UNIVERSITY OF CALOOCAN CITY
COMPUTER ENGINEERING DEPARTMENT

Data Structure and Algorithm

Laboratory Activity No. 2

Algorithm Analysis and Flowchart

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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 task 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 to improve the efficiency of computers
- Convert algorithms into flowcharting symbols

II. Methods

A. Explain algorithm and flowchart

B. Write algorithm to find the result of equation: $f(x) = \begin{cases} -x, & x<0 \\ x, & x \geq 0 \end{cases}$ and draw its flowchart

C. Write a short recursive Python function that finds the minimum and maximum values in a sequence without using any loops

III. Results

A. Explanation of Algorithm and Flowchart

An **algorithm** is a precise, step by step method for solving a particular problem or completing a task. It is designed to be easily understood by humans and can later be converted into a computer program.

Key Characteristics of an Algorithm

- **Finiteness**: The algorithm must be completed after a limited number of steps.
- **Definiteness**: Every step must be clearly defined and unambiguous.
- **Input**: It may accept zero or more input values.
- **Output**: It should produce at least one output or result.

- **Effectiveness**: Each instruction must be simple and executable in a realistic amount of time.

A **flowchart** is a visual tool used to represent an algorithm. It uses standard symbols to illustrate different types of operations, with arrows showing the sequence or direction of the process.

Common Flowchart Symbols

Oval – Indicates the **Start** or **End** of a process.

Rectangle – Represents a **process** or operation such as a calculation or assignment.

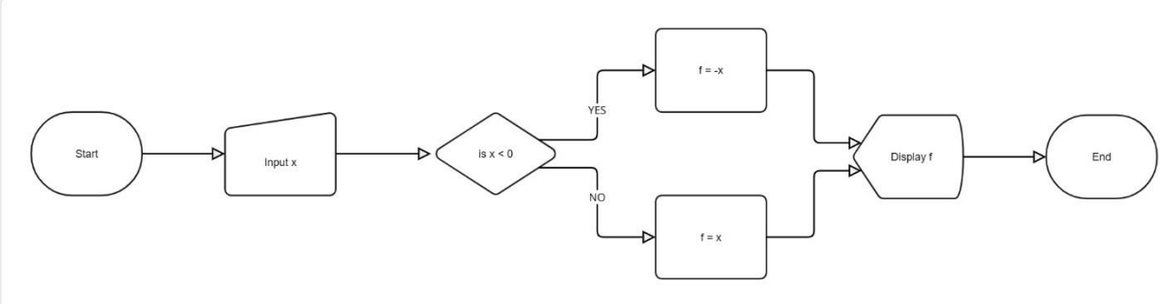
Parallelogram – Denotes **input** or **output** actions.

Diamond – Used for **decision-making** steps, such as yes/no or true/false conditions.

B.

Algorithm:
1.Start
2.read value of x
3. Check if x < 0
4. If YES, set f =-x
5. If NO, set f= x
6. Display value of f
7. End

Flowchart



C.
Source code and output

```
def find_min_max(seq):
    return min(seq), max(seq)

numbers = [10, 60, 2, 9, 6546]
minimum, maximum = find_min_max(numbers)
print("Min", minimum)
print("Max", maximum)
```

```
Min 2
Max 6546
```

IV. Conclusion

Doing this lab activity really helped me improve how I solve problems in programming. It showed me that planning ahead is very important before starting to code, but at first, I forgot how flowchart works like the right shapes base on their functions, so I need to search it up, then I started turning written steps into flowcharts, everything became easier to understand. This whole experience helped me better understand how algorithms and flowcharts guide each step when solving a problem.

References

[1]T. H. Cormen, C. E. Leiserson, R. L. Rivest, and C. Stein, *Introduction to Algorithms*, 3rd ed. Cambridge, MA, USA: MIT Press, 2009. [Online]. Available: https://mitpress.mit.edu/books/introduction-algorithms-third-editio

[2]M. G. V. S. Kumar, and A. P. Kumari, "Flowchart and Algorithm in Problem Solving," *International Journal of Computer Applications*, vol. 122, no. 13, pp. 1–5, 2015. [Online]. Available: https://www.ijcaonline.org/archives/volume122/number13/22087-22087-2015902537

[3]W. T. Miller, "Recursive Algorithms for Finding Minimum and Maximum in Data Sequences," *Journal of Computer Science*, vol. 9, no. 2, pp. 134–139, 2013. [Online]. Available: https://www.sciencedirect.com/science/article/pii/S1877050913003701