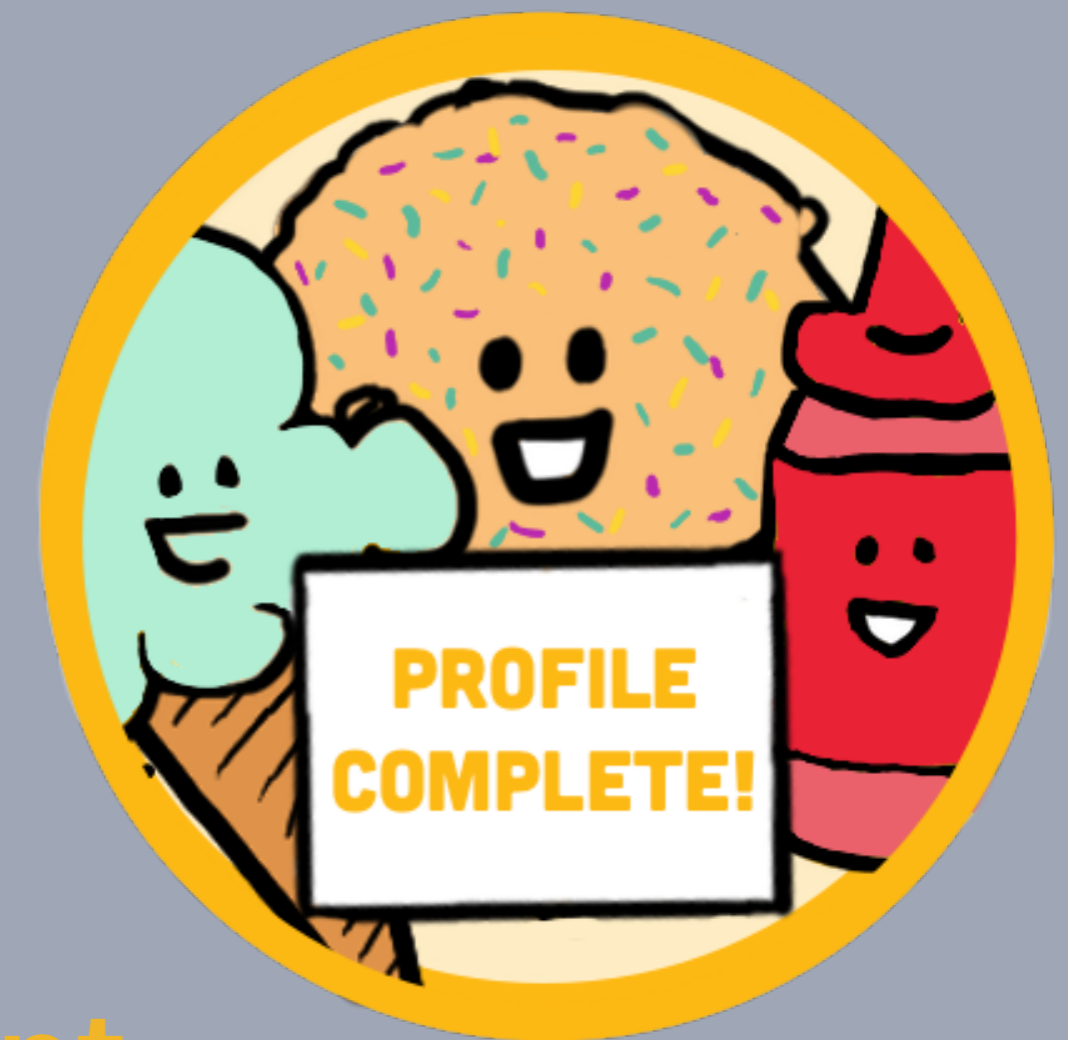


Who is Gravy?

Recommendation platform that wants to **collect food review data** and sell it to companies

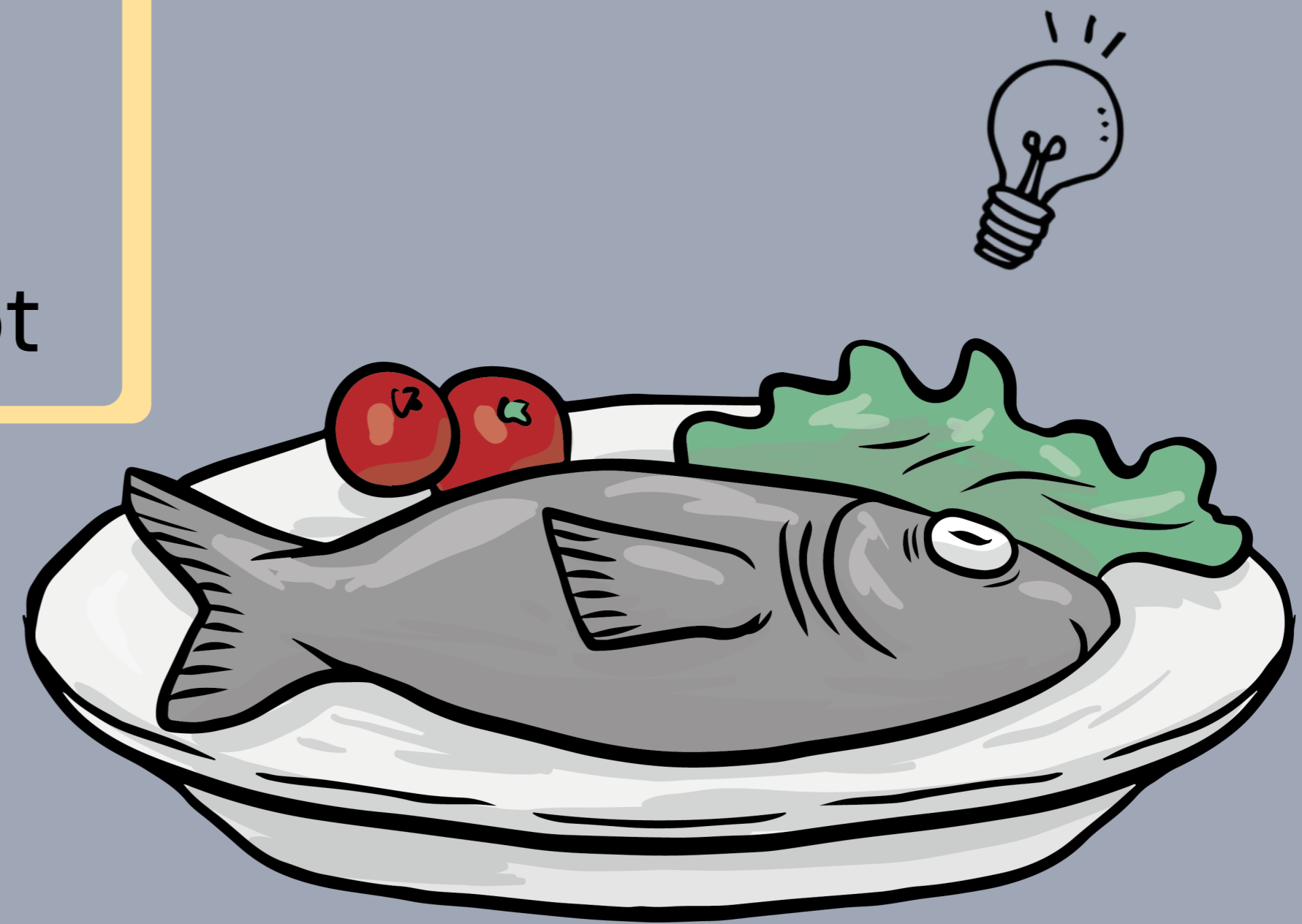
Gather consumer data and food preferences through **quiz** and interactive **rating system**

Use resulting taster type (virtuoso, captain, or pioneer) to provide value by creating **relevant recommendations**



Problem Statement

The initial ask was to create an exploratory hypothesis regarding what causes someone to like a food or not



Gravy Quiz Questions

How sweet is Coca-Cola?

Move the slider to the color you think best matches the sweetness of Coca-Cola.

Too Sweet



Not Sweet Enough
No idea, never had it!

< Back Next

Which of the following foods do you enjoy?

- Parmesan cheese
- Worcestershire sauce
- Bacon
- Mushrooms
- Ketchup
- Anchovies
- None of the above

< Back Next


Which of these have you experienced?

Choose all that apply.

- Concussion or other significant head injury
- Tongue surgery
- Whiplash
- Wisdom tooth extraction
- Serious ear infections during childhood
- None of the above

< Back Next

Ghirardelli Intense Dark Chocolate 72% Cacao



- I like how this tastes
- I don't like how this tastes
- I haven't tried it, but I think I'd like how it tastes
- I haven't tried it, but I don't think I'd like how it tastes

< Back Next

Here's another weird one -- did your mother experience significant morning sickness when she was pregnant with you?

- Yes (and she never lets me forget it)
- Nope
- Uh, I have no idea

< Back Next

Here's a weird one -- have you ever noticed pudding go from a thick texture to a watery and thin texture in your mouth?

- Excuse me? No.
- Kind of sounds familiar.
- Yes, I know what you're talking about.

< Back Next



Taster Profiles



Captain

Aye, aye, captain! Your Taste Profile tells us that you are in command of your palate, and you know what you like when it comes to your favorite tastes and flavors. You tend to have a sophisticated appreciation for a wide variety of tastes – ranging from a tolerance for sour foods to a fondness for the mouthwatering addition of umami to your meals.



Pioneer

Tally-ho, Pioneer! Your Taste Profile tells us that you're the type of eater who is looking for that extra something out of every meal: an adventurous taster who will say yes before you say no! You tend to be unafraid when it comes to adding a dash of flair to your dishes, whether that comes in the form of seasonings, herbs, or heat. You belong on the front lines of experiencing new and exciting tastes and flavors!

