CS-499 Capstone Module 4 Second Algorithm and Data Structures

Professor Conlan

Nick Burnette

**Briefly describe the artifact:**

--A weight loss app using Android Studio from CS 360 that stores weights over time.

**Justify the inclusion of the artifact in my ePortfolio, why did I select it, which components showcase my skills, how was it improved?**

--I chose the artifact because of its wide complexity and the fact that Mobile App development appeals to me. I showcase my skills in this enhancement by adding an algorithm for trend analysis which benefits the user, and by determining an efficient structure for storing historical weight entries (linked vs arraylist). The app was improved by adding value to the user through Trend Analysis of their weight loss journey.

**Did you meet the course outcomes you planned to meet in Module One?**

--Yes, specifically Creating Computing Solutions, Developing Algorithms, and Applying standard tools for computing solutions. I did this first in determining an efficient structure for storing the weight entries, I determined that ArrayList was superior to LinkedList. In this app, the list is accessed by index entries over time, that is to say weight entries being added by day with minimal deletions is a simple way to index the list. This makes it easy to sort for trend analysis. There is lower overhead in ArrayList whereas the LinkedList stores an object plus two references per node, concluding in the use of ArrayList here. Next I met the course outcomes by developing a computing solution, I created TrendAnalyzer to provide the user with more information about their weight loss.

**Reflect on the process of enhancing and modifying the artifact. What did you learn as you were creating and improving it? What challenges did you face?**

--While enhancing this artifact I learned how simple the algorithms are if you can only get organized first or if you can fully understand the problem. Setting a path becomes a matter of forward movement on that path, so the struggle is the beginning when there is no path (or there is every path). The challenges faced were in the complexity surrounding Android Studio and the ways it pulls through separation of concerns, to debug some of my issues I had to find where those issues were called. Many elements had not been inspected since I took this particular class 9 months ago.

===== Journal Portion Below =====

(The rest of this document was performed informally during development of the second artifact.)

Objectives: add an algorithm for trend analysis, and find an efficient structure for storing historical weight entries (linked vs arraylist). Final improvement involves checking Maven Repository for outdated libraries (Maven Portion DEPRECATED, this makes more sense in the Final Artifact Enhancement)

Notes:

I started by making a new github branch to track my progress and develop these new features safely. I had created a repository on my github account at the beginning of this capstone project. I pulled from the main repository to ensure a clean working space, I create the ‘algorithm-trend’ branch and push it to the GIT repository to exist remotely, double check I’m on the correct branch and start work on Enhancement 2.

A screenshot of a computer

AI-generated content may be incorrect.

I need to get organized to know where to begin. My idea to add an algorithm for weight-loss trend analysis is more daunting than I realized as I’m drilling into it, but as before if I keep my goals simple I can make progress. First I determine it is useful for the user of this app to see overall change, which will take the starting number 🡪 the latest number. Over time it will be beneficial to see the current pace, and weight loss is slow so I could compare the most recent 4 weeks to get a sample large enough but also recent enough. A slope direction moving up or down will be attached to both of those. I will implement a check for sufficient data, on day 1 there won’t be any trends for example. I will use best practices that will allow for this enhancement to use kilograms at a later date, but I’ll be creating the enhancement for ‘lbs’. ArrayList will be used instead of a linked list after evaluation of both options.

I will add the analysis to MainActivity so that it is called but keeps a separation of concerns. I create TrandAnalyzer.java and TrendSummary.java to be called from MainActivity.

A screenshot of a computer

AI-generated content may be incorrect.

Caught a small typo in TrandAnalyzer.java but fixed it with rename function.

I made some basic imports in TrendSummary.java

A screenshot of a computer program

AI-generated content may be incorrect.

I made code that I think captures the necessities in TrendAnalyzer.java

A screenshot of a computer screen

AI-generated content may be incorrect.

I am implementing the beginning of this algorithm in the onCreate portion of MainActivity.java, with a few FIXMES deliberately placed for later and also a note to transfer the String to strings.xml for best practices:

A screenshot of a computer program

AI-generated content may be incorrect.

Created entries in strings.xml for the trend summary, calling a string for ‘lbs’ so that a future collaborator can easily implement ‘kg’. 

I am stringing this up to go to progressSummaryText but I am concerned that screen is getting too full. Since I made a button for ‘my progress’ in the last enhancement, I will use that to add a new layout file to display the trends called **activity\_progress.xml**.

I realize that to complete this separation of concerns I will need to also create **ProgressActivity.java**. I could get by without if the trend results displayed on the main screen without getting too cluttered, but I want the flexibility to avoid cramming everything in to MainActivity. There are a lot of errors to resolve but following the progression from the class while implementing a new activity and registered it in AndroidManifest.xml, this is the button update that I’d placed last week:

A screen shot of a computer program

AI-generated content may be incorrect.

I have rigged up enough to test something so far and catch whatever I’m missing. On first go the ‘My Progress’ button from main goes to a new screen which is good.

