

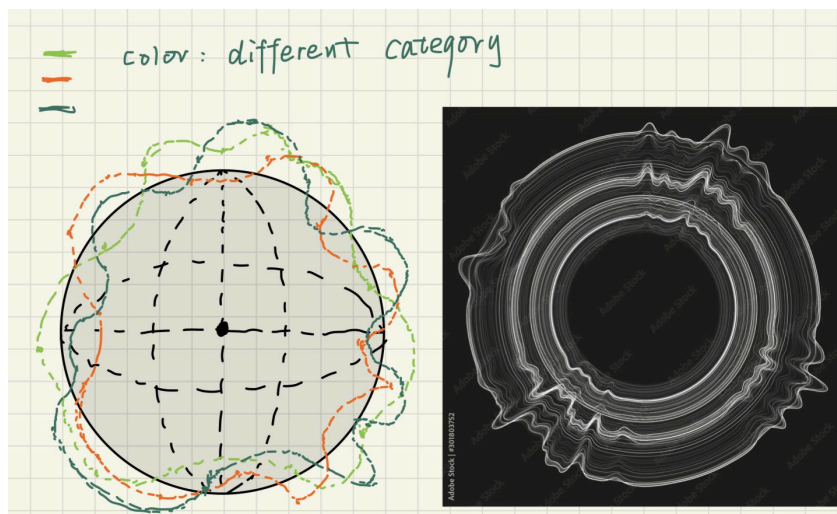
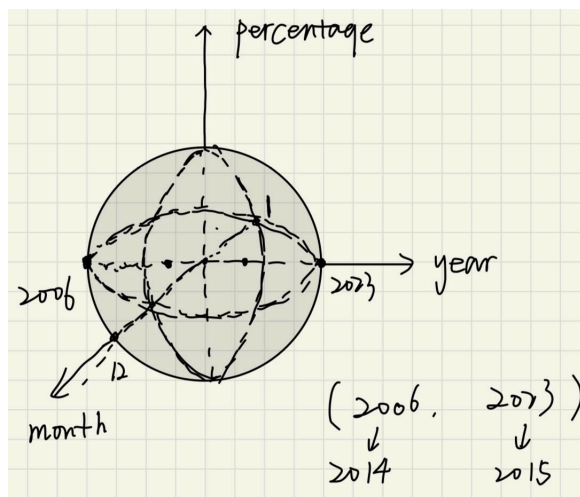
Project 2 - 5 categories related to Mental Health from Checkouts Over Time

MAT259, 2024, Jing Peng

Concept

With the inspiration of Project 1, I decided to focus on the five categories of publications related to mental health problems, which are Anxiety, Stress, Panic, Depression, and Mental Health. I selected the number of checkouts in these categories from 2006 to 2023, and also with the total number of checkouts, I calculated the percentage of these categories, which could reveal the trend over time more clearly.

I got this inspiration when I was listening to songs and thought it would be interesting if I could visualize the data in a sphere coordinate, combine different categories into one sphere, and compare them over time.



Process

I have gathered checkout records from 2006 to 2023 and specifically identified those related to five different categories. I organized the data by month and calculated the percentage of checkouts that fall under the different five categories. This provides insights into the proportion of these checkouts concerning the overall checkout activity over these years.

	A	B	C	D	E	F	G	H	I	J	K	L	M	N
1	years	months	Anxiety	Stress	Panic	Depression	Mental_Heal	counts	date	Anxiety_Percentage	Stress_Percentage	Panic_Percentage	Depression_Percentage	Mental_Health_Percentage
2	2006	1	120	260	90	165	16	353619	2006-1	0.033934828	0.073525461	0.025451121	0.046660389	0.004524644
3	2006	2	123	314	98	215	23	456151	2006-2	0.026964755	0.068836854	0.021484114	0.047133515	0.00504219
4	2006	3	156	406	141	287	31	568489	2006-3	0.027441164	0.071417389	0.024802591	0.050484706	0.005453052
5	2006	4	110	290	114	188	15	438392	2006-4	0.025091699	0.066150842	0.026004124	0.042883994	0.003421595
6	2006	5	90	250	96	156	18	341021	2006-5	0.026391337	0.073309268	0.028150759	0.045744983	0.005278267
7	2006	6	125	373	219	218	22	575038	2006-6	0.021737694	0.064865278	0.03808444	0.037910538	0.003825834
8	2006	7	148	403	241	195	22	587217	2006-7	0.02520363	0.068628803	0.041041046	0.033207485	0.003746486
9	2006	8	142	423	228	213	35	631815	2006-8	0.022474933	0.066949977	0.036086513	0.0337124	0.005539596
10	2006	9	108	317	185	182	27	498944	2006-9	0.021645716	0.063534184	0.037078309	0.03647704	0.005411429
11	2006	10	135	410	213	213	26	584848	2006-10	0.023082921	0.070103685	0.036419719	0.036419719	0.0044456
12	2006	11	135	391	190	298	28	560396	2006-11	0.024090108	0.069772209	0.033904596	0.053176682	0.004996467

Conversely, the Cartesian coordinates may be retrieved from the spherical coordinates (*radius* r , *inclination* θ , *azimuth* φ), where $r \in [0, \infty)$, $\theta \in [0, \pi]$, $\varphi \in [0, 2\pi)$, by

$$x = r \sin \theta \cos \varphi,$$

$$y = r \sin \theta \sin \varphi,$$

$$z = r \cos \theta.$$

Final Result

To make the result more like a sound wave, I've tried to use `vertex()` as well as `curveVertex()`. First, connect the points over the year and month. Then I also tried to connect every three adjacent vertexes to form and fill the surface, but it wasn't what I wanted, so I stayed at the first way. Then due to two special points with extremely high values, I let all the 0 percentages stay at 0, used `log()` to change the range of these data, set the upper and lower limits, and then used `map()` to assign the percentage value to the minimum and maximum radius of the sphere.

Initially, five balls represent the percentage of checkout from five different categories. Then we can choose to draw any of these category balls separately or draw all the data in one sphere. We can also choose to make the points or the axis of year and month disappear.

