

Programming Foundations - Final Report

Chin-Hua Pan

DGM6108 - Jay Taylor-Laird/2022 Winter

Introduction

Overall, my term project is to analyze **the relationship between my anxiety and unfinished homework**. My hypothesis is "As amount of unfinished homework increase, my level of anxiety increase." and "As total difficulty of homework increase, my level of anxiety increase." In addition, I'm also curious about that "Which subject of homework affect my level of anxiety the most?" Thus, I decided to process some details of unfinished homework to analyze.

Data

In the data, I accorded homework with most details. Includes total amount and total difficulty of unfinished homework. And movement status (be assigned or hand in), subject, type and point (which is assigned by instructor of the class) for each homework. About the total difficulty of homework, I assume that more points mean we have to spend more times and effort on it, in other words it much more difficult to me. So, I add up all of the points from all be assigned and not be submitted yet homework. Once a homework be assigned, I add it's point into total points. Then when I hand it in, I minus it. And I also recorded movement status so that I may process them later.

When I processed the data, I realized that I need to know which homework is final version for final project or term project, so I add a column to record whether each of them is or not. Because I need to know which homework is final version and I will remove them out. So that I could concentrate on daily data and avoid making them too similar and hard to read.

After I went through my code to draw horizontal lines, I found there is a bug that I didn't notice. For solving the problem, I add one column to record the week number of the data. Because I found it's hard for me to get week number by data processing. So I decide to process it manually.

Data I collected (Only about unfinished homework)

Green: I used to analyze my additional problem.

Orange: I used to analyze whether my hypothesis is correct.

From February 2nd until March 31st

Week NO.	Date	Day of Week	Anxiety Level (0-10)		All Homework			Details of Each Homework					
					Amount	Difficulty		Status (be assigned or hand in)	Subject	type	point	Is Final Version for Final Project?	
1	2/1/22 12:30	Tue	6	quite anxious	5	34	pts	be assigned	VC	discussion	8	pts	no
1	2/1/22 12:30	Tue	6	quite anxious	5	34	pts	be assigned	VC	drawing	10	pts	no
1	2/1/22 12:30	Tue	6	quite anxious	5	34	pts	be assigned	PG	term project	8	pts	no
1	2/1/22 12:30	Tue	6	quite anxious	5	34	pts	be assigned	PG	feedback	3	pts	no
1	2/1/22 12:30	Tue	6	quite anxious	5	34	pts	be assigned	Web	code	5	pts	no
1	2/1/22 18:00	Tue	8	highly anxious	7	58	pts	be assigned	PG	code	20	pts	no
1	2/1/22 18:00	Tue	8	highly anxious	7	58	pts	be assigned	PG	term project	4	pts	no
1	2/2/22 1:00	Wed	6	quite anxious	6	53	pts	hand in	Web	code	5	pts	no
1	2/2/22 9:00	Wed	7	highly anxious	7	58	pts	be assigned	Lab	code	5	pts	no
1	2/3/22 15:00	Thu	8	highly anxious	8	63	pts	be assigned	Web	code	5	pts	no
1	2/4/22 12:20	Fri	4	quite anxious	7	55	pts	hand in	VC	discussion	8	pts	no
1	2/4/22 18:00	Fri	3	slightly anxious	6	52	pts	hand in	PG	feedback	3	pts	no
1	2/4/22 18:30	Fri	3	slightly anxious	5	47	pts	hand in	Lab	code	5	pts	no
1	2/4/22 22:30	Fri	3	slightly anxious	4	39	pts	hand in	PG	term project	8	pts	no
2	2/7/22 1:00	Mon	2	slightly anxious	3	29	pts	hand in	VC	drawing	10	pts	no
2	2/7/22 20:30	Mon	6	quite anxious	8	179	pts	be assigned	VC	drawing	10	pts	no
2	2/7/22 20:30	Mon	6	quite anxious	8	179	pts	be assigned	VC	drawing	20	pts	no
2	2/7/22 20:30	Mon	6	quite anxious	8	179	pts	be assigned	VC	discussion	10	pts	no
2	2/7/22 20:30	Mon	6	quite anxious	8	179	pts	be assigned	VC	final project	100	pts	yes
2	2/7/22 20:30	Mon	6	quite anxious	8	179	pts	be assigned	VC	visit	10	pts	no
2	2/8/22 18:00	Tue	6	quite anxious	11	194	pts	be assigned	PG	code	5	pts	no
2	2/8/22 18:00	Tue	6	quite anxious	11	194	pts	be assigned	PG	term project	5	pts	no
2	2/8/22 18:00	Tue	6	quite anxious	11	194	pts	be assigned	PG	term project	5	pts	no
2	2/8/22 23:00	Tue	5	quite anxious	10	189	pts	hand in	Web	code	5	pts	no
2	2/9/22 13:00	Wed	4	slightly anxious	9	169	pts	hand in	PG	code	20	pts	no
2	2/9/22 18:00	Wed	4	slightly anxious	10	174	pts	be assigned	Lab	code	5	pts	no
2	2/10/22 16:10	Thu	4	slightly anxious	11	179	pts	be assigned	Web	code	5	pts	no
2	2/11/22 12:00	Fri	3	slightly anxious	9	164	pts	hand in	VC	discussion	10	pts	no
2	2/11/22 12:00	Fri	3	slightly anxious	9	164	pts	hand in	Lab	code	5	pts	no
2	2/11/22 22:20	Fri	2	slightly anxious	8	159	pts	hand in	PG	code	5	pts	no

