Computer Systems in Analytical Applications

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ABSTRACT

The academic research aims to expand the knowledge of advanced analytical software. Applications innovate over time, and in this generation, computer software has made it possible to live and carry out day-to-day chores within a click of a button. Being in a computer engineering field, it is vital to obtain an analytical to be resourceful of technological solutions. Through innovation, advancements in technology have continued to lend humankind an extended hand of ease into progression. This extended hand of ease is marked through applications that offer convenience. The components to obtain an analytical application are the sensor, rough set theories, spatial images, and artificial intelligence.

Key words : computer, applications, analytical, software, AI.

1. INTRODUCTION

In this information age, there are numerous devices and Computer Engineering is a broad field that comprises of several important topics on electrical engineering and the computer sciences [1]. This field trains individuals to build and improve different computer hardware and software. This discipline for engineering aims to ensure that all the various computer parts fit together and work well together. Being analytical is an ability to use his or her problem-solving skills and to be able to think about the different solutions immediately.

Being an analytical thinker in regard to all professions would mean that given a particular problem, him/her would be able to solve, understand, and plan out the problem and give out an effective solution. Even though this is encouraged for all careers, not everyone has the full capacity to become an analytical thinker. But with the help of Advanced Analytical Softwares, they can visualize accurately the problem being given to them, and they could see a whole new perspective of the problem that was not stated [2]. With all this information being provided by the software, they can create a more constructive and practical approach and solution.

Dozens of applications that help aid people in this problem are arising in the educational field of computer applications. These types of apps help create a model in which the researchers can easily visualize the figure or creating an application that has a solution-based analysis on mathematical problems, scientific problems, and the like [3]. Note that, not only application regarding education are the only ones that help people analyze situations, but also applications that support the disabled.

With further analysis of the system's applications and review the related compositions in regards to the topic, this research paper aims to expand the topic of Advanced Analytical Softwares and the components that are being used in creating these types of software, in which they are deemed to become useful to everybody.

2. BACKGROUND OF THE STUDY

An analytical thinker is someone who can fully comprehend a given situation or problem, and subsequently provide solutions to the problem. With the use of computer systems, one may be able to understand these certain situations or issues fully. Utilizing the aid of these computer systems provides efficient work for the researchers involved [4]. The use of computer systems could provide avenues that were not initially expected to be present by the researchers, giving new options for solutions that could prove more beneficial compared to the initial answers that were conceived, being useful to future researchers for the same problem.

With the software in our disposal today, such as ecolego and Scilab, this shows how advanced technology has come and what kind of help we can look for in cases of problem-solving [5]. Softwares like this provide new perspectives on problem-solving situations and have guided present researchers with knowledge and algorithmic problem solving that are needed for questions today. Software like this will continue to benefit researchers alike on new issues arising. Smarter and more efficient applications will be able to provide solutions to future problems and will allow prospective users of these applications to understand these problems fully [6].

According to the Spotfire Blogging Team (2014), Data visualization can strengthen the decision-making skills by enabling operational and business leaders to quickly identify the nature of an unexpected problem, as well as the factors that are contributing to it. Continuing from this, an unexpected problem like that will be quickly solved with the help of data visualization, giving them all possible angles of

approach to solve a problem. With the multitude of applications that can help ease the process of problem-solving, it covers multiple aspects of society [7]. This can range from the sciences such as engineering and medicine, as well as business-oriented aspects.

3. STATEMENT OF THE PROBLEM

In this study, the researchers are aiming to improve an individual's ability to use the multiple applications available for different problem-solving circumstances brought up to them, so that they may be able to visualize these problems altogether [8]. The applications are easily programmable and understandable to the professionals who are tasked to utilize these applications as part of their profession, but there are also the individuals that intend to use these applications to broaden their problem-solving skills or find it necessary to use the apps for their particular problem [9]. Visualization allows researchers to analyze problems that would initially prove difficult to solve thoroughly. The researchers then believe that these applications will improve with more use by different professionals. With the individual's abilities and the applications, themselves being developed, researches for all kinds of problems present will be dealt with efficiently and effectively. With this, future research will only advance for future issues that may arise [10].

4. SIGNIFICANCE OF THE STUDY

This study is aimed at every researcher utilizing computer systems. An efficient and effective aid to a researcher's problem solving provides multiple avenues for them to tackle the problem. With better visualization of problems given to the researchers, certain aspects of the problem that would not have been presented to them at first glance will now reveal themselves. With this added benefit, researchers can provide better solutions that not only aid their current research but will also aid future research [11].