A black cell phone with a white screen

AI-generated content may be incorrect.

I need a back button, so will add that next. I made one in SMSActivity.java for the assignment and I will reproduce it here: btnBackToMain = findViewById(R.id.*btnBackToMain*);

I added a few more weights and some of the algorithm is working. I am not seeing the desired result but it isn’t crashing either, so I know where to make a few tweaks. I also haven’t yet implemented the up/down arrows or weekly trend (UPDATE: up down arrows are UI/UX and will be shelved for this artifact enhancement):

A screen shot of a cell phone

AI-generated content may be incorrect.

I noticed some cleanup needed with the Since Start message, improved below:

A screen shot of a cell phone

AI-generated content may be incorrect.

I have made progress. Now I want to add the last 4 week trend, I made updates to TrendAnalyzer to parse the weights, dates, and days from strings to numbers so that I can use them in the analyzer. I made changes to ProgressActivity including a check to ensure hasEnoughData before continuing. I adjusted TrendSummary to include the 4 week trend, setting it to a string, and I concatenated the progressSummaryText despite the warning against concatenating strings. I’m still calling strings, so I’m only concatenating the called strings and a newline.

I left an old recycler view for now on the main screen which comes in handy verifying there should be data to work with on the Recent Progress line:

A screenshot of a cell phone

AI-generated content may be incorrect. A screen shot of a cell phone

AI-generated content may be incorrect.



Clicking My Progress now shows the line for Recent Progress but the data isn’t showing anything. I likely don’t have sufficient entries and may need a new way to test it. I did add another + "\n" to the line for greater clarity. I likely don’t have enough entries to meet the 4 week coding, but I also need to test this. Looking over the code, the trend should log unless the following:

* Only 1 entry total -> not enough data = 0.0
* Entries older than 28 days but no recent entries = 0.0
* Only 1 entry in last 28 days = 0.0
* >= 2 entries in last 28 days should be calculated.

Entries were not being calculated and I had enough entries that they should. I found a problem in the ‘if’ portion and changed it:

OLD: if (idxOldestInWindow != -1 && idxOldestInWindow < entries.size() - 1) {…

NEW: if (entries.size() >= 2 && idxOldestInWindow != -1) { // any 2 entries in the 28 day window other than today's

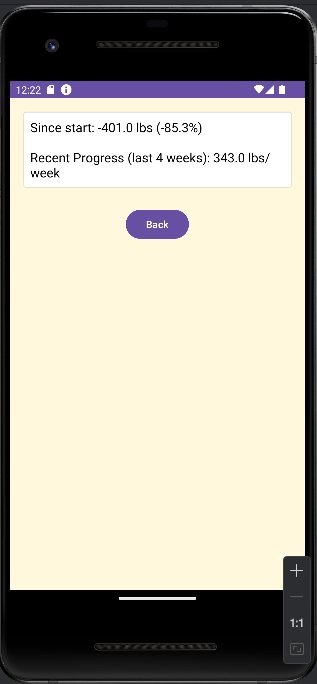
However I still got 0.0 lbs/week. I believe it may have to do with parsing the WeightEntry Date. If it’s a number I don’t need to parse it, I go to check and yes it is a string:

A screen shot of a computer program

AI-generated content may be incorrect.

So I go to inspect WeightDatabaseHelper.java to see the format in question. Any variation on the yyyy-MM-dd will return a 0.0 lbs/week in the TrendAnalyzer.java. Upon inspection of MainActivity.java and TrendAnalyzer.java, the same “yyyy-MM-dd” format is used. This means Parsing isn’t what is failing, so it isn’t falling back to new Date(0).

I’ve been assuming the list is sorted, perhaps I need to sort the list. Before I do that, I’m wondering if there isn’t just a simpler approach to get this value. I rebuilt the sorting method in TrendAnalyzer and on the latest test I have something populating the Recent Progress line:



I wasn’t paying much attention to my goal vs date entries during testing, but I’d placed a 500 lb goal and added weights that were less than that. I think most people will have a goal for weight loss, not weight gain. I made these changes that are more inline with what the average user would see:

* I deleted all but the first entry made on 9-17 for 69lbs.
* I changed my goal weight to 50 lbs.
* I added a new entry of 68 lbs today and clicked the ‘My Progress’ button.

A screenshot of a cell phone

AI-generated content may be incorrect.

The current screen Since Start shows + 1 lbs, which indicates 1 lb towards my goal, or a 1.5% change towards my goal. (I may change that, it sounds like I gained a pound when I actually lost a pound)

The Recent Progress is easier to read, I’ve lost -0.9 lbs in the last 4 weeks. This needs some tweaking and I want to avoid adding extra code to check for +/- and then concatenating a string so I made an adjustment in strings.xml in the message that drops the ‘+’ sign entirely from the first portion of total change. See improved version below:

A screenshot of a cell phone

AI-generated content may be incorrect.