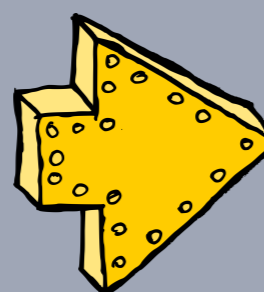


Virtuoso

Well, well! We have a Virtuoso here! Your Taste Profile tells us that you are a master at detecting the nuances of taste, likely because you experience it with greater intensity than the average person. We might not find you snacking on an unsweetened grapefruit at breakfast, or digging into a pile of unseasoned brussels sprouts at supper, but you know how to turn what might be otherwise unpleasant tastes tolerable with a pinch (or five) of pantry staples like sugar and salt.

Datasets: Food Preferences

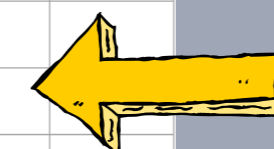
user id for each person who has taken the quiz



this table was used to join unique user and food ids across tables

user_id	food_id	vote	saved
01ffe122-c211-4424-9fdc-d4e522c60204	9cc0375b-7885-4913-af8a-268cd685175f	D	
01ffe122-c211-4424-9fdc-d4e522c60204	1e737227-c62e-4fdb-b9ad-7d4b4a7e4005	L	
01ffe122-c211-4424-9fdc-d4e522c60204	c9923c97-5600-49f1-8d89-93314f3b53cc	L	
01ffe122-c211-4424-9fdc-d4e522c60204	a048a466-dba5-4010-a78b-58a299c7f806		t
01ffe122-c211-4424-9fdc-d4e522c60204	20b34685-6644-4728-a3f6-ceca412b0b84	D	
01ffe122-c211-4424-9fdc-d4e522c60204	c4b67635-c7a7-4d6b-93ac-6d832a7757bf	D	
03ecafa9-a26b-483c-bc48-ab1dd95aaa6a	ca664d76-e5eb-4525-a30a-7f9b96c1eb73	L	
03ecafa9-a26b-483c-bc48-ab1dd95aaa6a	0657e826-652c-4329-9a8b-aaa2733b3742	D	
03ecafa9-a26b-483c-bc48-ab1dd95aaa6a	eb0160b0-6aa0-4a11-9ff2-7e2715017fc1	D	
08a73537-d351-44f8-832b-6d73e22ceb0a	0657e826-652c-4329-9a8b-aaa2733b3742		
08a73537-d351-44f8-832b-6d73e22ceb0a	36e95c99-90a3-4d26-9c82-6c7a5d90aaf9	L	t
08a73537-d351-44f8-832b-6d73e22ceb0a	f48fd13-b1d7-4bb2-a2e5-4f418fe2f681	L	
08a73537-d351-44f8-832b-6d73e22ceb0a	9ac016ee-a6ed-4d89-a31a-9c4fd24a21bb	L	
08a73537-d351-44f8-832b-6d73e22ceb0a	592fb740-251d-4f96-b119-56c7a6db703f	D	
08a73537-d351-44f8-832b-6d73e22ceb0a	ce242bf8-3eed-47d2-8156-da1b297e94a3	L	t
08a73537-d351-44f8-832b-6d73e22ceb0a	86337709-8456-40e4-8b91-4bb180bd7d9d	L	t
08a73537-d351-44f8-832b-6d73e22ceb0a	c938a7dc-967d-4107-bea8-a08dfd3fdb6f	L	t
0e9d359e-1dfa-46af-b533-aac1aa91b860	f2d66b75-9fcb-4cfd-a7f3-cadfa53bfc85	D	
0e9d359e-1dfa-46af-b533-aac1aa91b860	0657e826-652c-4329-9a8b-aaa2733b3742	L	
0e9d359e-1dfa-46af-b533-aac1aa91b860	b6c29dee-b7d6-9565-a18747fbd7d3		

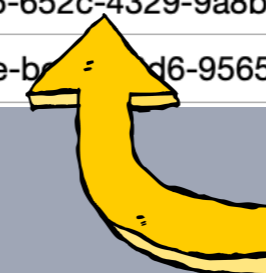
how each user voted on certain foods



whether or not a user saved a food



food id for each food a user has interacted with



Datasets: Food Info

id	food_name	serving_description	serving_units
5d9a109a-44c1-41d1-b908-7b6c39d441f8	Häagen-Dazs Vanilla Milk Chocolate Ice Cream Bar	1	bar
ecc9663b-c978-411a-bea5-8b93ed86cce8	Cheddar Folios Cheese Wraps	42	g
fbe62681-bab3-4de1-be7f-97dd8009d408	Imagine Organic Creamy Broccoli Soup	1	cup
f9f4c38a-7fe9-439c-a90c-b317b1613bb5	nudge. brazilian coffee butter	2	tbbsp
37728b0e-397f-4aad-8184-6a8c01c70be5	Amy's Organic Soups, Thai Coconut (Tom Kha Phak)	1	can
bcddd4c6-d919-45bb-898b-ba05f710c5a3	Talenti Cold Brew Coffee Dairy Free Frozen Sorbetto	2/3	cup
973f8f44-ab1f-430c-a3a9-f4d82b1f1020	Yolélé Jollof Fonio Pilaf	1/4	cup
0ea5ce27-5808-41e0-b9d1-e124f280df58	Birds Eye Veggie Made Frozen Cheddar Mac & Cheese	1	cup
13d1c761-e855-4c4d-ab85-154d9e61a6a5	Healthy Choice Simply Steamers Chicken & Vegetable Stir Fry	1	meal
0ace7b47-d410-4b4c-9b79-a11d238ae87a	Tabatchnick Vegetable Soup	1	pouch
817095e4-0d0b-4c18-b3da-a7fa5d400bfe	Healthy Choice Simply Steamers Grilled Chicken & Broccoli Alfredo	1	meal
e7eb93e8-999f-4d6e-bbae-5b98d929e7e4	Purely Elizabeth Original Granola	1/3	cup
c7876834-0305-4605-aeab-ba195e69f9ed	Purely Elizabeth Blueberry Hemp Ancient Grain Granola	1/3	cup
980f6799-6ca2-435f-a0bd-069d76f6a837	Nush Blueberry Cake	1	cake
015184dc-a601-43db-812f-49c5886787fa	SkinnyPop White Cheddar Popcorn Cakes	2	cakes
0d2aa021-72b9-4206-8a88-33a3e2ec2740	Green Giant Broccoli & Cheese Mashed Cauliflower	1/2	cup
b50c77fe-6888-426a-9883-98fea8fc1414	Applegate Natural Breakfast Sausage, Savory Turkey, No Antibiotics, Cooked	3	links
b4acc53a-f580-44e0-9cf6-78592e80ee09	Applegate Natural Breakfast Sausage Patties, Chicken & Maple, No Antibiotics, Cooked	1	patty
3ca2104f-04e6-4448-b462-eb3dfe96a71a	Garden Lites Veggies Made Great Blueberry Oat Muffins	1	muffin
699bc18d-9412-4767-83e0-d18c00f44d38	Dasani Sparkling, Berry	1	can
503df6ce-db8a-4826-8b37-764f839ac694	Zevia Zero-Calorie Soda, Ginger Root Beer	1	can

calories_per_serving	carbs_per_serving	protein_per_serving	fat_per_serving	sugar_per_serving	sodium_per_serving	fiber_per_serving	cholesterol_per_serving
250	20	3	18	19	40	<1	45
180	0	12	13	0	330	0	45
120	23	2	2.5	7	190	3	0
200	22	2	12	21	35	1	0
330	24	7	23	9	1,300	4	0
280	33	5	9	31	25	1	155
160	35	3	0	2	410	2	0
170	22	10	5	2	410	2	15
190	15	23	4	8	500	4	75
90	17	4	1.5	3	80	4	0
190	8	28	5	2	600	4	85
140	20	3	6	6	125	2	0
140	20	3	5	7	110	2	0
160	18	5	12	1	280	4	70
90	14	2	2.5	0	210	3	0
90	8	3	5	2	430	2	15
90	1	11	5	0	440	0	45
60	1	5	4	1	220	0	25
110	21	3	2	10	125	2	25
0	0	0	0	0	35	0	0
0	0	0	0	0	0	0	0

ingredients
Vanilla Ice Cream: Cream, Skim Milk, Sugar, Egg Yolks, Vanilla Extract. Milk Chocolate and Vegetable Oil Coating: Milk Chocolate (Sugar, Whole Milk Powder, Chocolate, Cocoa Butter, Soy Lecithin, Vanilla Extract), Coconut C
PASTEURIZED MILK, SALT, ENZYMES, ANNATTO COLORING
Filtered Water, Organic Broccoli, Organic Potatoes, Organic Tapioca Starch Flour, Organic Celery, Organic Onions, Organic Leeks, Organic Evaporated Cane Syrup, Sea Salt, Organic Garlic, Organic Expeller Pressed Canola O
cane sugar, vegetable oil (sunflower, palm, canola), arabica coffee (whole coffee matter™), skim milk, milk, whey, lactose, sunflower lecithin, natural flavors, salt. caffeine: 40mg caffeine per serving
Filtered Water, Organic Coconut Milk (Organic Coconut, Water), Organic Sweet Potatoes, Organic Carrots, Organic Tofu (Filtered Water, Organic Soybeans, Magnesium Chloride), Organic Green Beans, Organic Sautéed Oni
Water, Sugar, Egg Yolk And Whole Egg, Coconut Oil, Almonds, Dextrose, Coffee, Carob Bean Gum, Vanilla Extract.
Fonio, tomato, salt. Contains 2% or less of: carrot, onion, tamarind, sunflowers oil, paprika, spices. annatto seed, garlic, turmeric, baobab leaf powder. Contains: mustard.
Cooked Lentil Zucchini Elbow Pasta (Lentil Flour, Water, Zucchini), Water, Cheddar Cheese (Pasteurized Milk, Cheese Cultures, Salt, Enzymes, Annatto Color), Cream, Contains 2% Or Less Of Cheddar Cheese (Cultured Past
Cooked Chicken (Chicken Breast, Water, contains 2% or less of: Sea Salt, Sugar, Olive Oil, Isolated Soy Protein, Natural Flavoring), Broccoli, Water, Carrots, Edamame, Onions, Red Bell Peppers, Soy Sauce (Water, Wheat, S
water, carrots, green beans, onions, tomato paste, celery, peas, potatoes, corn, lima beans, barley, enriched macaroni product (durum semolina, niacin, ferrous sulfate, thiamine mononitrate, riboflavin and folic acid), green sp