Aside from researchers, this study is also aimed at computer-related professionals. With the evolution of visualization technologies such as ray tracing, which provides a real-life behavior to lights in video games, technology will soon be able to mimic real-life behavior in most applications, not just video games. This greatly benefits both, computer-related professionals and researchers, as this will truly provide a complete visualization of problems and greatly decrease human error. Aside from visualization, algorithmic programs that solve mathematical problems will also continue to evolve. As computer systems continue to become more advanced, the workload that a person can give them will also increase. This allows computer professionals to test the limits of what computer systems can do, possibly solving problems that were previously unsolvable.

5. DESCRIPTION OF THE SYSTEM

Ecolego is a software tool that specializes in risk management. It is a software that simulates natural evolution. It is designed for radiological risk assessment and environmental analysis. A consumer can utilize real-life and accurate environmental simulations within an array of commands [12]. It features an easy-to-use interface using "building blocks" to create reports, input results, and executes probabilistic simulations and sensitivity analysis. Ecolego enhances the assurance of technological management toward environmental risk and factors.

Scilab is a software tool that has been curated for the use of engineers and scientists worldwide [13]. It is an application that utilizes the utmost quality of code language, allowing and enabling a spectrum of coding language to be encoded within Scilab to function and command. It offers technological solutions that are centered within algorithm development, algorithm deployment, numerical analysis, data visualization, and application development. It is known to cover functional domains that are essential for technological solutions which are mathematics, optimization, statistics, signal processing, and control systems. Scilab is an accessible platform that allows application development, coding and curation for free.

Advanced Simulation Library abbreviated as ASL is a multiphysics simulation platform readily made available online as an open source. It is also used as an extensive tool for solving partial differential equations. The application is known to be coded within the OpenCL language, allowing expansive and infinite storage within the ASL's memory bank. ASL is also known as a simulation and model platform, being able to showcase numerous physical and chemical phenomena outside of any laboratory [14].

Microsoft's Seeing AI is a free technological application that especially narrates and sees the world for users of the low vision community. Seeing AI is an exhibition of the ability of artificial intelligence to enhance independence and convenience within day-to-day tasks. Seeing AI has been made possible through utilizing the rough set theory, electronic sensors and artificial neural network [15].

6. METHODOLOGY

This computer system aims to provide analytical data to its users so that they may use this important information not only to provide a solution for the user's problems but also to further improve the efficiency of the situation given by the user [16]. This system is comprised of Microsoft's Seeing AI, Ecolego, Scilab, and Advanced Simulation Library.

In this system, Microsoft's Seeing AI is in charge of utilizing the device's electronic sensors such as the camera to convert physical information into data for the computer to read [17]. Seeing AI also provides the user with the basic but necessary

information to the user since it sends the converted physical data to the AI Cloud which then provides the software with basic yet necessary information about the data from the physical information.

Advanced Simulation Library is in charge of the spatial imaging, Rough Set Theory, and Artificial Neural Network of the system [18]. This software can take the converted physical data and simulate it. This makes it possible for the software to analyze and store the data in an accurate manner.

7. REVIEW OF RELATED LITERATURE

Rough set theory is a new computer analytical approach to imperfect knowledge [19]. This problem has been tackled by philosophers, mathematicians, and logicians. In the area of Artificial intelligence, there are many approaches to understand and work around imperfect knowledge fully. This theory has contributed significantly in regard to technological advancements [20, 21]. Artificial intelligence and cognitive sciences are developed through the rough set theory. Some of the main advantages of this theory are that it provides sufficient and efficient methods and algorithms in solving the problem and finding the hidden patterns around the said problem [22].

Rough Set Theory has gained all the importance it has due to various applications leaning towards the industrial, cognitive, and database applications [23]. Different intelligent control system design using the Rough Set Theory, which is then more useful when implemented in a decision-making system [24]. With all the technological innovations, this theory can be found in many applications that concern medical data analysis, finance, voice recognition, image processing, and the like [26].

Sensors are innovative devices that are often used to react and recognize optical signals. It translates the physical characteristic into an electric signal [27]. An example of an application that uses sensors would be Microsoft Seeing AI. It is an application that is designed to help disabled people to navigate around their day [28]. They point their phone's camera to what subject they would want to know, and they could hear the description of what the AI system has recognized [29,30].

