UNIVERSITY OF CALOOCAN CITY
COMPUTER ENGINEERING DEPARTMENT

Data Structure and Algorithm

Laboratory Activity No. 3

Translating Algorithm to Program

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I. Objectives

Introduction

Data structure is a systematic way of organizing and accessing data, and an algorithm is a step-by-step procedure for performing some tasks in a finite amount of time. These concepts are central to computing, but to be able to classify some data structures and algorithms as “good,” we must have precise ways of analyzing them.

This laboratory activity aims to implement the principles and techniques in:

- Writing a well-structured procedure in programming
- Writing algorithm that best suits to solve computing problems
- Writing an efficient Python program from translated algorithms

II. Methods

- Design an algorithm and the corresponding flowchart (Note: You may use LucidChart or any application) for adding the test scores as given below if the number is even: 26,49,98,87,62,75
- Translate the algorithm to a Python program (using Google Colab)
- Save your source codes to GitHub

III. Results

Algorithm:

1. **Start**
2. Initialize sum to 0
3. Initialize index to 0
4. While index is less than the length of the list:
    - Select the score at the current index
    - If the score meets a certain condition (implied by "Score is seen" in the flowchart):
        - Add score to sum
    - Increment index by 1
5. When the loop ends (when index is no longer less than the length of the list):
    - Display the sum
6. **End**

Flowchart:

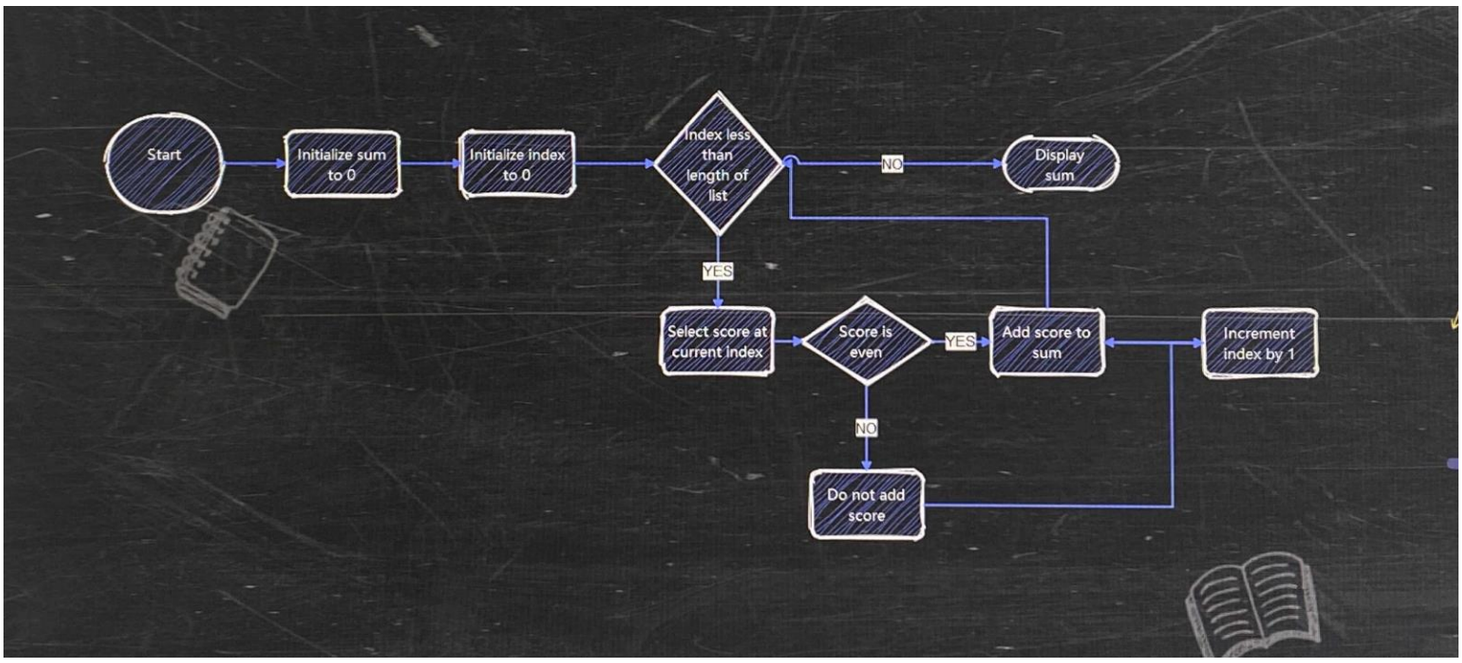

Figure 1: Flowchart of the program

Explaination:

This flowchart describes an algorithm that calculates the sum of all even numbers in a list. It starts by initializing the total sum and index to 0. Then, it checks if the current index is less than the length of the list. If it is, the score at the current index is selected. The algorithm checks whether the score is even. If it is, the score is added to the sum; if not, it is skipped. Regardless, the index is then increased by 1, and the process repeats. When all elements have been checked, the final sum is displayed, and the algorithm ends.

Source code:

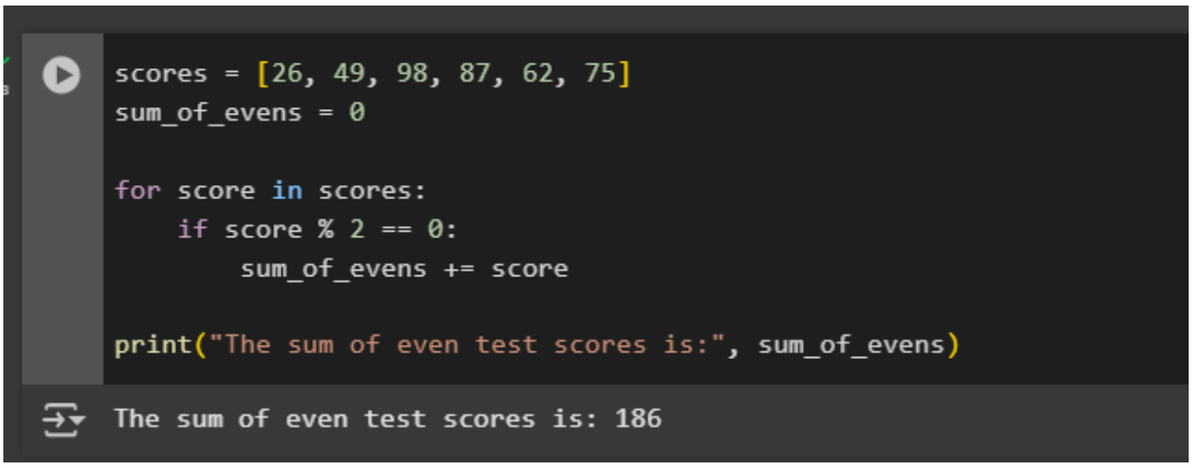

Figure 2: Source code of the program

Explaination:

This Python script calculates the sum of all even numbers in the list [26, 49, 98, 87, 62 and 75] by looping through each score to identify which ones are even (which are 26, 98 and 62) and then adds them together for a total of 186.

IV. Conclusion

This lab activity effectively showed how data structures and algorithms can be applied in a real-world programming task. The aim was to find the sum of even test scores in the list [26, 49, 98, 87, 62, 75]. It was divided into three sub-tasks namely, designing the algorithm, creating the flow chart and writing the final code. The solution to the problem uses a simple loop through the numbers with an additional condition checking if the number is even. Consequently, its time complexity is (O(n), where each number is only checked once. The even numbers in the list are 26, 98 and 62 and their sum is 186.

References

Flowchart Design

S. S. Lam, "Flowchart techniques for structured programming," ACM SIGPLAN Notices, vol. 11, no. 5, pp. 12-26, May 1976, doi: 10.1145/988009.988011.

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T. H. Cormen et al., Introduction to Algorithms, 3rd ed. Cambridge, MA: MIT Press, 2009.

Python Programming

G. van Rossum and F. L. Drake Jr., Python 3 Reference Manual. Scotts Valley, CA: CreateSpace, 2009.

Academic Integrity

UCC-CpE Department, "University of Caloocan City Computer Engineering Department Honor Code," Univ. Caloocan City, Tech. Rep. UCC-CpE-2020, Jan. 2020.