↑
unique food
id and
serving info

↑
ingredients
nutritional
content

Datasets: Taster Profiles

id	taster_type	coca_cola	sour_patch_kids	green_vegetables	black_coffee	umami_foods	meat	salted_pretzel	salt	pudding	dietary_restrictions	allergies	dislikes
816ebbd4-a578-4c2a-9130-6e0e8bc23eea	virtuoso	90	86	0	4	{6}	4	1	2	0	{1}	{0}	{0}
7ae2b06d-ceed-4af3-b7a7-e1cb293a2f48	captain	91	42	0	0	{1,5}	1	2	1	2	{}	{8}	{8}
2067ac5d-6f68-4766-a5d9-078582a78097	captain	41	79	0	0	{1,2,3,4,5}	4	0	0	2	{}	{0}	{8,5}
6df37a05-ad11-432f-9a4e-f76f1ea634fd	virtuoso	75	40	1	2	{1,2,3,4,5,6}	4	1	0	0	{}	{0}	{8}
288bd7a9-aa0b-47ab-b01b-1d6f5f3e8ed7	pioneer	99	47	0	5	{1,2,3,4,5}	4	1	0	0	{}	{0}	{8}
4d4bc8d0-b48d-449b-9d42-78361540bf7e	captain	99	74	0	4	{1,2,4,5,6}	0	1	0	2	{}	{0}	{0}
cd079ad3-e36c-4294-a440-3c4dca7b30c6	virtuoso	43	92	2	0	{1,3,4}	5	2	0	1	{}	{0}	{8}
6e5a9fe4-2a12-4725-bb7c-e40e4085998e	captain	63	52	0	2	{2,4}	2	2	0	0	{}	{0}	{0}
4530acfa-af1e-41a7-a353-98f65bdb91fe	virtuoso	87	41	1	4	{1}	5	1	-1	0	{}	{0}	{8}
8b997132-fee0-47d2-8f4b-316113df30db	pioneer	99	99	0	5	{1,2,3,4,5}	5	2	0	2	{}	{0}	{8}
5266a96b-03dd-4ee1-9bdc-e38937fa41b9	pioneer	93	13	0	4	{1,4,5,6}	4	2	2	0	{}	{0}	{5}
1a322e8c-bb4a-4f70-a594-7f878b13f180	pioneer	56	35	1	3	{3,4,5}	4	2	0	0	{1}	{0}	{8}
fba8fa5d-3abe-4dea-88dd-9741f49c59f0	virtuoso	73	77	2	5	{1,2,3,4,5,6}	4	0	-1	0	{}	{0}	{0}
83502a83-2ec7-462c-be98-8e3d08d2eaf5	pioneer	86	61	0	5	{1,2,3,4,5}	4	2	2	0	{}	{0}	{8,6,4}
d596a668-02cb-4496-8d10-dcd910b0d544	virtuoso	74	82	1	0	{1,2,3,5}	4	1	1	0	{}	{0}	{8}
999de0fd-1058-40e3-9b60-1cca62d929fd	captain	53	44	1	0	{1,2,3,4,5,6}	5	2	1	1	{1}	{0}	{0}
f6845df2-f61f-4ad8-b0c7-0cb18e0927f4	pioneer	41	37	0	5	{1,3,4,5}	3	2	1	0	{}	{0}	{8,6}
c013ea4c-1a2c-426e-b98a-04ffff108adc	pioneer	18	99	0	0	{1,2,3,4,5}	4	2	2	0	{}	{0}	{8}
faff52a-3423-4e8a-a6e7-51d662e4f1b6	pioneer	31	28	1	0	{1,4,5}	0	2	0	0	{}	{0}	{8}
3d979697-ec51-4e70-b21d-de5cb0be83d5	pioneer	57	58	1	5	{1,2,3,4}	4	2	2	0	{8}	{0}	{8,2}
1d288132-4142-4acf-8408-8ed2baf01f53	pioneer	53	39	0	5	{1,2,3,5,6}	4	2	1	0	{1}	{0}	{0}

diet	diet_percentage	exercise_frequency	morning_sickness	cooking_frequency	cooking_meals
					{}
{5,11}	82	4	f	5	{}
{1}	21	2		4	{}
{1}	56	1		3	{}
{1}	70	4		4	{}
{7,10}	98	4		4	{}
{1}	64	4	f	2	{}
{3,13}	64	4		1	{}
{3,7}	81	5		1	{pasta, stir_fry, roast_chicken, banana_bread, sandwich, chilli, pancakes, cookies}
{1,5,7}	82	3		5	{}
{2,3,7,8}	34	3		4	{}
{1}	87	3	f	4	{}
{1}	14	1		1	{}
{1}	75	1	f	4	{}
{1}	85	3	t	5	{}
					{}
					{}
{1}	47	2	f	5	{frozen_dinner, sandwich, cheese_plate}
{1}	88	4	f	4	{pasta, stir_fry, roast_chicken, banana_bread, sandwich, cheese_plate, chilli, pancakes, cookies}
{10}	99	1		2	{pasta, stir_fry, roast_chicken, banana_bread, sandwich, cheese_plate, pancakes, cookies}
{8}	99	1		5	{pasta, stir_fry, roast_chicken, frozen_dinner, cheese_plate, chilli, pancakes, cookies}
	51	4		4	{}

skittles	hersheys	lindt	philadelphia	laughing_cow	babybel	haribo_gummy_bears	aunt_jemima	campbells	chobani	ghirardelli2	hersheys2	jif	lucky_charms	philadelphia2	simply_lemonade	tostitos
								0	0	0	0	0	0	0	0	0
								2	4	1	1	1	1	2	1	2
								1	2	1	1	1	2	1	1	3
								1	2	2	3	1	2	2	1	1
								2	1	1	1	1	1	1	1	1
								2	2	1	1	2	1	2	1	2
								1	1	2	3	1	1	4	1	1
								2	1	1	3	2	1	2	1	1
								2	1	1	3	2	1	2	1	2
								2	2	1	1	1	1	2	1	2
								2	2	1	3	1	1	2	1	3
								1	2	4	2	1	1	1	1	1
								1	1	4	4	1	1	2	1	3
								1	1	1	4	1	1	1	1	1
								2	1	1	1	1	1	2	1	1
								0	0	0	0	0	0	0	0	0
								1	2	1	3	1	3	1	1	1
								1	2	1	1	2	2	2	1	3
								1	4	2	2	1	1	2	1	1

↑
user id and associated taster type

↖
how users ranked certain sample foods and tastes

↗
user habits questions

→
predictive accuracy questions

Datasets: Transformations



Manually tagged data and turned variables into **dummies**



Got a **unique list of liked foods** for each taster type



Graphed the frequencies of each tag relative to the list of liked foods(%) for each taster type

Datasets: Transformations

Foods liked by each taster profile

	product_name
0	Trader Joe's Everything But the Bagel Greek-Style Yogurt Dip
1	Siete Spicy Blanco Cashew Queso
2	Soom Chocolate Sweet Tahini Halva Spread
3	Sir Kensington's Chipotle Mayonnaise
4	Ba-Tampete Half Sour Pickles
5	Valrhona Le Noir Amer 71% Cacao Dark Chocolate
6	Brami Garlic & Herb Lupini Snack
7	Bohana Popped Water Lily Seeds, Soulful Spice
8	Bohana Popped Water Lily Seeds, Wild White Cheddar
9	Mamma Chia Wild Raspberry Chia Squeeze
10	Bee Local Hot Honey
11	Frontera Avocado Tomatillo Salsa
12	Hippeas Organic Chickpea Puffs, Sriracha Sunshine
13	Nush Foods Pineapple Mango Cake
14	ParmCrisps Pizza Real Cheese Crisps
15	SmartSweets, Sour Gummy Bears
16	Siggli's Skyr Icelandic-Style Strained Non-Fat Yogurt, Vanilla
17	Quest Protein Cookie Double Chocolate Chip
18	Louisville Vegan Jerky Co. Reuben's Smoky Carolina BBQ Vegan Jerky
19	Green Giant Veggie Tots Broccoli & Cheese
20	Wasa Crispbread, Light Rye
21	Moon Cheese Cheddar Believe It
22	Moon Cheese Get Pepper Jacked
23	Moon Cheese Oh My Gouda
24	Rao's Homemade Pizza Sauce
25	Maille Dijon Mustard
26	Maille Old Style Whole Grain Dijon Mustard
27	Grey Poupon Dijon Mustard
28	Chung Jung One Gochujang
29	Hikari Organic Miso Paste, White
30	Rao's Homemade Marinara Sauce
31	Glaceau Vitaminwater Zero Power-C Dragonfruit Enhanced Water Beverage
32	Perrier, Pink Grapefruit
33	Wasa Crisp'n Light 7 Grain
34	Claussen Kosher Dill Spears
35	Trader Joe's Parsnip Chips
36	Trade Street Jam Co. Smoked Peach Jam
37	Jeni's Darkest Chocolate Ice Cream
38	Food For Life, 7-Sprouted Grains English Muffins
39	Paleochef Maple Mustard
40	Wilde Chicken & Waffle Chicken Chips
41	Bai Antioxidant Infusion Costa Rica Clementine
42	Soom Foods Pure Ground Sesame Tahini
43	Chobani A Hint of Monterey Strawberry Low-Fat Blended Greek Yogurt
44	Notty Lemonberry White Protein Chocolate