Through this application, sensors are placed inside their software, which then generates images and translates it into electronic signals which transfers the data to the main server, and goes back in the form of sound. This application then becomes the eyes of the disabled person. RFID can be used for its communication [31].

With Spatial Analysis it suggests that simple interactions with the problem can lead to intricate and correct spatial entities [32]. Agent-based modeling uses software agents that have a

purposeful goal and can interact and can be modified by the user while seeking their objectives [33].

Through this component in a computer system, educational applications are then developed to help aid with the student's visualization in specific mathematical figures. Applications such as SCILAB, Ecolego, and the advanced simulation library all have this component [34]. The developed simulation library does help mathematicians or work fields not only in line with mathematics but also in medical areas as well. The Advanced Simulation Library creates a 3d Figure of the human part that the doctor wants to examine, and from there, they could see everything [36]. Alongside this application, SCILAB and Ecolego work hand in hand in functioning as an imaging software that helps the researchers analyze the problem and see it in another perspective.

The Artificial Neural Network acts as the brain of the computer software. It gives the software to think similar to humans [37]. It is an advanced technology compared to command-based computing systems because it is designed to interpret and process information in the same manner humans do. Some of the practical uses of the Artificial Neural Network would be the capacity of deep learning and rewriting its programming. Such advances have limitless potential and have made considerable innovations in the field of Artificial intelligence.

The use of Artificial Neural Network is evident in applications that provide mathematical solutions. Since solving numerical solution requires a step by step process and analysis, because of an Artificial Neural Network, it can also do the same but gave a more in-depth explanation. Alongside this, applications such as the Microsoft See AI also uses this software network in the app [38]. It recognizes places, voices, and faces to help the disabled user [39].

In the academic study of Montgomery, Dragićević, Dujmovic, and Schmidt entitled A GIS-based Logic Scoring of Preference method for evaluation of land capability and suitability for agriculture suggests the Logic Scoring of Preference method to further assess assets in agriculture management [40]. The LSP method enables macro data to be encoded in the system into further assessment and multicriteria decision making. It allows input to be deciphered through a full spectrum of logic efficiently. Similarly, Ecolego also utilizes the Logic Scoring of Preference method to execute environmental risk management [41].

In Workload-aware database monitoring and consolidation researched by Curino, Jones, Madden, Balakrishnan of MIT university, database monitoring through their platform named Kairos can put quantitative measures and algorithms within predictions of combined resource utilization of affiliated workload. Similar to Scilab, these applications can utilize

non-linear optimization and near-zero performance degradation through database monitoring [42].

Sarbin, Brugger, Wellman, and Kuhns' academic study titled Game machine data transfer system utilizing portable data units operates the data transfer through collecting information from a smart card that functions to save memory, address problems, control algorithms and protect the circuit [43]. The data transfer is used for the complete functionality and memory storage processes of the game machine. This system is also used by Scilab to efficiently provide and predict technological solutions that are readily made for their consumers, scientists, and engineers, through algorithms that are saved within the data transfer [44].

8. THEORETICAL CONSIDERATIONS

All the applications that were brought up in this academic paper are technical, in which only a few individuals understand. Users of these programs should be able to understand all the concepts behind the mechanics of the computer system of these programs; and the method of analysis these programs generate. With the user's intent to understand the concepts and algorithms that help programs to complete the solutions to the problems users are inputting in the computer system.

This method contributes to the program's advancement as time passes by. Users only need the basic academic platform, in order for them to further understand the program's concept and data structure. By proceeding with the application, users who wish to improve their visualization and understanding of problems that require necessary equipment to obtain the accurate result, and an open mind to further expand their perspective about these certain applications.

Furthermore, by considering all the technical sides of these applications, users are made to improve more in their analytical skills; in which they will be able to use in their future professions.
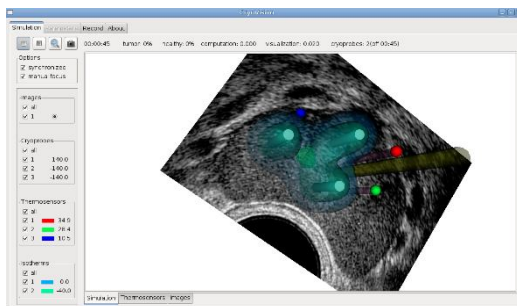
9. DATA AND ANALYSIS

Figure 1: Advance Simulation Library

Advanced Simulation Library (ASL) is a multiphysics simulation platform. The way it is programmed to compute, and the process is written in OpenCL. This application can also be run very efficiently by a variety of architectures, may they be as powerful as supercomputers or as essential as an FPGAs and GPUs, because this platform uses non-matrix solution techniques. This platform also uses C++ as its programming interface, making it much simpler and more accessible for programmers. This platform is used to simulate scientific phenomena in many fields.