2	2/13/22 20:00	Sun	1	slightly anxious	6	129	pts	hand in	VC	drawing	10	pts	no
2	2/13/22 20:00	Sun	1	slightly anxious	6	129	pts	hand in	VC	drawing	20	pts	no
2	2/13/22 23:30	Sun	1	slightly anxious	5	124	pts	hand in	PG	code	5	pts	no
3	2/14/22 20:30	Mon	3	slightly anxious	8	172	pts	be assigned	VC	drawing	8	pts	no
3	2/14/22 20:30	Mon	3	slightly anxious	8	172	pts	be assigned	VC	drawing	20	pts	no
3	2/14/22 20:30	Mon	3	slightly anxious	8	172	pts	be assigned	VC	digital art	20	pts	no
3	2/15/22 18:00	Tue	3	slightly anxious	9	177	pts	be assigned	PG	term project	5	pts	no
3	2/16/22 0:30	Wed	3	slightly anxious	8	172	pts	hand in	Web	code	5	pts	no
3	2/16/22 9:30	Wed	4	quite anxious	10	180	pts	be assigned	Web	final project	5	pts	no
3	2/16/22 9:30	Wed	4	quite anxious	10	180	pts	be assigned	Web	final project	3	pts	no
3	2/17/22 10:30	Thu	3	slightly anxious	11	185	pts	be assigned	Lab	code	5	pts	no
3	2/18/22 15:00	Fri	2	slightly anxious	9	175	pts	hand in	PG	term project	5	pts	no
3	2/18/22 15:00	Fri	2	slightly anxious	9	175	pts	hand in	Lab	code	5	pts	no
4	2/21/22 10:00	Mon	2	slightly anxious	8	170	pts	hand in	Web	final project	5	pts	no
4	2/21/22 19:00	Mon	1	slightly anxious	7	167	pts	hand in	Web	final project	3	pts	no
4	2/21/22 22:00	Mon	1	slightly anxious	6	159	pts	hand in	VC	drawing	8	pts	no
4	2/22/22 14:00	Tue	1	slightly anxious	5	139	pts	hand in	VC	drawing	20	pts	no
4	2/22/22 18:00	Tue	2	slightly anxious	6	144	pts	be assigned	Lab	term project	5	pts	no
4	2/23/22 15:00	Wed	2	slightly anxious	7	146	pts	be assigned	Web	final project	7	pts	no
4	2/26/22 11:00	Sat	2	slightly anxious	6	141	pts	hand in	Lab	term project	5	pts	no
4	2/26/22 11:20	Sat	3	slightly anxious	7	161	pts	be assigned	PG	code	20	pts	no
4	2/26/22 21:00	Sat	2	slightly anxious	6	141	pts	hand in	VC	digital art	20	pts	no
5	2/28/22 20:00	Mon	2	slightly anxious	9	184	pts	be assigned	VC	drawing	8	pts	no
5	2/28/22 20:00	Mon	2	slightly anxious	9	184	pts	be assigned	VC	drawing	25	pts	no
5	2/28/22 20:00	Mon	2	slightly anxious	9	184	pts	be assigned	VC	discussion	10	pts	no
5	3/1/22 18:00	Tue	4	quite anxious	11	214	pts	be assigned	PG	code	25	pts	no
5	3/1/22 18:00	Tue	4	quite anxious	11	214	pts	be assigned	Lab	code	5	pts	no
5	3/2/22 2:30	Wed	4	quite anxious	10	207	pts	hand in	Web	code	7	pts	no
5	3/2/22 21:30	Wed	2	slightly anxious	9	187	pts	hand in	PG	code	20	pts	no
5	3/3/22 15:30	Thu	4	quite anxious	10	194	pts	be assigned	Web	final project	7	pts	no
5	3/4/22 0:00	Fri	4	quite anxious	9	184	pts	hand in	VC	discussion	10	pts	no
5	3/4/22 9:00	Fri	4	quite anxious	8	176	pts	hand in	VC	drawing	8	pts	no
5	3/5/22 10:30	Sat	3	slightly anxious	7	171	pts	hand in	Lab	code	5	pts	no
5	3/6/22 10:00	Sun	4	quite anxious	8	183	pts	be assigned	PG	term project	12	pts	no
5	3/6/22 22:00	Sun	3	slightly anxious	7	146	pts	hand in	VC	drawing	25	pts	no
6	3/7/22 20:00	Mon	5	quite anxious	10	196	pts	be assigned	VC	drawing	10	pts	no
6	3/7/22 20:00	Mon	5	quite anxious	10	196	pts	be assigned	VC	drawing	30	pts	no