captains: 157 unique foods

	product_name
0	Trader Joe's Everything But the Bagel Greek-Style Yogurt Dip
1	Sir Kensington's Chipotle Mayonnaise
2	Ba-Tampete Half Sour Pickles
3	Valrhona Le Noir Amer 71% Cacao Dark Chocolate
4	Brami Garlic & Herb Lupini Snack
5	Bohana Popped Water Lily Seeds, Soulful Spice
6	Bohana Popped Water Lily Seeds, Wild White Cheddar
7	Brami Lupini Snack with Chili & Lime
8	Bee Local Hot Honey
9	Frontera Avocado Tomatillo Salsa
10	Hippeas Organic Chickpea Puffs, Sriracha Sunshine
11	Eden Foods Gomasio Sesame Salt
12	ParmCrisps Pizza Real Cheese Crisps
13	SmartSweets, Sour Gummy Bears
14	Siggli's Skyr Icelandic-Style Strained Non-Fat Yogurt, Vanilla
15	Quest Protein Cookie Double Chocolate Chip
16	Louisville Vegan Jerky Co. Reuben's Smoky Carolina BBQ Vegan Jerky
17	Tandoor Chef Chicken Tandoori with Spinach
18	Green Giant Veggie Tots Broccoli & Cheese
19	Tandoor Chef Palak Paneer
20	Wasa Crispbread, Light Rye
21	Moon Cheese Cheddar Believe It
22	Moon Cheese Get Pepper Jacked
23	Moon Cheese Oh My Gouda
24	Rao's Homemade Pizza Sauce
25	Maille Dijon Mustard
26	Maille Old Style Whole Grain Dijon Mustard
27	Grey Poupon Dijon Mustard
28	Tutto Calabria Hot Chili Peppers
29	Chung Jung One Gochujang
30	Hikari Organic Miso Paste, White
31	Maggie Tamarind Sauce
32	Heinz No Sugar Added Tomato Ketchup
33	Rao's Homemade Marinara Sauce
34	Glaceau Vitaminwater Zero Power-C Dragonfruit Enhanced Water Beverage
35	Perrier, Pink Grapefruit
36	Wasa Crisp'n Light 7 Grain
37	Claussen Kosher Dill Spears
38	Trade Street Jam Co. Smoked Peach Jam
39	Jeni's Darkest Chocolate Ice Cream
40	Paleochef Maple Mustard
41	nudge. brazilian coffee butter
42	Fineapple Vegan Liquid Gold Cheese Sauce
43	Soom Foods Pure Ground Sesame Tahini
44	Chobani A Hint of Monterey Strawberry Low-Fat Blended Greek Yogurt

pioneers: 111 unique foods

	product_name
0	Bohana Popped Water Lily Seeds, Soulful Spice
1	Bohana Popped Water Lily Seeds, Wild White Cheddar
2	Bee Local Hot Honey
3	Louisville Vegan Jerky Co. Reuben's Smoky Carolina BBQ Vegan Jerky
4	Wasa Crispbread, Light Rye
5	Rao's Homemade Pizza Sauce
6	Maille Dijon Mustard
7	Maille Old Style Whole Grain Dijon Mustard
8	Trader Joe's Parsnip Chips
9	Wilde Chicken & Waffle Chicken Chips
10	Soom Foods Pure Ground Sesame Tahini
11	Chobani A Hint of Monterey Strawberry Low-Fat Blended Greek Yogurt
12	Nush Foods Blueberry Cake
13	Kween Granola Butter, Original
14	OATLY! Original Oat Milk
15	Impossible Burger
16	Purely Elizabeth Original Granola
17	Bai Antioxidant Infusion Panama Peach
18	Evol Egg & Smoked Gouda Breakfast Sandwich
19	General Mills Honey Nut Cheerios Cereal
20	Kim's Magic Pop Original Flavor Freshly Popped Rice Cakes
21	Louisville Vegan Jerky Co. Paulette's Maple Bacon Vegan Jerky
22	Jacobsen Salt Co. Pure Flake Finishing Salt
23	Purely Elizabeth Blueberry Hemp Ancient Grain Granola
24	Trader Giotto's Oven-Baked Cheese Snacks
25	Cello Whisps Asiago & Pepper Jack Cheese Crisps
26	Bohana Wild White Cheddar Popped Lily Seeds
27	Seedlip, Garden 108, Leaf Herb Pod
28	Seedlip, Spice 94
29	Dona Masala Chai Concentrate
30	Seedlip, Grove 42, Citrus
31	Malk Organics, Maple Pecan Malk
32	Kodiak Cakes Protein Packed Buttermilk Flapjack & Waffle Mix
33	Les Moulins Mahjoub Traditional Harissa Spread
34	Brooklyn Delhi Curry Ketchup
35	Bohana Soulful Spice Popped Water Lily Seeds
36	Citterio Fresco Genoa Salame & Provolone Cheese
37	Bai Antioxidant Infusion Malawi Mango
38	Go Raw Sprouted Organic Pumpkin Seeds with Sea Salt
39	SkinnyPop White Cheddar Popcorn Cakes

virtuosos: 40 unique foods

Datasets: Transformations



Calories (kcal)

Daily Value: 2000

High: 400 (20%)

Low: 40 (2%)

Carbs (g)

Daily Value: 275

High: 20%

Low: 3%

Protein (g)

Daily Value: 51

High: 20%

Low: 5%

Fat (g)

Daily Value: 60.5

High: 20%

Low: 3g/ serving

Sugar (g)

Daily Value: 30.5

High: 22.5%

Low: 5%

Sodium (mg)

Daily Value: 2300

High: 460, 20%

Low: 115, 5%

Fiber (g)

Daily Value: 27.5

High: 20%

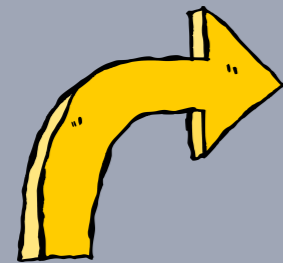
Cholesterol (mg)

Daily Value: 300

Low: 20mg

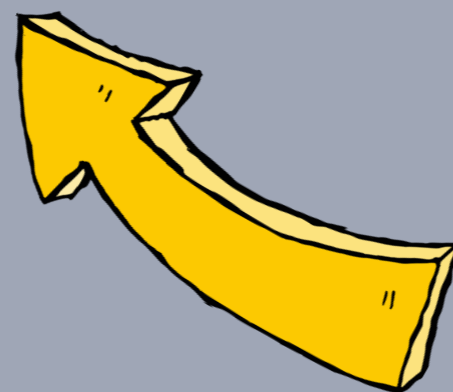


Datasets: Transformed Data



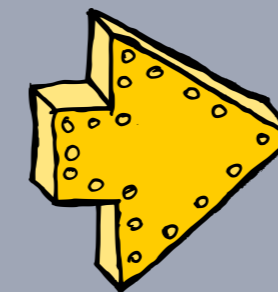
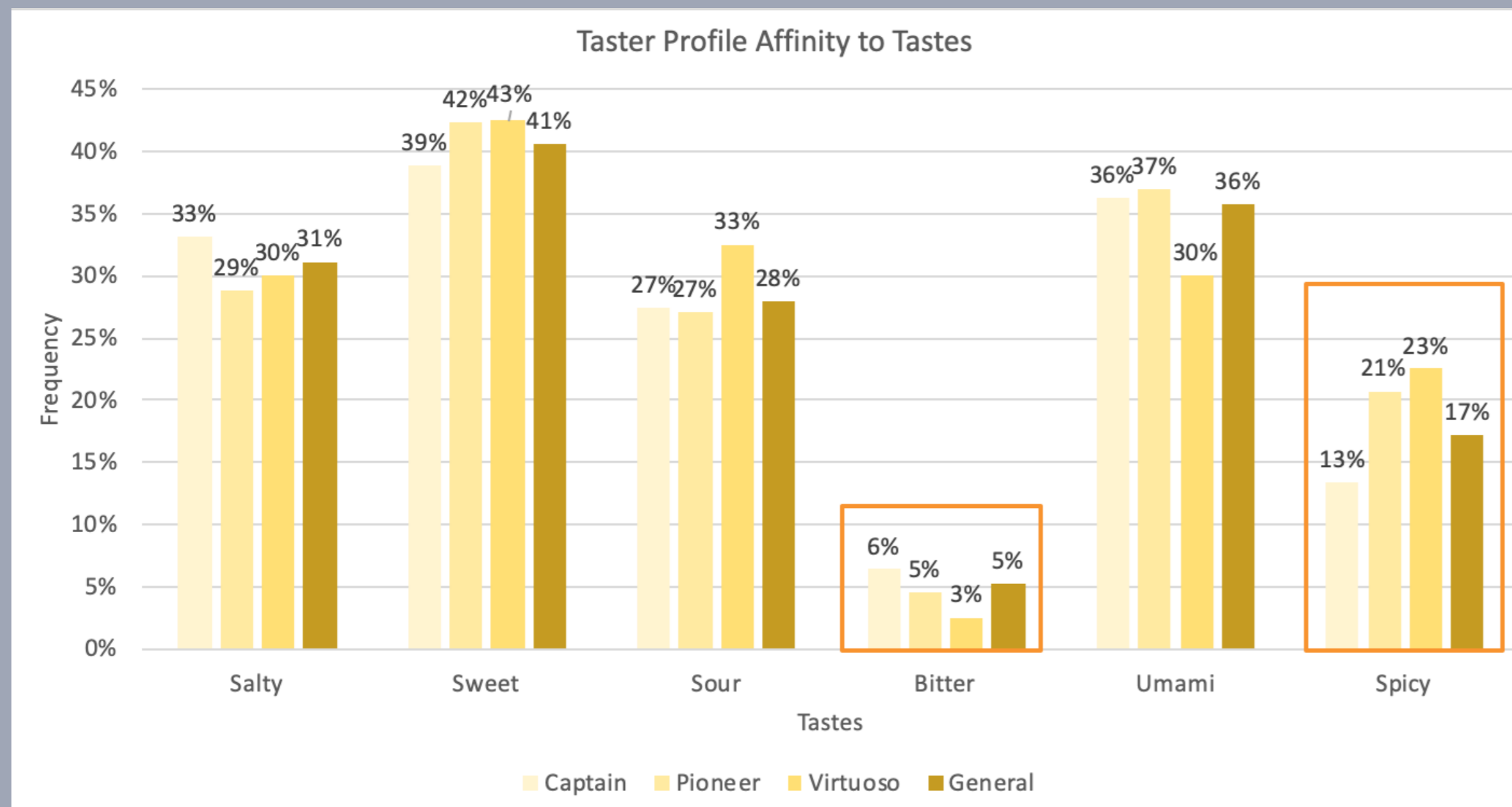
for each taster type, a list of unique rated foods were generated

