Computer Coding and Analytical Problem-Solving Analysis

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Unit 1

Introduction – why code?

Computer codes, also known as program codes, are organized sets of commands that create computer programs, which are executed by computers. Comprehending computer sciences and their relevant aspects is becoming imperative in today's rapidly growing world of technological advancement. Therefore, the skills to code and recognize the significance of computing and coding are extremely crucial for students of almost every level to compete in the hyper-connected era. Computer coding is used in the classroom to implicate analytical reasoning and problem-solving as well as other exciting activities, including game creation. (Duckett)

Exciting elements of coding – game creation, etc.

Computer programming is laden with marvels; however, for beginners, it is essential to get their hands on HTML/CSS programming that allows them to develop web pages and allows them a world of customizing their web page's font colors, size, appearance, and themes. Through HTML/CSS coding, students can also embed different links on their self-created web pages. Basically, HTML is known as a markup language that surrounds the content of a web page and instructs the browser regarding lists, headings, subheadings, tables, etc. On the other hand, CSS works as a style-sheet language that assists the users in styling the page by altering colors, fonts, font size, layout, etc. Java and C++ languages are advanced computer coding programs and are used to develop applications for android or iOS smartphones.

Along with webpage designing, game creation is an exciting and most interesting reward for learning computer coding. There are several advanced software and programming tools that allow users to develop computer games, but for beginners, Scratch is an easy and specifically developed program. Video games have emerged as a substantial influence on the advanced and modern industry of entertainment. Computer-based games facilitate almost every sort and group of players from one-player shooting games to role-playing story-based games. Through varieties of concepts and designs, game developers invigorate stories into games, and sometimes, it becomes all about just reducing the armies to get maximum points. In advanced-level games, writers, sound effect designers, game design developers, and artists incorporate their efforts and expertise to create a masterpiece;

nevertheless, at the beginner's level, it can be executed as a one-man show. ("The Process of Game Creation")

Big Picture

How computers function – solving problems for humans

Problems are an integral part of every human's life and can occur anytime, anywhere, either internally or externally. Such problems vary in their level of complexity and magnitude, and therefore, some of them are simple and small, meanwhile others might be huge and complicated. Phenomenally, problem-solving is a task to be dealt with on a regular basis, and people use either computers or personal intuitive skills to solve them. A computer can be defined as a device that is designed to receive instructions and commands to execute different tasks, including logical and arithmetical operations, in an automatic manner. The subject capacity of computer machines to follow the sets of generalized operations is referred to as programs and allows computers to carry out an immensely wide array of multiple tasks. A computer is designed to perform four basic functions that are:

- Input of Data
- Processing of Data
- Processed information output
- Storage of information and Data

No one can deny the efficacy of computers when it comes to problem-solving and conducting analytical processing. People use computers to solve several problems on a day-to-day basis. Through computers, it is convenient to calculate the Time Value of Money, prepare financial statements, and make substantial decisions by analyzing computer-based charts and graphs. The list of problems a computer solves is endless. The computer follows a certain chain of commands and stages to solve a problem. The first phase is analyzing the problem and then the development of an interconnected algorithm that further leads to the development of a flowchart. Coding, execution, and compilation come after the creation of the flowchart, and then come the stages of testing, debugging, and documentation of the solution. (Wagman)

Give examples of problems – discuss whether problem examples are better solved by humans or computers.

Evidently, computers process and manipulate an extreme range of information in a faster way as compared to any human. Computers are designed to process the provided data, perform required calculations, and summon up numerous scenarios with the speed of a superhuman. For instance, in a chess game, computers are highly skilled to devise countless moves ahead of humans and cleverly

solve the problems of a chess game better than any human chess master. Moreover, computers are adapted to learn and process swiftly and skim through the most optimal choices from complicated ones. Of course, humans are smart, too, but computers are superb when it comes to managing various kinds of puzzles.

Nevertheless, there are almost three areas where humans excel compared with computers, at least for the time being. The first one is the implication of common sense for solving innovative and unique problems. Compared to humans, computers cannot deal with unknown and new situations as they are not programmed to find unidentified parallels and, therefore, cannot tackle the unfamiliar. Humans' ability to manage new problems is acknowledged as common-sense reasoning, and as a matter of fact, common sense is not very common in computers. This sort of problem-solving occurs mostly in the medical field.

Artificial intelligence has captivated the modern world of humanity; from Siri to automated cars, AI-based computer programming assists humans and makes their lives easier. However, feelings and emotions are not comprehensible by computers or any AI program and, therefore, arts and writing that touch the emotional edges of audiences are not possible for a computer. Similarly, in times of misery, a robot cannot comfort a human's emotions and vice versa. Furthermore, all artificial intelligence programs are able to develop eye-catching illusions and can imitate the style of a renowned painting but in any case, computers cannot make a fabulous and authentic work of art all by themselves. For this reason, art and craft are unique human dexterities at least for now. Regardless of all other factors, computers are indispensable to survive in today's world, and the absence of computers and AI technologies can somehow paralyze the operations of human lives.

Problem-solving with puzzles and games

Learning through puzzle-based exploration of critical thinking and problem-solving is instinctively fun. The underlying objective of puzzle-based creative learning is to establish a foundation for students to become effective problem-solvers in the real world as well. The ubiquity of computers makes algorithms and critical thinking an imperative skill for almost everyone. Computer-based or algorithmic puzzles involve explicitly defined procedures for problem-solving and offer an effectual tool to provide students with the preamble to significant concepts and techniques of algorithmic problem-solving. Puzzles encourage users to think in a more abstract way and expand the scope of computer programming and computer language. In addition, puzzles develop innovation and creativity among users and cater to their problem-solving abilities. Puzzles and different word games encourage users to exert more conscious effort into solving them and give more engaging outcomes than any other exercise.

Word game examples

Different computer programming software, including Scratch, provides a trouble-free way to create a

wide variety of mathematics and word games. Such coding is tremendously uncomplicated, and even a fourth-grade student can execute it. Step-by-step instructions make the task easier and scaffold the procedure for better understanding. A game project features gameplay user interaction and popularizes the word game among computer users. When it comes to word and math games, some of them are original and authentic, while others are merely a parody of other popular video games. The most eminent word games at the time are Scrollers, Tycoons, Mazes, Platformers, and Pong Games.

Intro to Scratch – creating simple characters

Scratch is a programming language that was developed by MIT and offers free programming by accessing its online community. From Scratch, one can create interactive stories as well as animations and games, as Scratch equips its users with multiple interactive options. Creating a character from Scratch is unimaginably unfussy and very convenient, even for kids. A character from Scratch is called a sprite, and to add a new character, a user has to click on the provided buttons. (Duckett)

Moreover, a user can choose a sprite from the given library or can draw one of their choices by utilizing the draw option. Scratch also features an option so the user can either upload a photo or take one through a webcam and use it as a sprite. These sprites or characters can be used to create personalized and customized story-telling as well as develop word or math games. One can drag the character anywhere on the stage and can move them through animation controls.

Reference

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