6	3/7/22 20:00	Mon	5	quite anxious	10	196	pts	be assigned	VC	final project	10	pts	no
6	3/8/22 10:00	Tue	6	quite anxious	11	217	pts	be assigned	PG	term project	21	pts	no
6	3/8/22 12:00	Tue	7	highly anxious	12	222	pts	be assigned	Lab	code	5	pts	no
6	3/8/22 23:30	Tue	7	highly anxious	11	215	pts	hand in	Web	final project	7	pts	no
6	3/10/22 0:00	Thu	7	highly anxious	10	210	pts	hand in	PG	term project	12	pts	no
6	3/10/22 18:00	Thu	8	highly anxious	11	215	pts	be assigned	Web	final project	5	pts	no
6	3/11/22 0:00	Fri	7	highly anxious	10	203	pts	hand in	PG	term project	12	pts	no
6	3/11/22 16:30	Fri	6	quite anxious	9	198	pts	hand in	Lab	code	5	pts	no
6	3/11/22 17:30	Fri	8	highly anxious	11	238	pts	be assigned	PG	term project	10	pts	no
6	3/11/22 17:30	Fri	8	highly anxious	11	238	pts	be assigned	PG	term project	30	pts	no
6	3/12/22 16:30	Sat	6	quite anxious	10	208	pts	hand in	VC	drawing	30	pts	no
6	3/12/22 17:30	Sat	6	quite anxious	9	198	pts	hand in	VC	drawing	10	pts	no
6	3/13/22 16:30	Sun	5	quite anxious	8	188	pts	hand in	PG	term project	10	pts	no
6	3/13/22 19:00	Sun	4	quite anxious	7	178	pts	hand in	VC	visit	10	pts	no
7	3/14/22 8:30	Mon	3	slightly anxious	6	168	pts	hand in	VC	final project	10	pts	no
7	3/14/22 20:30	Mon	3	slightly anxious	7	153	pts	be assigned	VC	drawing	15	pts	no
7	3/15/22 18:00	Tue	5	quite anxious	9	183	pts	be assigned	PG	code	20	pts	no
7	3/15/22 18:00	Tue	5	quite anxious	9	183	pts	be assigned	Lab	term project	10	pts	no
7	3/15/22 23:30	Tue	4	quite anxious	8	178	pts	hand in	Web	final project	5	pts	no
7	3/16/22 23:00	Wed	4	quite anxious	7	148	pts	hand in	PG	term project	30	pts	no
7	3/19/22 22:20	Sat	6	quite anxious	6	128	pts	hand in	PG	code	20	pts	no
7	3/20/22 0:00	Sun	5	quite anxious	5	118	pts	hand in	Lab	term project	10	pts	no
7	3/20/22 18:00	Sun	4	quite anxious	4	103	pts	hand in	VC	drawing	15	pts	no
8	3/22/22 18:30	Tue	7	highly anxious	7	318	pts	be assigned	PG	term project	15	pts	no
8	3/22/22 18:30	Tue	7	highly anxious	7	318	pts	be assigned	PG	term project	50	pts	no
8	3/22/22 18:30	Tue	7	highly anxious	7	318	pts	be assigned	PG	term project	150	pts	yes
8	3/23/22 17:00	Wed	9	highly anxious	8	418	pts	be assigned	Web	final project	100	pts	yes
8	3/26/22 0:00	Sat	9	highly anxious	7	403	pts	hand in	PG	term project	15	pts	no
8	3/27/22 21:00	Sun	7	highly anxious	6	303	pts	hand in	VC	final project	100	pts	yes
9	3/29/22 15:20	Tue	6	quite anxious	5	253	pts	hand in	PG	final project	50	pts	no
9	3/30/22 19:00	Wed	4	quite anxious	4	238	pts	hand in	VC	final project	15	pts	no
9	3/31/22 6:00	Thu	5	quite anxious	3	138	pts	hand in	Web	final project	100	pts	yes

Anxiety Level	description
10	extremely anxious
7-9	highly anxious
4-6	quite anxious
1-3	slightly anxious
0	not anxious

subject
PG = Programming foundations for Digital Media
Lab = Lab for DGM 6108
Web = Web Creation Boot Camp
VC = Visual Communication

Data I use in primary graph

- ◆ Week No.
- ◆ Date
- ◆ Anxiety
 - Level
- ◆ Detail of Each Homework
 - Status (be assigned or hand in)
 - Subject
 - Is Final Version for Final Project or Term Project or not

Data I use in secondary graph

- ◆ Day of Week
- ◆ Anxiety
 - Level
- ◆ All Homework
 - Amount
 - Difficulty

Data I process in my code:

Anxiety: Find maximum value in that day, because my goal is to see extreme level

Point Percentage of Each Subject:¹

I show point percentage for radius instead of point, because certain points might be different meaning for different subject. For example, 100 points may be easier for Web Creation Boot Camp than Programming Foundations because the total points of it is 500 points and the total points of Programming Foundations is 150 points. So, we can see point percentage might be much more objective and reasonable.

¹ This concept is from Prof. Jay Taylor-Laird's suggestion.

First, I calculate total points for each subject in whole quarter. And then filter out the “final version for final project or term project” homework. Because my goal is to observe daily data, and the extreme value always make daily value too small and similar with each other. And that’s hard to observe data so I remove the extreme value. In second step, I sum up points of subject in that day. And I take points of each subject divide its total points. Then I will get point percentage for each subject.

For every subject in one day, I use this formula to calculate:

$$\text{Point Percentage} = \frac{\text{Be assigned points in that day}}{\text{Total points in whole Quarter}}$$

Evolution of Data

Nowadays, I collected daily anxiety and three main reasons affect my anxiety. Unfinished homework is just one of the main reasons. The others are entertainment and sugar intake. Besides main reasons, if there is other reason not included in above, I wrote it into “note” column. Although I didn’t analyze all of them in this term project but I believe they also affected my anxiety to some degree.

[Whole Row Data is Here >](#)

Rationale

In primary graph

In week 1 and 2, we can see the color of face is redder on weekday than one the weekend. And all the circle area on Monday to Thursday is obviously more and larger than areas in weekend. That means there is less homework on the weekend so I was just slightly anxious. In week 1 to week 3, I observe that whatever the blue circles (which means Visual Communication) is small or large, my anxiety seemed not change by it. And keep to look at other colors, there are four green circles with similar size on Wednesday and Thursday, but my anxiety had some variety. So green circle might to not the reason caused my anxiety increase. Then I found when orange-red circles are larger, the face color became redder. So, I think this was the main reason caused me anxious.

In week 3 to week 5, my anxiety generally maintains in the middle level. I think that might because I already was used to keep balance between my anxiety and homework. Maybe I was better to control my time and handle the homework.

After week5, all circle area became larger than before. And my anxiety generally was up to highly level since week 6. Comparing week5 and week 6, I think the circle areas are similar

but I was more anxious in week 6. That might be because since week 6, we started to prepare for final project of term project. I didn't feel anxious about it because I thought I still have enough time in week 5. And we also can see the same phenomenon - when orange-red circle is larger, my anxiety increased.