product_name	food_category	High Cal	Low Cal	High Carb	Low Carb	High Protein	Low Protein	High Fat	Low Fat	High Sugar	Low Sugar	High Sodium	Low Sodium	High Fiber	Low Cholesterol	Salty	Sweet	Sour	Bitter	Umami	Spicy	Organic	Processed
Bohana Popped Water Lily Seeds, Soulful Spice	Snack	0	0	0	0	0	0	0	0	0	1	0	0	0	1	1	0	0	0	0	1	0	0
Bohana Popped Water Lily Seeds, Wild White Cheddar	Snack	0	0	0	0	0	0	0	0	0	1	0	0	0	1	1	0	0	0	0	1	0	0
Bee Local Hot Honey	Snack	0	0	0	0	0	1	0	0	1	0	0	1	0	1	0	1	1	0	1	0	1	0
Louisville Vegan Jerky Co. Reuben's Smoky Carolina BBQ Vegan Jerky	Snack	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	1	1	0
Wasa Crispbread, Light Rye	Snack	0	1	0	1	0	1	0	1	0	1	0	0	0	1	0	0	1	0	1	1	0	0
Rao's Homemade Pizza Sauce	Snack	0	0	0	1	0	0	1	0	0	0	0	1	0	1	0	1	0	1	0	0	0	0
Maille Dijon Mustard	Ingredient	0	0	0	1	0	1	1	0	0	1	0	1	0	1	0	0	0	0	1	0	0	0
Maille Old Style Whole Grain Dijon Mustard	Condiment	0	1	0	1	0	1	0	1	0	1	0	0	0	1	1	0	1	0	1	1	0	0
Trader Joe's Parsnip Chips	Snack	0	0	0	1	0	0	0	0	0	1	0	0	0	1	1	0	0	0	1	0	0	1
Wilde Chicken & Waffle Chicken Chips	Drink	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	0	0	0	0	0	0	0
Soom Foods Pure Ground Sesame Tahini	Snack	0	0	0	0	0	0	0	0	1	0	0	1	0	1	0	1	0	0	1	0	1	0
Chobani A Hint of Monterey Strawberry Low-Fat Blended Greek Yogurt	Snack	0	0	0	0	1	0	0	0	1	0	0	0	0	0	1	1	1	0	1	0	1	0
Nush Foods Blueberry Cake	Snack	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	1	0	0	0	0	1	0
Kween Granola Butter, Original	Snack	0	0	0	1	0	0	1	0	0	1	0	1	0	1	0	0	0	1	1	0	1	0
OATLY! Original Oat Milk	Drink	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	0	1	0	0	0	0	0
Impossible Burger	Ingredient	0	0	0	0	0	0	1	0	1	0	0	0	0	1	0	0	0	0	0	1	1	0
Purely Elizabeth Original Granola	Ingredient	0	0	0	0	0	0	0	1	0	1	0	1	1	1	0	0	0	0	0	0	0	0
Bai Antioxidant Infusion Panama Peach	Drink	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	1	0	0	0	0	1
Evol Egg & Smoked Gouda Breakfast Sandwich	Ingredient	0	1	0	1	0	1	0	1	0	1	0	1	0	1	1	0	0	0	0	0	1	0
General Mills Honey Nut Cheerios Cereal	Snack	0	0	0	0	0	0	0	1	1	0	0	0	0	1	0	1	0	0	0	0	0	1
Kim's Magic Pop Original Flavor Freshly Popped Rice Cakes	Snack	0	0	0	0	1	0	1	0	0	1	0	0	1	0	0	1	0	0	0	0	1	0
Louisville Vegan Jerky Co. Paulette's Maple Bacon Vegan Jerky	Snack	0	0	0	0	0	0	0	1	0	0	0	0	0	1	1	1	1	0	0	1	0	0
Jacobsen Salt Co. Pure Flake Finishing Salt	Snack	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0	1	0	0	0	0	0	0

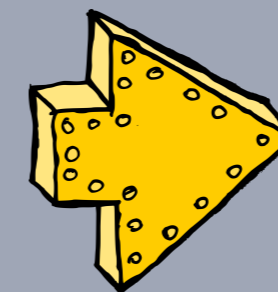


foods were tagged by food category (i.e. "snack", "ingredient", etc.)

Hypothesis 1: Taster Profile Affinities (Taste)

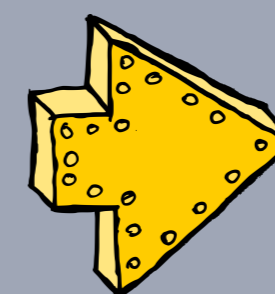
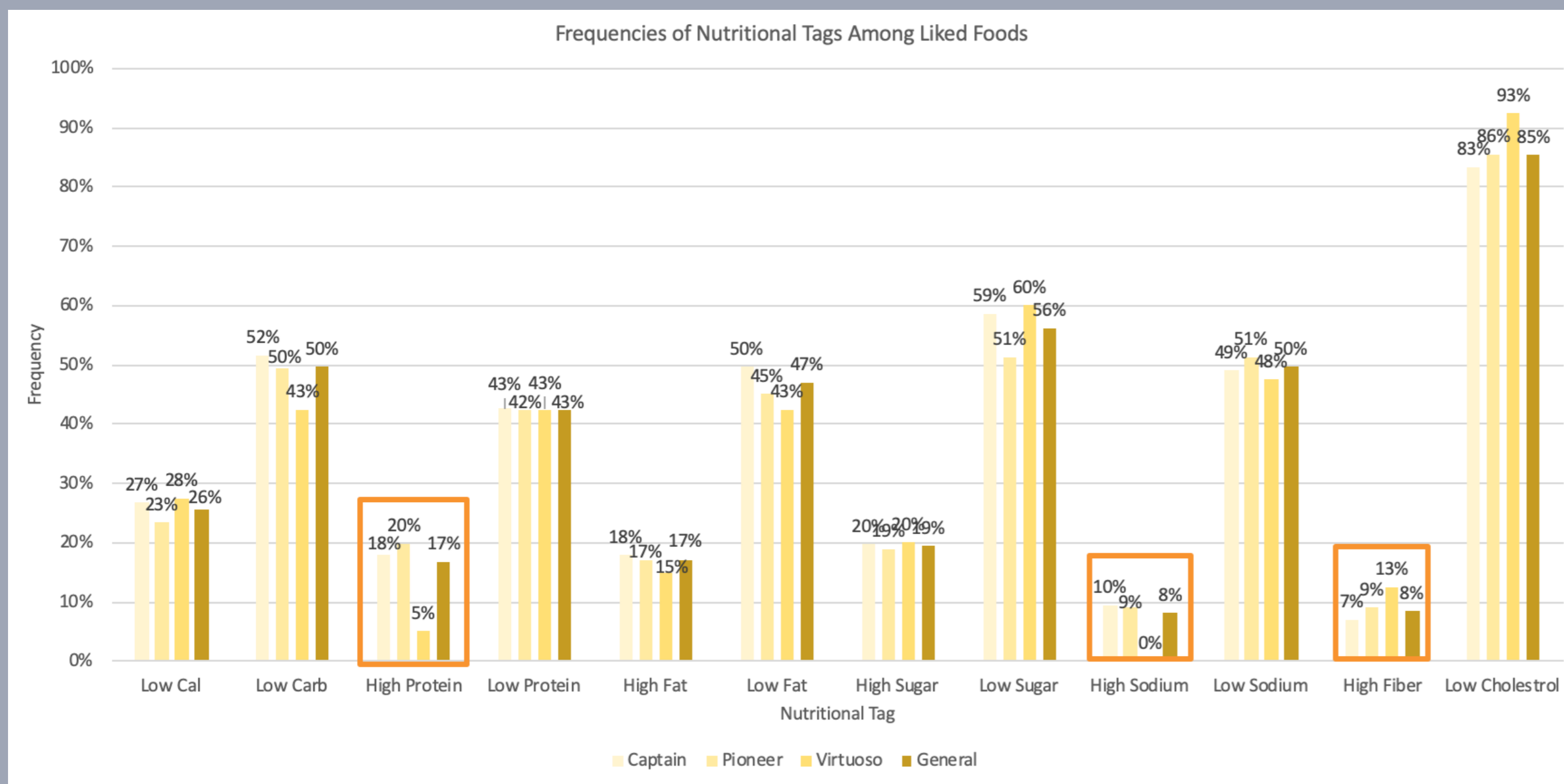


relatively higher preferences for **sweet, salty, and umami** across all taster types