To install ASL, you will need to install cmake first, along with libraries such as OpenCL, boost, and VTK. You may then download and install ASL. Create a directory in the machine by typing "mkdir build-asl && cd build-asl" in the console. You may then use cmake generator to produce Makefiles or project files for your IDE (Visual Studio, Xcode, Eclipse, etc.). Then, you can finally make it. You may also write your code with ASL as its installation provide you with the requirements to make it possible.

Seeing AI is an application that takes the user's camera to recognize physical objects and sceneries, processes and analyzes them, with the help of Artificial Intelligence, and relays the information to the user by reading it out loud. This smartphone application that aims to help those with visual impairments such as those who are blind and those who have low vision abilities. The form appears like any other smartphone camera app but instead of filters that change the image's appearance, the form comes with categories for the user to choose. These categories tell the Artificial Intelligence what type of situation that the user is in so that the application can further cater to the users need in that situation compared to having one general way for the use the analyze and function. This application is only currently available for iOS, but it functions reasonably well in the proper circumstances.

Ecolego is a software tool that does deterministic and probabilistic simulation, given a situation. These determinations and probabilities can help assess the risk of the condition that the user has given. This software tool is equipped with many specialized databases so that its simulations are as accurate and as precise as running the real thing.

To use Ecolego, it can be downloaded from their website "http://ecolego.facilia.se." Once you have downloaded the software for the appropriate device, you must create an account, and have it verified by and Ecolego admin for you to access the software.

Scilab is a numerical computation program developed by ESI Group. This program allows the user the possibility of calculating and computing a simulation. This program can be used for engineering and scientific purposes as it can handle complex and complicated computations.

Scilab can be downloaded and installed from their website "https://www.scilab.org." Upon opening Scilab, you will be greeted with a few windows. These windows are the console, files, variable browsers, and command history. An operation can be performed by Scilab by typing it in the console. The answer will be displayed after the keyword "any." It is essential to know that the syntax of Scilab is very sensitive; however, its operations and functions are very inherent. Scilab also has an editor which functions similarly to the console. The only difference is that the user was readily able to edit multiple lines of operations. Its editor works like any word program and is also very intuitive. The graphics window for Scilab shows the plots and graphs of the curved surfaces and points of what the user has given.

10. CONCLUSION

Ever since the digital revolution, there have been constant advancements in the technology that is present everywhere. Parallel to the increase of problems all around the world, society is experiencing huge breakthroughs in technology, whose purpose is to solve all of these problems. New technologies can easily be replaced by other techniques in just a short amount of time. Technology that is known today may be unrecognizable tomorrow. An example is a camera. When the camera was created, its purpose is to capture still or moving images. Now, it can be used for a lot of things like forensics. Cameras, specifically CCTVs, serve as evidence whenever a crime is investigated, and through further advancements, these CCTVs can accurately identify the people in the crime scene. In the middle of the said technological breakthrough, the computer plays the most crucial role since it is flexible to all kinds of data or information that goes through it. The continuous upgrade of networks has made other fields faster and easier. It allows for the study of concepts such as spatial imaging and resolution, which allowed facial recognition to have a lot of applications such as security, criminology, and even payments. When it comes to technological advancements, there is no "ceiling" when talking about how much further technology can improve.

11. RECOMMENDATIONS

The use of smartphones in facial recognition is a small step for the adaptation of facial recognition in more complex devices. Instead of applying facial recognition one person at a time, it would be ideal for using it to analyze multiple people simultaneously. To improve the accuracy of facial recognition, adapting better algorithms with more variables to complement the result would be recommended. Better software in analyzing the images would also be advisable. In addition to that, cameras with high resolution would complete facial recognition a lot, reducing the percentage of errors. Storage for modern surveillance cameras also need an upgrade because of the usage of stored footage is too significant. A possible application of multiple facial recognition can be in the manufacturing industry. The manufacturing plant will be able to keep track of its workers and their safety. Applying this idea can also reduce the risk of security breaches in the plant compared to the conventional way of key cards. This can ensure that only people that have granted access can enter the plant.

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