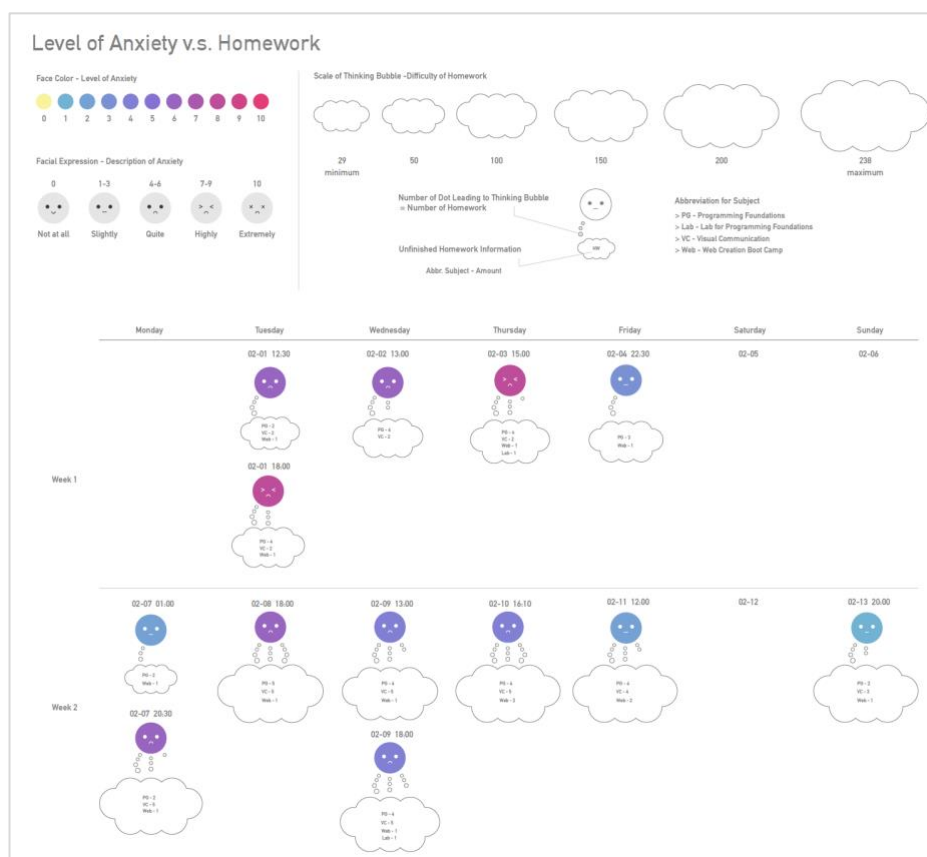
In secondary graph

The goal of this graph is to observe the relationship between my anxiety, amount and difficulty of unfinished homework. We can see generally when the amount increases, I would feel more anxious. And there is an interesting phenomenon in this graph. There are two trends for my anxiety and amount variations. We can tell that they have linear relationship.² However, the gradient of upper line is larger than lower one. The reason maybe it's affected by difficulty. We can see the difficulty obviously larger in upper line than in lower line. So, I think that's an interesting result caused by the two variables.

Sketches

My original sketch

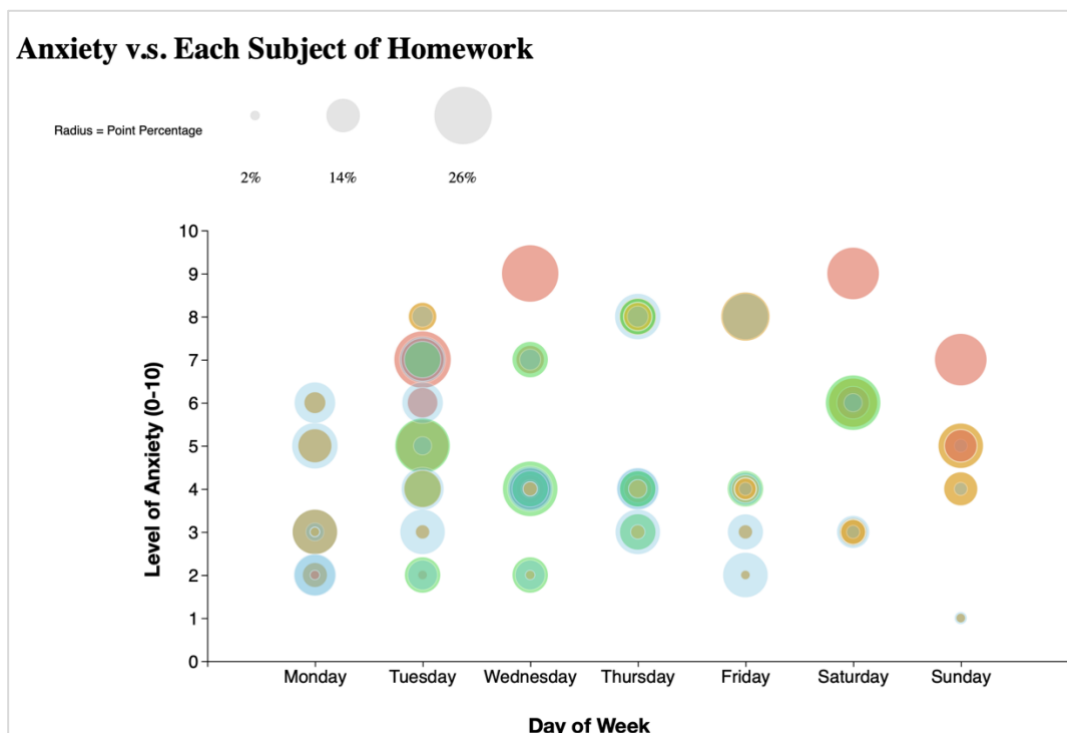
I tried to show my data day by day because I would like to obvious my data with concept of timeline.