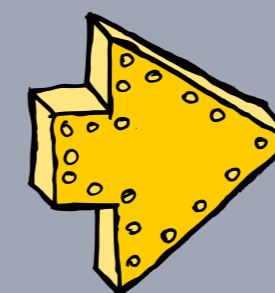


general **distaste** for **bitter and spicy** foods across taster types

Hypothesis 2: Nutritional Tag Frequencies

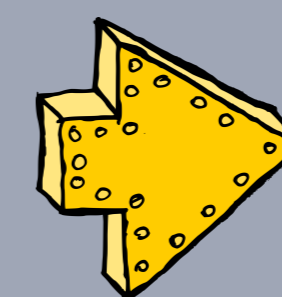
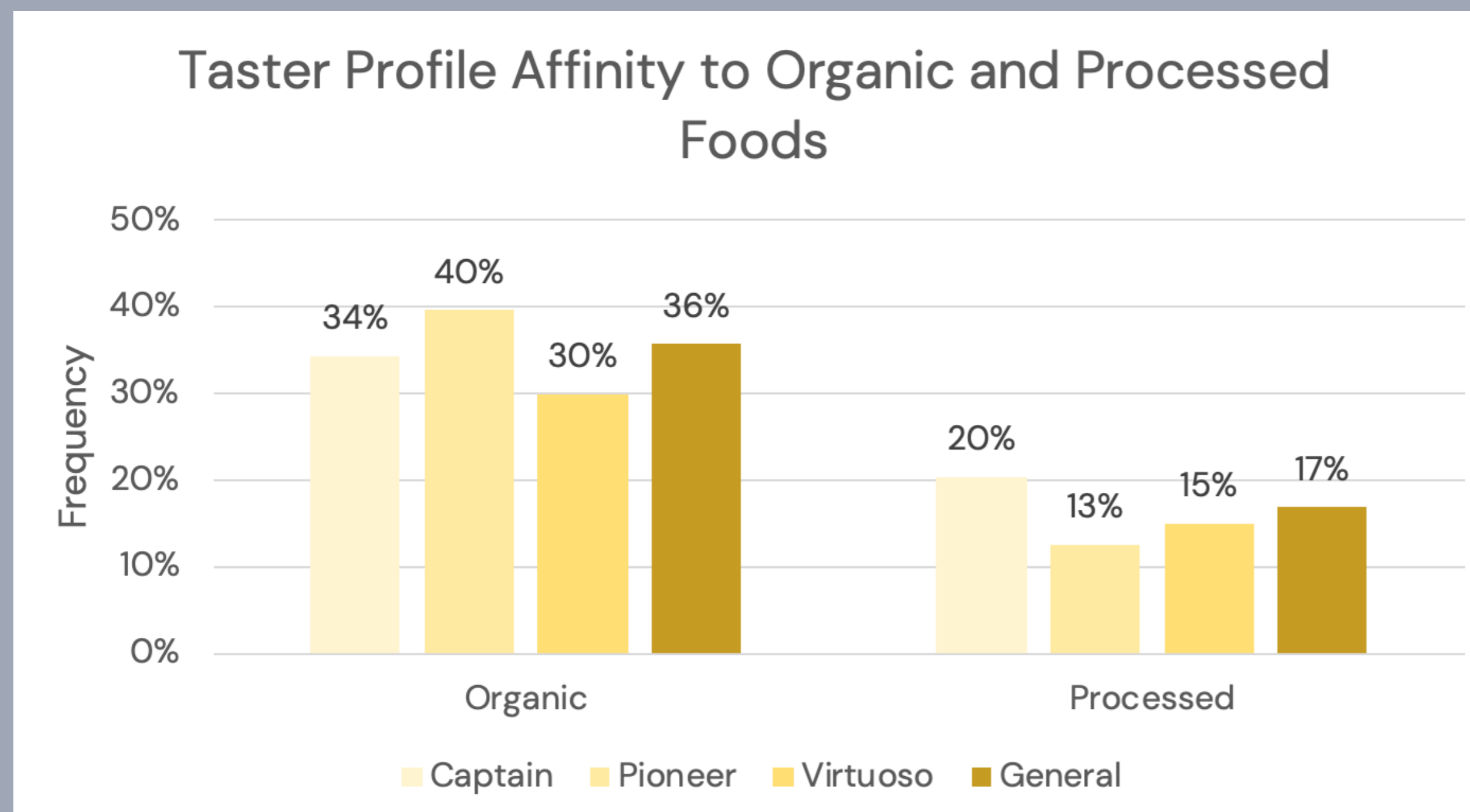


foods categorized as **“low cholesterol”** are the most popular



there is **not much variation** between the nutrient preferences of different taster types

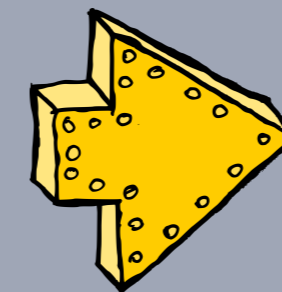
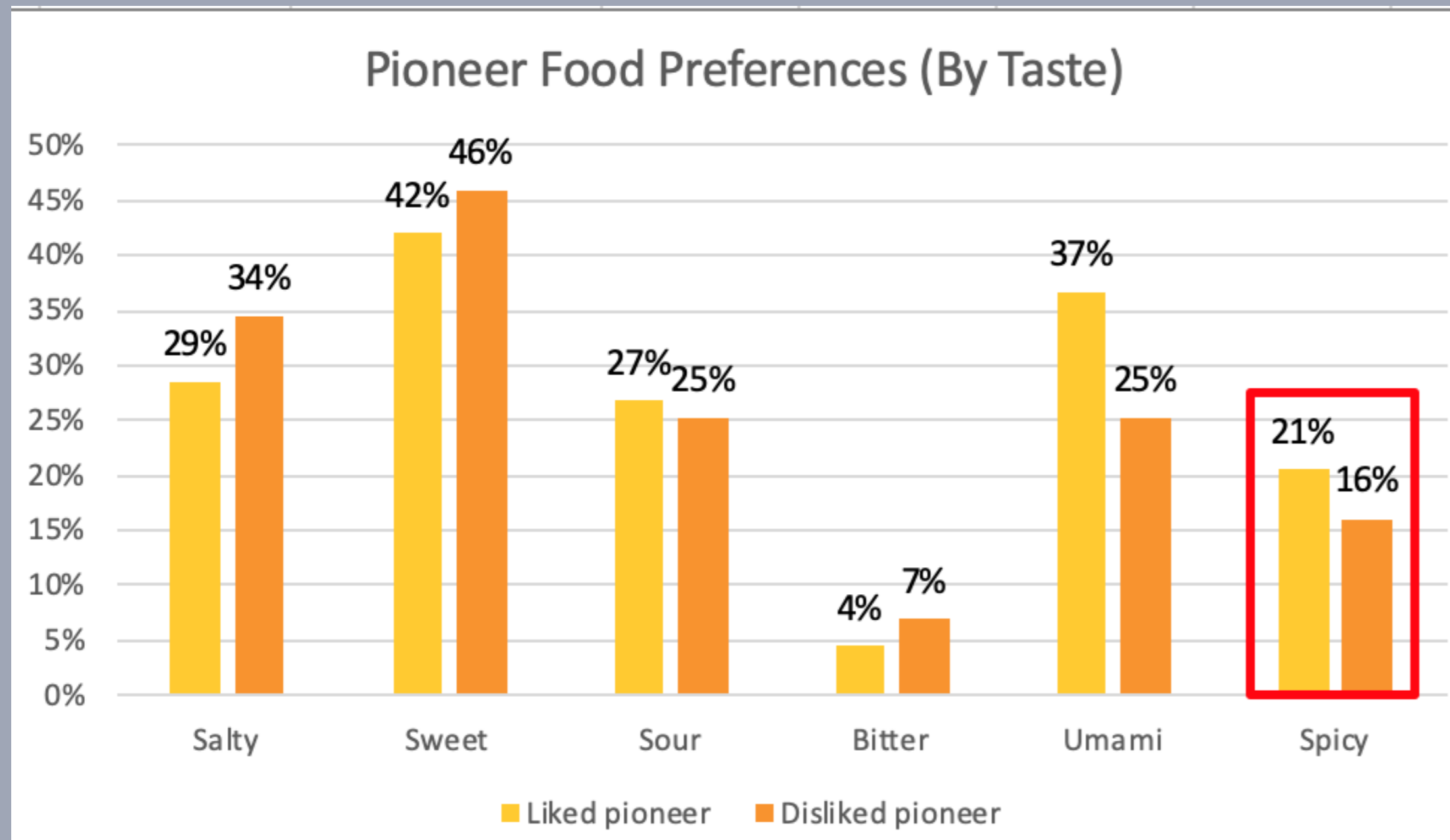
Hypothesis 3: Affinities to Organic and Processed



