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Analysis of Computational Thinking Process

(Theoretical)

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***Abstract*—**Before the era of computers, the problem and the procedure to solve must be understood but now in the modern era with the access of advanced technologies, we need to look for the ways to solve a problem where computational thinking plays a vital role. Computers may help us solve the problems but before a problem can be tackled we should understand it correctly to create a solution for it.

Keywords-*analysis; computational; abstraction*

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I. INTRODUCTION

Computational thinking allows us to take a complex problem, understand what the problem is and help develop possible solutions. We can then present these solutions in a way that a computer, a human can understand. A complex problem is the one that, at first glance, we don't know how to develop solution of it. Computational thinking involves taking a complex problem and breaking it down into a sequence of small, more manageable problems. Each of these smaller problems can then be looked at individually, considering how similar problems have been solved previously and focusing only on the important details, while ignoring irrelevant information. Then, simple steps or rules to solve each of the smaller problems can be designed and developed.

II. STEPS PRESENT IN COMPUTATIONAL THINKING

A. *DECOMPOSITION: It is a process of breaking down data, processes, or problems into smaller, and manageable parts to solve separately to ease the process of complex problem solving.*
B. *PATTERN RECOGNITION: This includes the process of observing patterns, trends, and regularities in data.*
C. *ABSTRACTION: After recognizing the pattern in the data, we use abstraction to identifying the general principles that generate these patterns, simply this process includes finding the logic by looking at the pattern.*
D. *ALGORITHM DESIGN: Developing the step by step instructions for solving complex and similar problems. This uses above three steps to create an algorithm for a problem.*

III. ALGORITHM AND FLOWCHARTS

An algorithm is an important detailed step by step plan to solve a problem. It is usually the starting point for generating computer program. An algorithm is composed of detailed instructions, arranged in the order in which they are to be carried out. A visual method of depicting algorithms are flowcharts. A flowchart is a type of diagram that represents step by step instructions or a process, where different kinds of boxes shows the steps, and these are linked by arrows to show their order.

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IV. TABLES AND FIGURES

Table 1. This chart shows how computational thinking differs from computer science.

Computational Thinking Concept	Computer Science Application
Break down of problem into parts or steps	Break a computational graph problem into 6 steps, each one to be completed by a different computer processor
Find or recognize the patterns	Visualize data comparing material and computer speed to notice a trend
Develop instructions to solve a problem	Write a computer program or code to sort data
Generalization of patterns into rules, principles	Realize complex data structures require less code than complex programming does

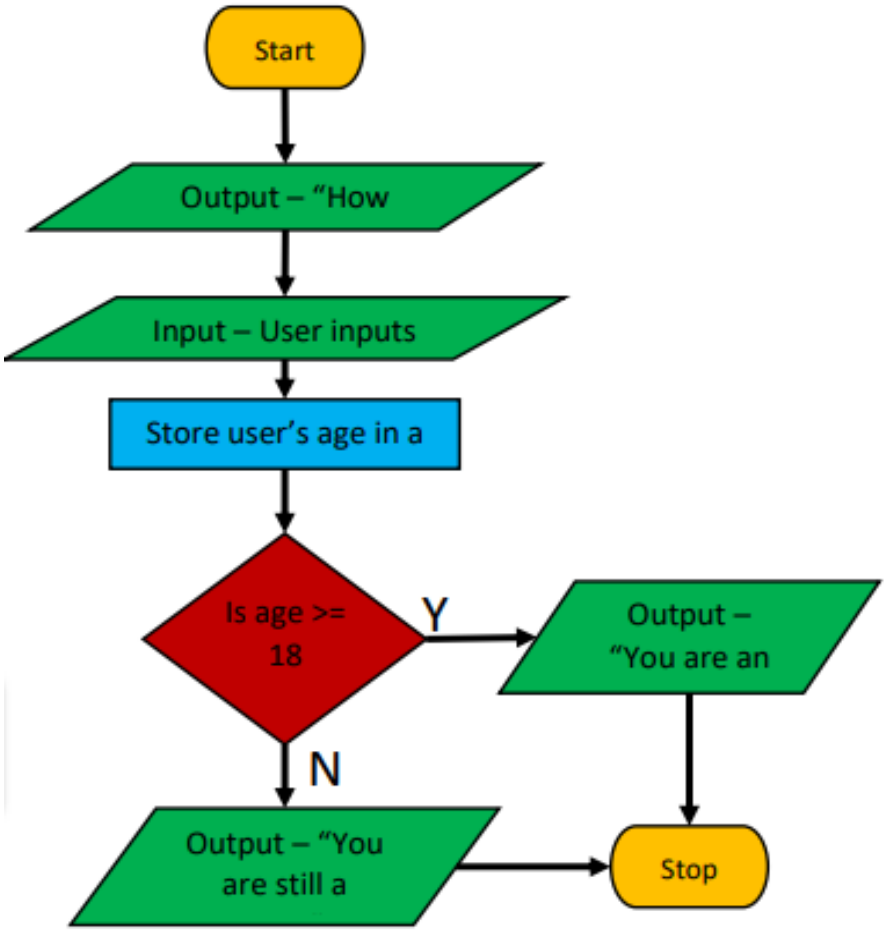

Figure 1. Example of a Flowchart: (a) Flowchart representing an algorithm.

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V. CONCLUSION

This paper shows the analysis of computational thinking and it's process. Its advantages and disadvantages are studied along with their performance and efficiency.

VII. APPLICATIONS

A. Literature: It can help break down the analysis of a poem into analysis of words used, rhyme, imagery, structure, tone, diction, and meaning.
B. Economics: To find cycle patterns in the rise and drop of the country's economy and to represent trends in the data using the surveys.
C. Mathematics: To figure out the rules, principles of a concept in any calculation or theory.
D. Culinary Arts: Helpful in writing recipes, making transcripts of videos.
E. Business Enhancement: Correct estimation of the problem and building a proper solution increases the efficiency.
F. Risk Analysis: help in predicting the risk in any system or programs using the past data.

VI. DISADVANTAGES

A. Lack of control: It provides only the steps to solve a problem or to design an algorithm but it does not help in controlling the process.
B. Reliability: Sometimes, it is not helpful to predict using computational thinking if we are using the messy data.

VII. Advantages

A. *Efficient*: In business, daily life it contributes to small improvements and enhance the efficiency.
B. *Understanding:* It provides people to be able to understand and think through business problems using the aforementioned concepts.
C. *Opportunity builder*: Computational thinking skills are beneficial to careers in virtually every sector, including consumer products, business and financial markets, energy, travel and tourism, or public services such as healthcare, education, law, and order.
D. Workplaces require employees to take an active role in thinking problems and creating different solutions.
E. Forecasting: After pattern recognition, it helps in predicting the other parts of the pattern.

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