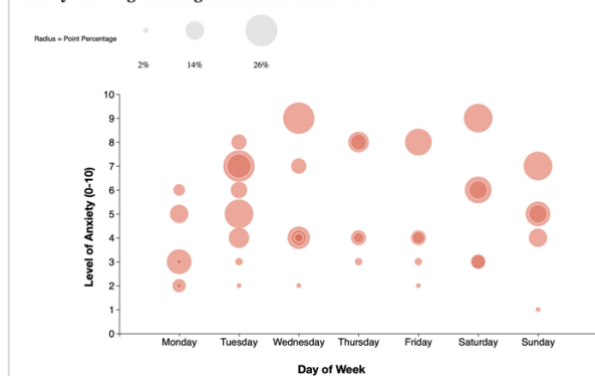
² I learned from this website: <https://www.data-to-viz.com/graph/scatter.html>

The same data in scatterplot

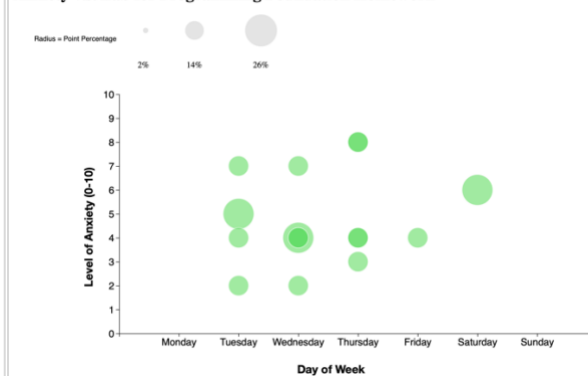
I also tried to draw my data in type of scatterplot, but I feel the circles overlapping seriously. And it's not easy to separate each subject to observe unless draw them in independent graph. (Like following graphs)



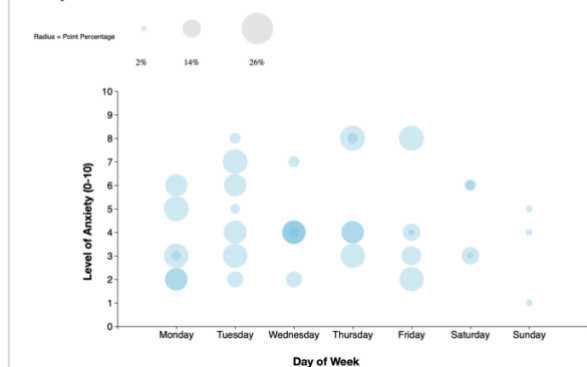
Anxiety v.s. Programming Foundation Homework



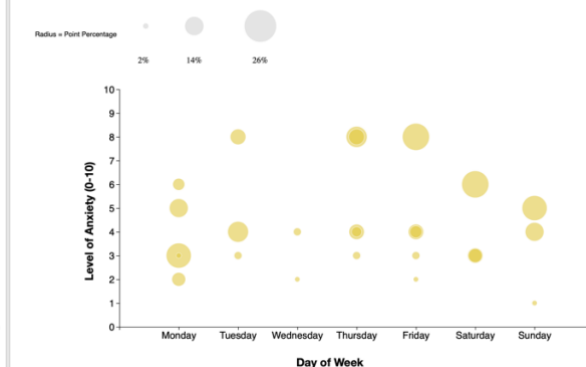
Anxiety v.s. Lab for Programming Foundation Homework



Anxiety v.s. Visual Communication Homework

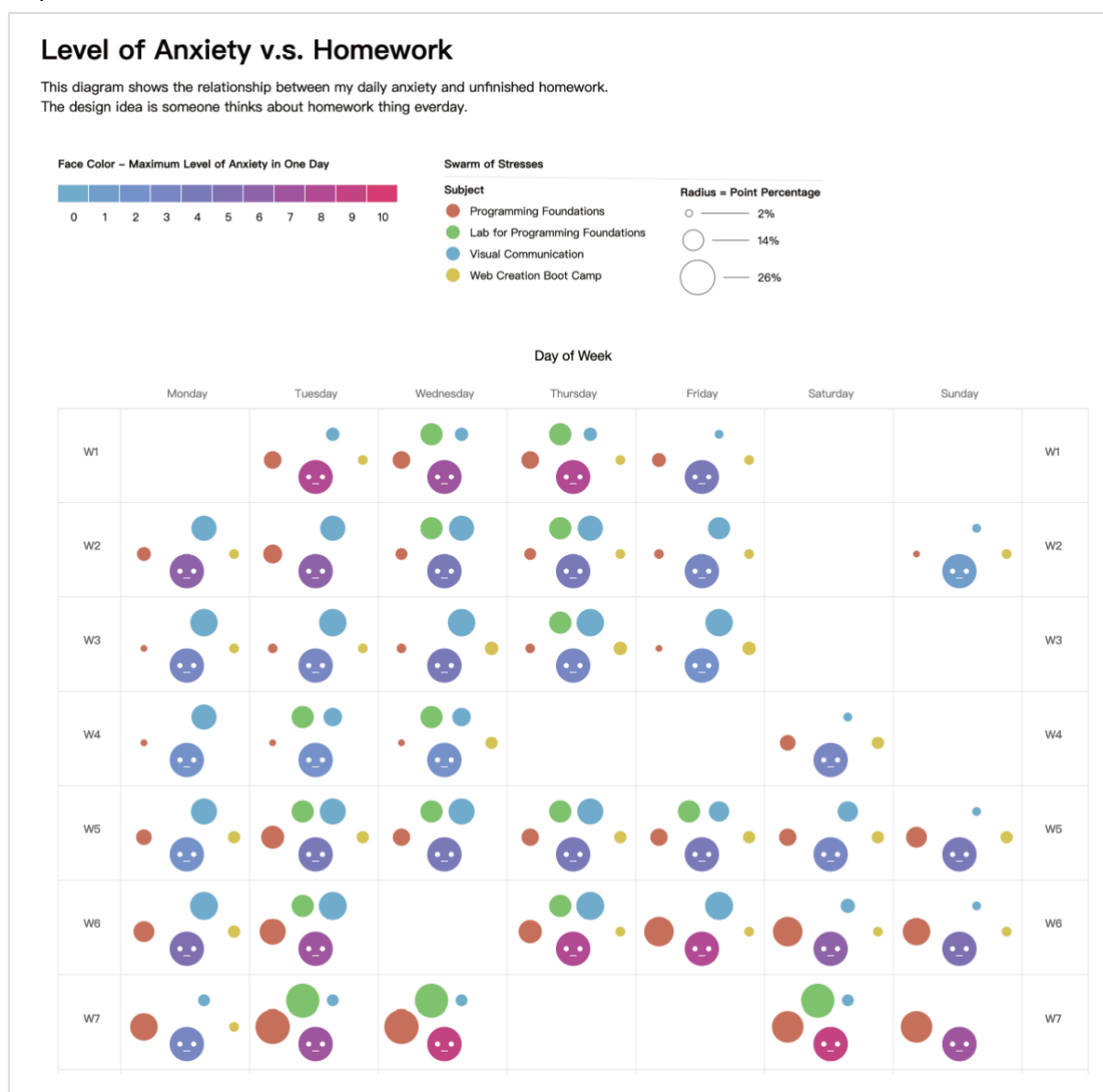


Anxiety v.s. Web Creation Boot Camp Homework



After revising sketch, now my graph is like this:³

The concept generally is a calendar table. There is a face and some swarm of stresses every day.