general preference
for **organic foods**
over processed

Validation: Pioneer Food Preferences

Hypothesis: Pioneers have a lower tendency to dislike spicy foods

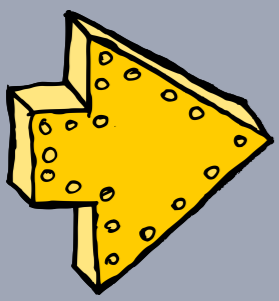
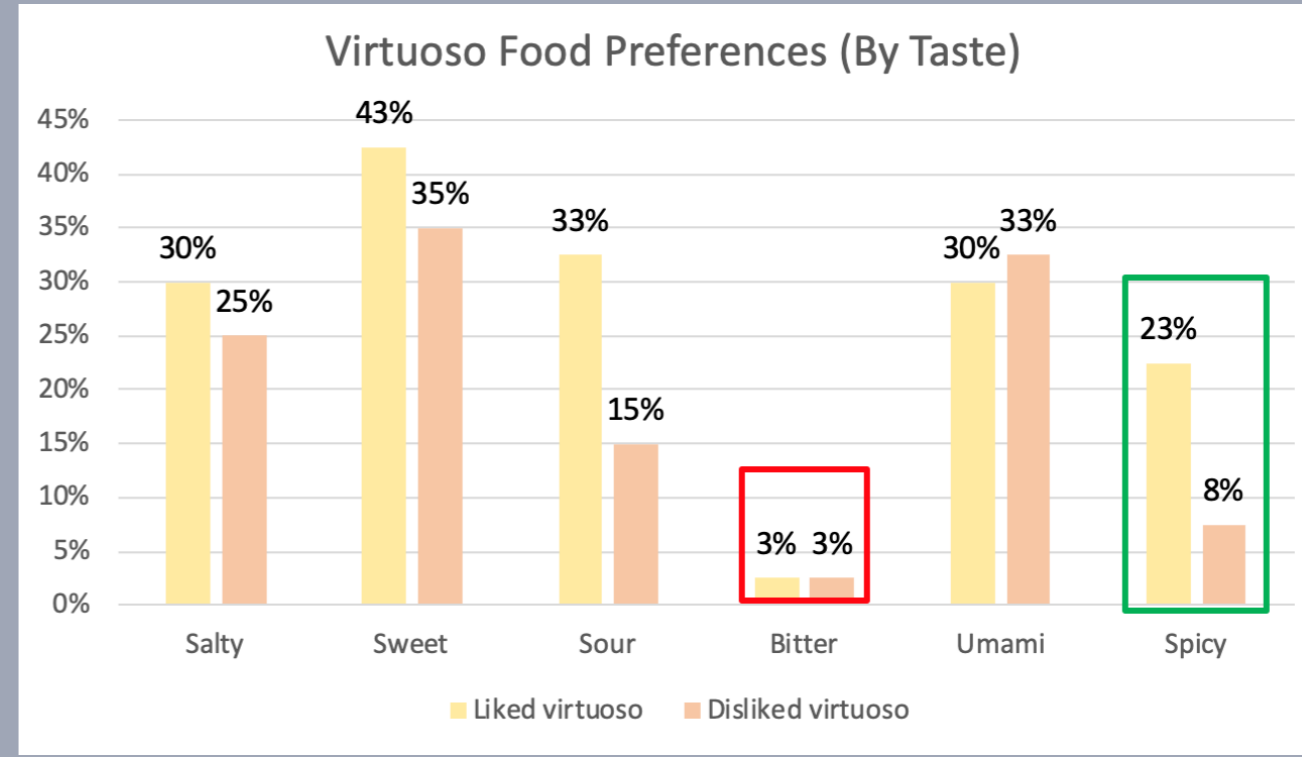
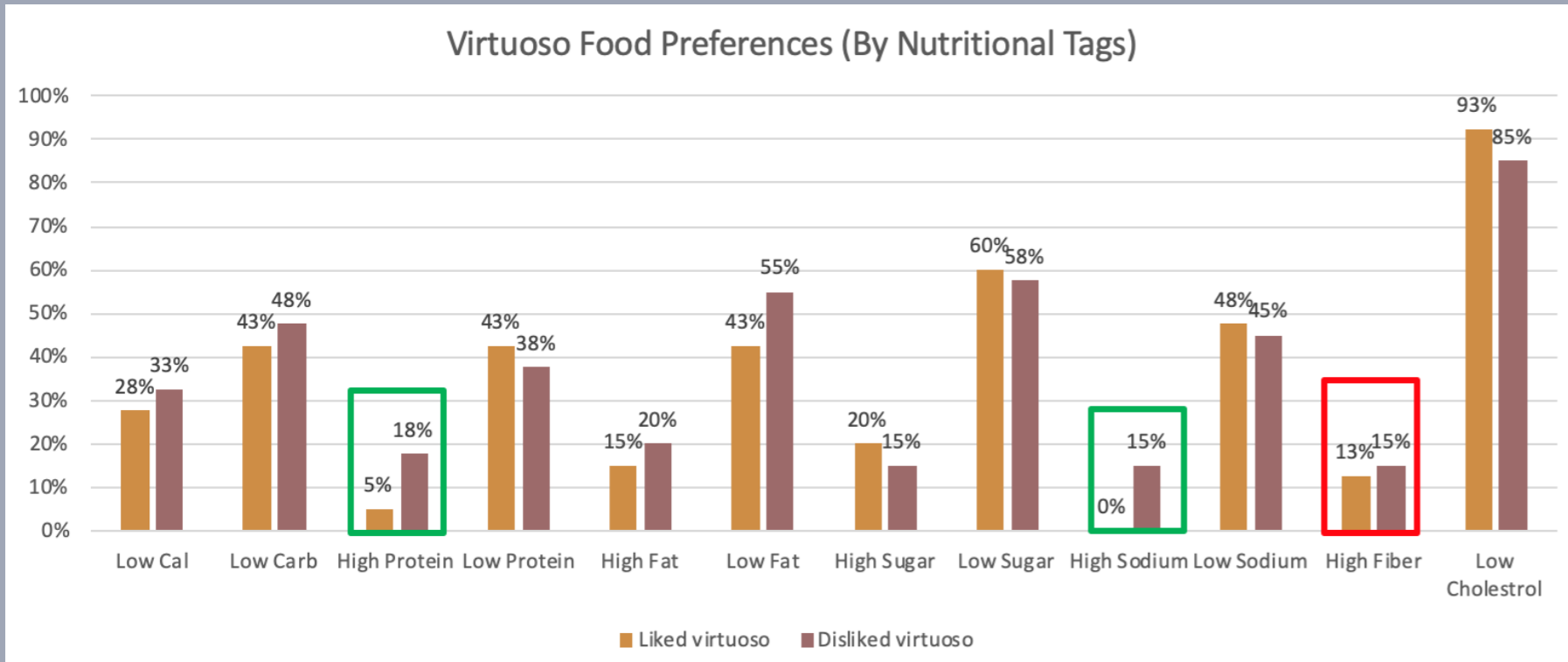


High percentage of dislike votes towards spicy foods **contradict** with hypothesis

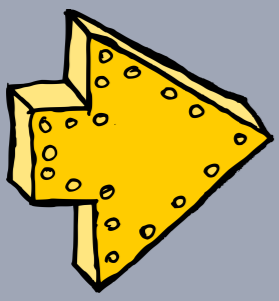
Foods liked: 112
Foods disliked: 87

Validation: Virtuoso Food Preferences

*Hypothesis: Virtuosos have a lower tendency to dislike spicy & high fiber foods
higher tendency to dislike bitter, high protein and high sodium foods*



Contradictory insights for bitter foods and high fiber foods



Aligning insights for spicy, high protein and high sodium foods

Foods liked: 40
Foods disliked: 40

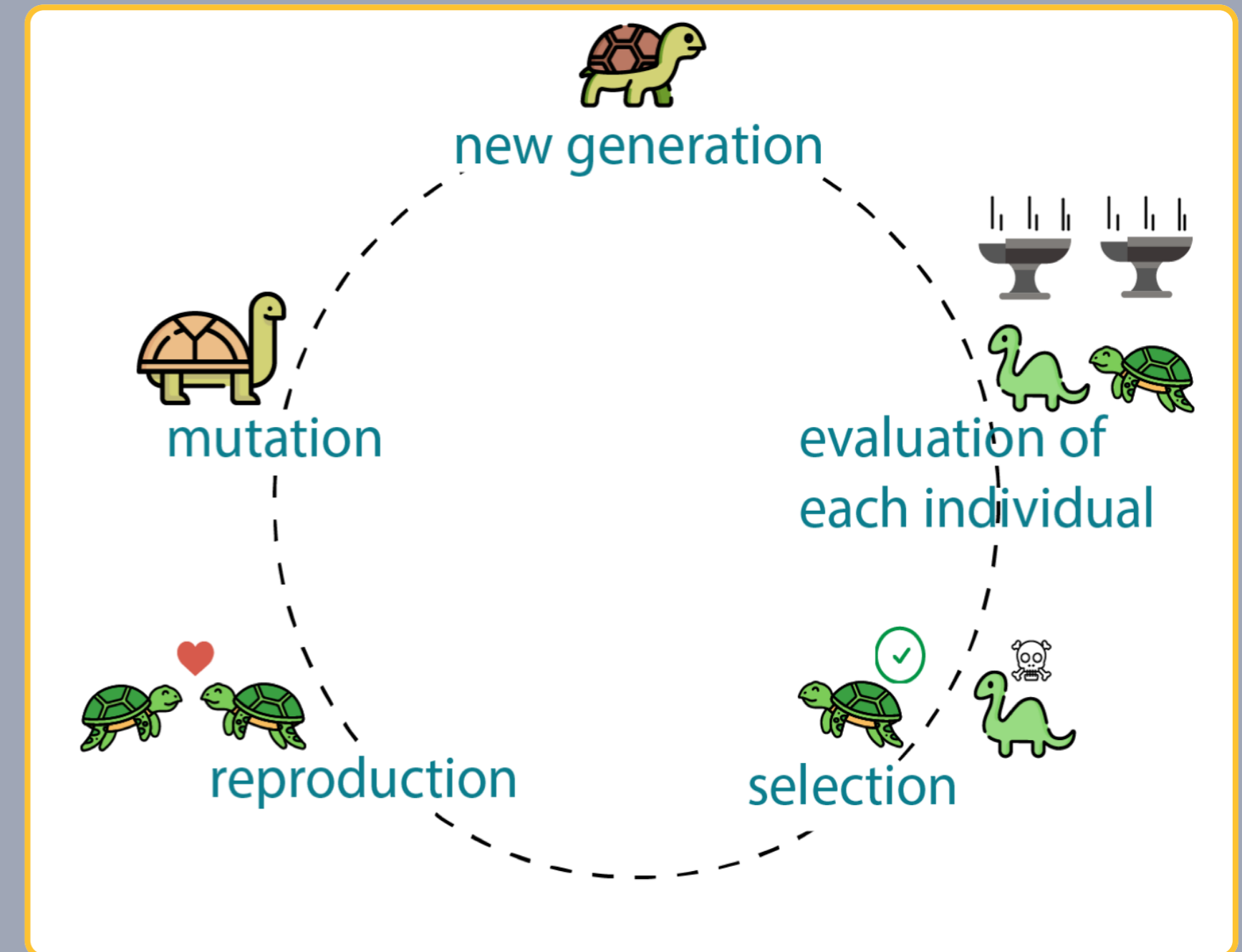
Analysis of Graphs

Our hypotheses don't seem to say anything very conclusive, which suggests that a more sophisticated recommendation algorithm is needed.