I know may be not the best type to observe data because it would be too long. But I like the idea to show face and swarm of stresses (which originally is thinking bubbles). I feel that makes my graph much more meaningful, not just lifeless shapes. That's one of the reasons I chose this graph. However, in typical scatterplot, I feel it's exactly easier to obvious the trend in independent graph. But once losing timeline (date or in which week) information, it makes me hard to recall what happen at that time and not easy to tell the reason for it. So I still hope I could contain week information in my graph.

³ I appreciate Prof. Jay Taylor-Laird gave the calendar idea and discussed with me to revise graph progressively.

Self Analysis

Hypothesis and questions

My hypothesis is "As amount of unfinished homework increase, my level of anxiety increase." and "As total difficulty of homework increase, my level of anxiety increase." And my additional question is "Which subject of homework affect my level of anxiety the most?". Generally, we can see the trend in secondary graph exactly matches to my hypothesis, "**As amount of unfinished homework increase, my level of anxiety increase.**" and "**As total difficulty of homework increase, my level of anxiety increase.**" And we also can find out when total difficulty larger, I would feel anxious more quickly.

Conclusions

In the calendar graph, I found that in the first a second weeks, I usually feel more anxious in the first few days of week, and then calm down on the weekend. Maybe that's because homework usually be assigned on Monday, Tuesday and Wednesday. And then week 3, 4 and 5, I seem like to be not anxious. I recall these days and think the reason. Maybe it's because I already got used to handle much more homework. Or I just feel the final project is still have time to prepare.

The subject which **affects me the most slightly I think is Visual Communication**. Maybe that's because I consider drawing is a kind of relaxing leisure. It didn't decrease my anxiety such strongly like actual entertainment because it still caused a little pressure of due date. But at least it didn't increase my anxiety.

In the other hand, **Programming Foundations homework usually seems like to increase my anxiety the most**. That's an interesting point for me. Because I had ever thought I already improved my coding skill rather than I studied in college. And I might be able to handle it better and easier. But I was wrong. Programming still affects my anxiety the most, and I think it's still not easy for me at all. I had never thought the result would be like this.

Other data I collected but did not analyze

I also collected other reasons and tried to see their relationship with my anxiety. For example, I guess that "As my sugar intake increase, my anxiety will decrease." But according to my data, when I had some sweet snack, my anxiety usually maintained sluggish. I recall the reason and I found the fact is "When I feel my anxiety seems to increase, I will intake sugar to ease the anxiety." So, the relationship between them might be opposite. It might be "As my anxiety increases, my sugar intake increases." That's a little surprised me.

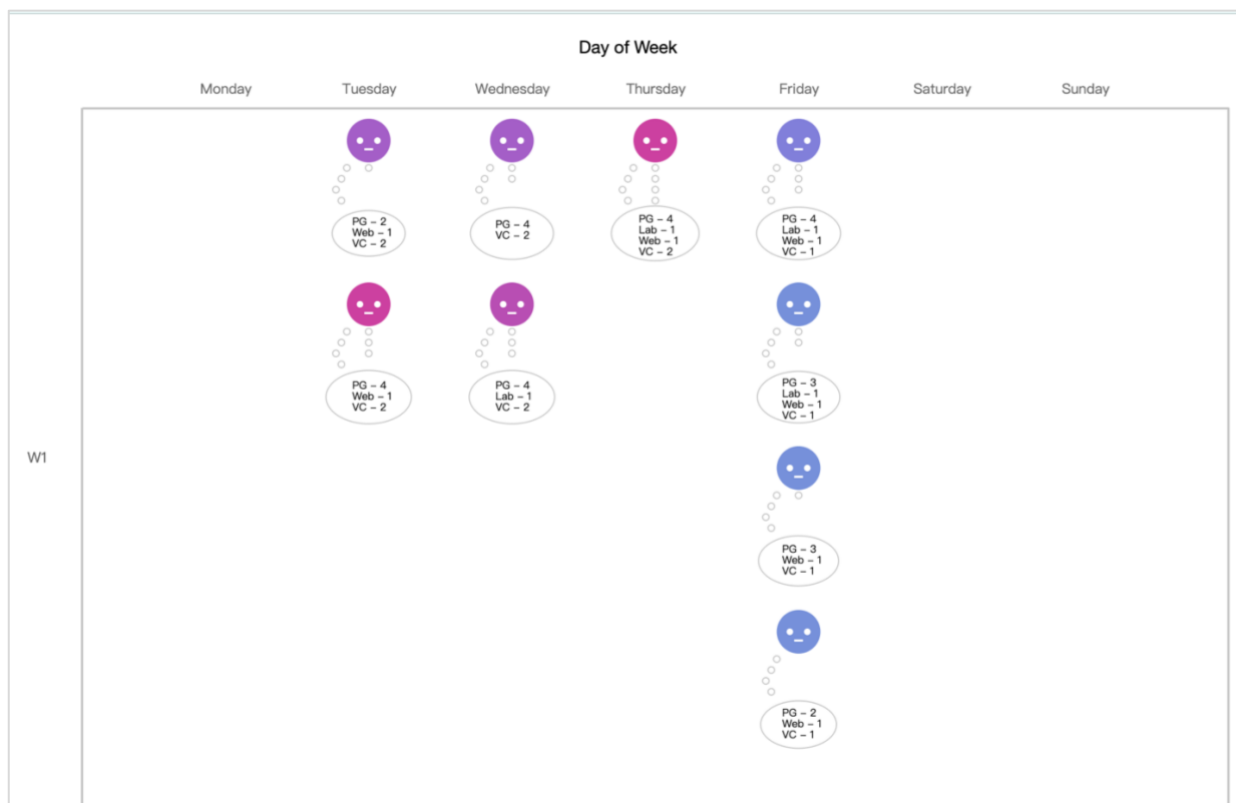
More data in the future

I didn't have the habit to collect data from my daily life. But I'm used to write down all my homework in my datebook. That makes me easier to consider how much time I should save to write my homework and plan my schedule. Through the collection process in last two months, I think if I have one more chance to do this analysis. Maybe I should collect my weight as well. Because if anxiety affect my sugar intake, it might affect my weight and health indirectly. And I had better write it on my datebook to reminder myself do not become overweight and fat every day.

Additional – Evolution of Simplifying

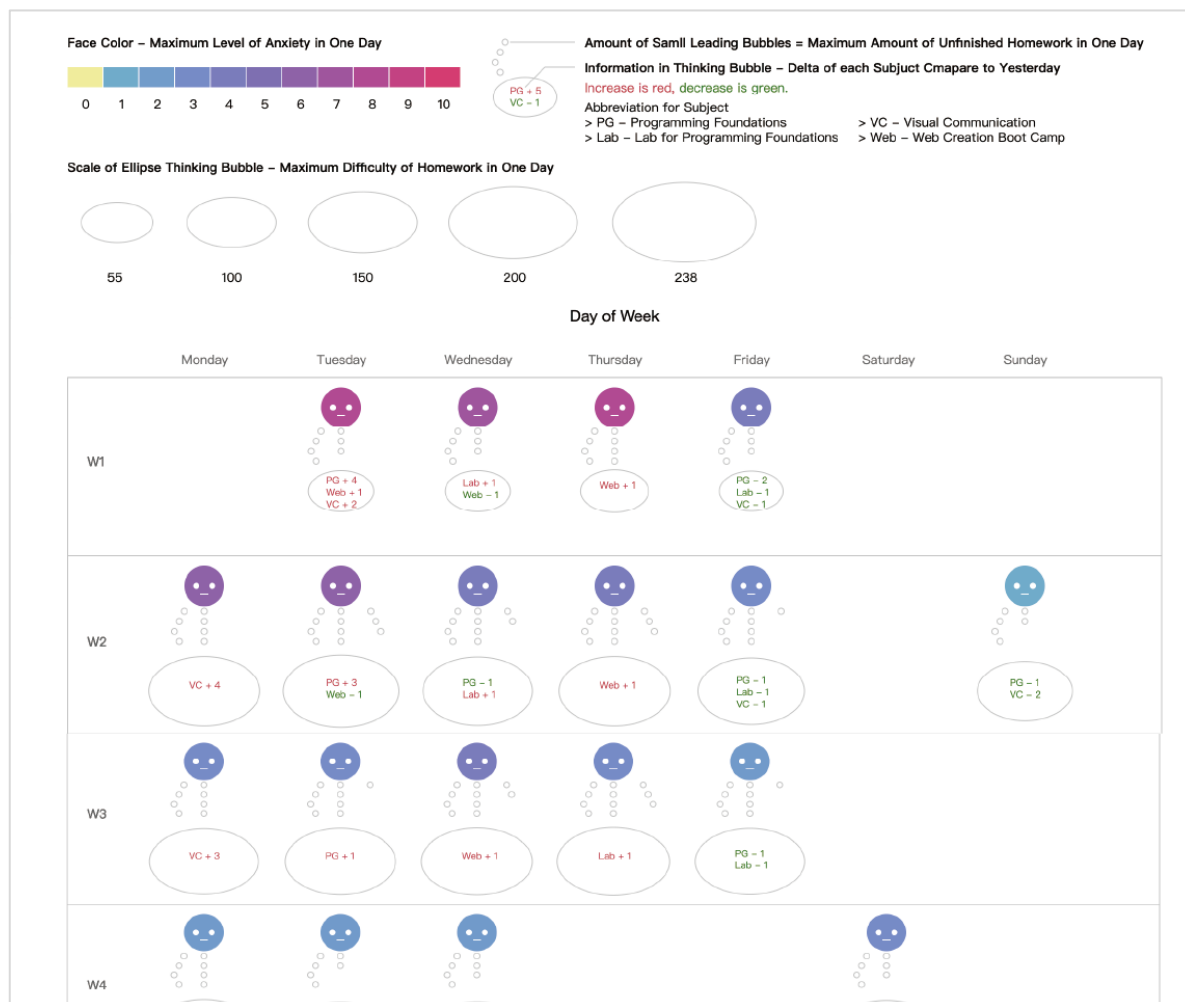
Considering ability and time, I simplified something to implement by coding. For example, the shape of thinking bubble which should be cloud shape but I draw it with ellipse. And the facial expression should be changed by description of anxiety. After I received suggestions from professor and my classmates, they reminded me that it's similar to the meaning of face color, I give it up in this project. And in my original design, I try to show more information in the visualization, but it caused that it's hard to read and make people confused about what's the point.

▼ I spent lots of effort to draw data by data and calculate how high should a week be, but it's not friendly to read.



Then I simplified to show one data in a day, and filter data to pick the maximum for all the value.⁴ At the same time, I figure out the potential detail of homework I most care about is subject. So, I decide to show delta of subject for observing which subject affect me the most.