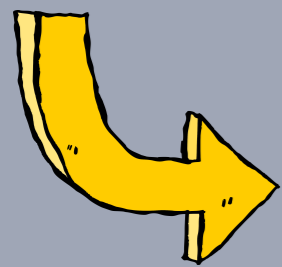
Genetic Algorithms Introduction

- 1 Imitate natural selection
- 2 Minimal data requirements
- 3 Inherent adjustability
- 4 "White Box" interpretability

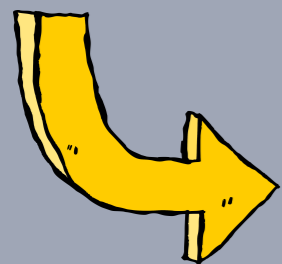


Objective

Maximize the number of good recommendations



Run every single food through the algorithm and get the top matches



Consider other factors to filter recommendations

Has the user seen this product before?

Personal preferences

Allergies/ dietary restrictions

Transforming Data for Optimization

To develop a scoring system, we first need an **objective function with proper inputs and weights...**

	F_Trait 1	F_Trait 2	F_Trait 3	P_Trait 1	P_Trait 2	P_Trait 3	Is Real Match?	Score
0	0	0	0	0	0	0	1	?
1	1	1	1	1	1	1	1	?
2	2	2	2	2	2	2	1	?
3	3	3	3	3	3	3	1	?
4	4	4	4	4	4	4	1	?

$Y_i = \beta_1 X_i + \dots + \beta_n X_i$

A solution is a set of **weights** on the given **inputs** that generates a **score**

([0.94260485, -0.20380951, -0.71642816, 0.44875224, -0.86762403, -0.72049647])

We look at the **proportion of real matches** as a measure of the model's performance (fitness)

Initializing Population

```
agent = np.random.uniform(-1, 1, 6)
```

```
agent
```

```
array([ 0.94260485, -0.20380951, -0.71642816,  0.44875224, -0.86762403,  
       -0.72049647])
```

1

Agents/Individuals

2

Each agent is a model
for recommendations

3

Adjusting its weights

Evaluate Fitness and Ranking

Fitness function based on matches

Ranked selection

Automating recommendations

	F_Trait 1	F_Trait 2	F_Trait 3	P_Trait 1	P_Trait 2	P_Trait 3	Is Real Match?	Score
0	0	0	0	0	0	0	1	?
1	1	1	1	1	1	1	1	?
2	2	2	2	2	2	2	1	?
3	3	3	3	3	3	3	1	?
4	4	4	4	4	4	4	1	?

```

for match in matches.index:
    print(f'Score = {sum(matches.iloc[match, :-2]*agent)}')
Score = 0.0
Score = -1.1170010875237828
Score = -2.2340021750475656
Score = -3.351003262571348
Score = -4.468004350095131

print(training_data.sort_values('Score Correlated', ascending=False).iloc[:200])

```

Match	Score	Score Correlated
332	1	0.917840
211	1	0.230365
319	1	0.391131
323	1	0.037479
456	1	0.871610
..
239	0	0.002933
491	0	0.562840
478	0	0.925549
347	1	0.862981
37	0	0.344148

Crossover and Mutation

Crossover

Combine agents to create a new generation

Mutation

Slightly alter the new population to maintain diversity

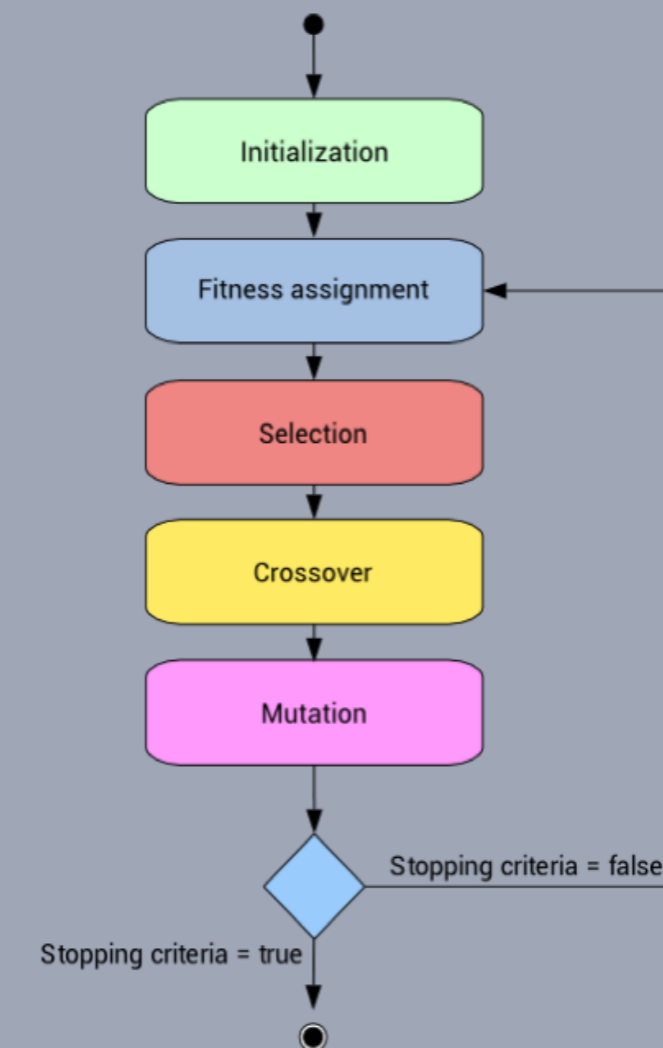
```
# Agent 1
[1., 0.4, 0.4, 0.9]
# Agent 2
[0.2, 0.1, 0.9, 1.]

# Crossover
# Combine some random subsets of the agents
# New Agent A
[0.6, 0.5, 0.65, 0.95]
# New Agent B
[1., 0.1, 0.4, 1.]

#Mutation
[0.61, 0.28, 0.71, 0.97]
```

Termination

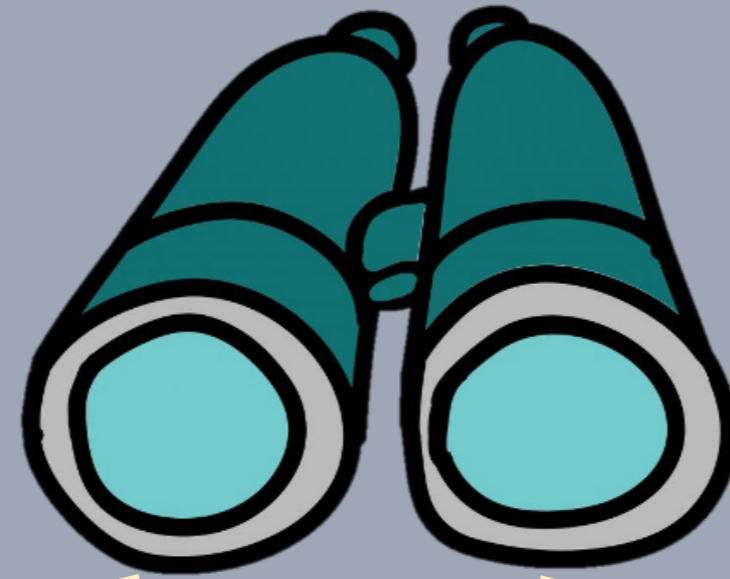
- 1 Repeat process
- 2 Terminate when we're not improving anymore
- 3 We get an agent that will be our model for the recommendation algorithm
- 4 Rerun/retrain algorithm with new data



```
[max(0, round(a,2) ) for a in agent]
```

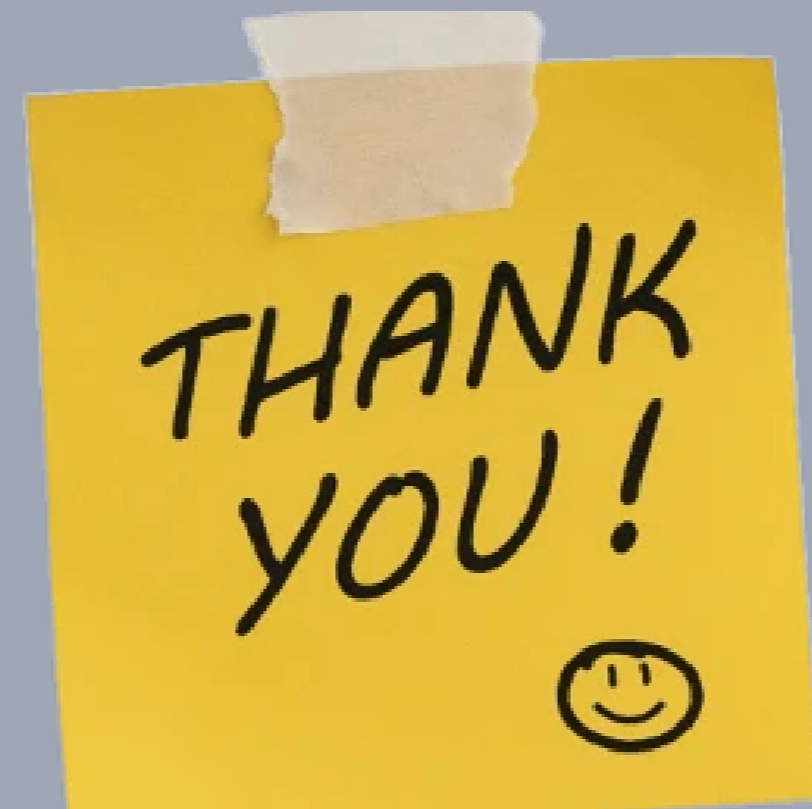
```
[0.94, 0, 0, 0.45, 0, 0]
```

Next Steps



Collect more data to build a better understanding of what 'good' and 'bad' recommendations look like

Test other features to see if we can find better predictors



Questions?