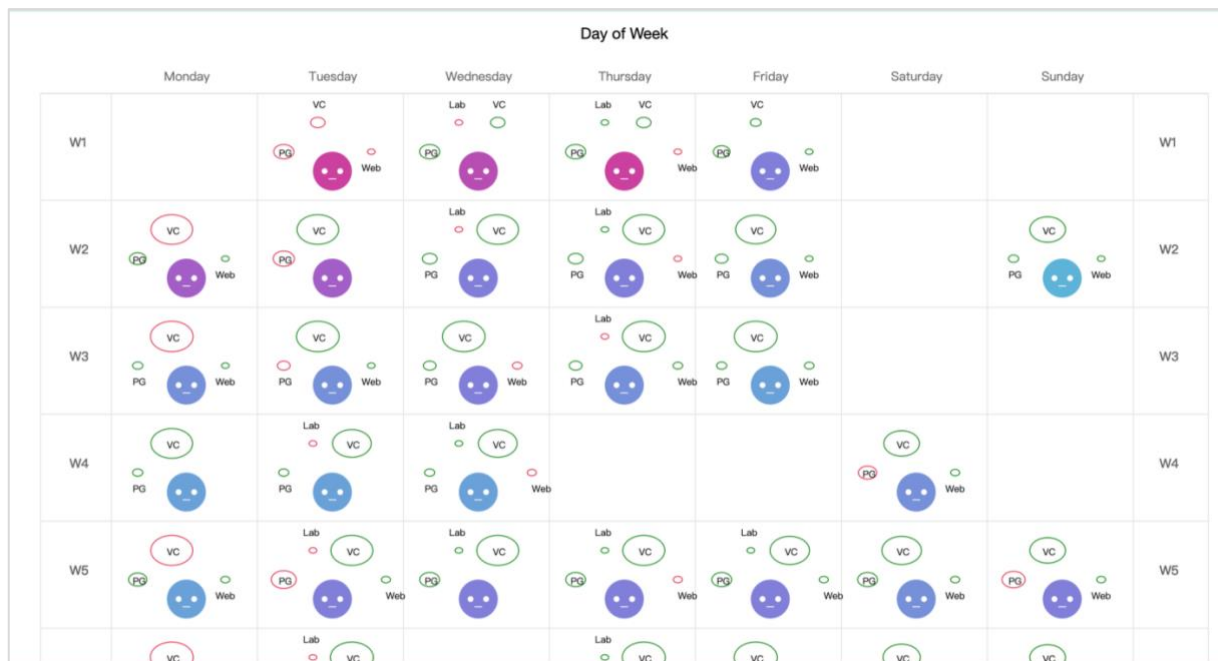
▼ Trying to calculate delta of subject homework makes me more familiar with processing my data.



⁴ Citation for my classmate Esther Pronovost and Linh Tran discussed with me about the daily data idea. And my roommate also taught me about the difference between observing maximum and average.

But after I discuss with professor, he suggested me to put thinking bubbles on the heads, it would make "thinking" idea clearer. And I put it to the top and remove amount information, then it's much better to read. Then professor said it is more like "swarm of stresses", I agree with professor's idea. So, I change them back to circle shapes.

▼ I just moved bubbles to top of head but haven't change them to circles. Add I also add calendar grids.



Ultimately, I simplified the color for anxiety just from blue to purple and to red. Because I need more color to show my subject. And I don't hope the colors conflict to each others.

Additional

Data Processing

In this term project, I implement some data processing, and that's an important part I learned. So, I would like to explain more details and some issues I suffered.

During the process, I had ever wanted to change my data from nested to flatten. But when I coding, I found my brain usually was stuck in it. Because it essentially is nested information. So, I still keep my data nested.

When I converted date information from string to date type. I found the format of "2022-02-01" string will convert to wrong date with a little bit error. So, I had to format the string as "02-01-2022" to get correct date.⁵

⁵ Citation for my roommate that he helped me to figure out this solution.

One of the big challenges for me is to restructure every data I need. First, I use several arrays to store every kind of value based on date. Like anxiety and point percentage for different subject of homework every day. After I completed this step, I have to figure out how to create a new object with the structure and fill in all information in it. Finally, I learned Object.create method on website and knew how to create. Then just push them into the new array data.

I almost processed data in array type, but I found it sometimes would occur edge events in the first or last data. I had heard suggestions from others say that object may be processed much more comprehensive. But I think I'm more familiar with array, so I still decided to use this way to process. But I actually once almost couldn't find out where the bug is when there is only one data in the last date. I thank to my roommate for dealing with the problem with me. We checked all logic step by step and print out the values to make sure it's exactly I want. And then I found the problem is at the last data, in my last version draft 1, everything is ok because there is more than one data on the last day. When I update my collection sheet to data.js, there would be an error said that there is some undefined data in my array. I go through the process again and again, then finally figure out what's the timing I should summarize my data.

Drawing Data

The concept I keep to draw this visualization is draw everything I need in a group first, and then move the group to proper position by setting "transform: translate" attribute. I studied how to group several shapes as a unit for daily data and set data to draw them day by day. For drawing a calendar, I draw an axis for day of week by using point scale. And then I create y axis for each week by drawing lines and writing labels on by myself.

In fact, today in my graph I could just go back to draw all of them by using the concept I learned from class. Because the position is regular and stable. But I really learned a lot from trying to draw different amount of data in one day and know how to calculate different height for every week.

Citations

- ◆ I know more about visualization analysis on this website: <https://www.data-to-viz.com/graph/scatter.html>
- ◆ Specific citation about coding is all in code documents.
- ◆ I usually search function on MDN: <https://developer.mozilla.org/en-US/docs/Web/JavaScript>
- ◆ I pick color HEX number on this website: <https://coolors.co/5e0b15-90323d-d9cab3-bc8034-8c7a6b>
- ◆ I pick up the four double split complementary colors on Adobe Color: <https://color.adobe.com/zh/create/color-wheel>
- ◆ Citation for my classmate Esther Pronovost discussed with me and gave me some suggestions like picking the maximum in one day for simplifying my graph.
- ◆ Citation for my roommate discussed with me about coding debugging and data processing problem.