



Understanding Logical Reasoning Through Computer Systems

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ABSTRACT

This academic research aims to expand the understanding of logical reasoning in computer systems. As applications innovate over time, modern technological innovations have created computer software which makes it possible to carry out day-to-day chores with a click of a button. Being in a computer engineering field, it is vital to obtain a logical sense of reasoning to be resourceful and establish technological solutions. Through innovation and advancements in technology, application developers have continued to lend an extended hand of ease into progression. This hand of ease is marked through applications that offer convenience. The components to obtain a logical application are the sensor, rough set theories, spatial images, and artificial intelligence.

Key words :logic, computer systems, applications, advancements.

1. INTRODUCTION

In the generation of constant technological advances and progression, the need for diverse, creative and smart problem solvers is currently needed across the world. The field of computer engineering trains individuals to help build and innovate different components of the computer. This discipline for engineering aims to ensure that all the various elements of the computer fit well together and help with the productivity of the user [1]. In line with computer engineering, being logical is an ability to create an inference to justify another statement.

Improving logical reasoning can help one in this field of engineering because by designing programs, logic is commonly used to understand and correctly use the symbolic languages [2]. In regards to all professions, logical thinking skills are considered to be crucial to the workplace environment. Employees at any position can be called and expected to find a solution to certain problems that can be innate to the area of their expertise; Therefore, the more utilized logical thinking skills are in a workplace, the better productivity related to the decision making the process of employees with fewer mistakes being made [3]. But with the help of computer systems that target logical skills, users can visualize accurately the problem being given to them or a set

of data and be given a new perspective on how to look at the problem and produce an appropriate solution.

Applications that help aid people in this problem are arising in the educational and working field of computer applications. These types of apps help create a model in which students can easily visualize the figure or creating a software that has a solution based analysis on mathematical problems, business problems and the like [4].

With further analysis of the system's applications and review the related compositions in regards to this topic, this research paper aims to expand the topic of Logical Reasoning software and the components that are being used in creating these types of software, in which they are presumed to become useful to anybody in the working and academic field.

2. BACKGROUND OF THE STUDY

The use of logic applies to a multitude of fields. Logic is usually defined as the science of valid thought [5]. This logic applies to all aspects of life. The basis of all logical thinking is sequential thought [6]. We use this sequential thought to process the decisions we make throughout our life. A sequential logic process benefits us as we tackle all things through a step by step process, thus making us solve these problems logically. The sequential nature that logic helps us develops is what leads to problem-solving. This highlights the importance of logic.

A computer system is also capable of performing logical operations. It is the responsibility of the central processing unit to handle logic, basic arithmetic, and things as such [7]. A computer system can handle heavy loads that humans cannot, such as they have the capability to perform such heavy tasks. This is why for most processes, computer systems are a big help. With the speed and efficiency that it provides, it is no wonder that most processes now are used with the aid of a computer [8]. Technological advances in computer hardware and performance also attribute to the load that these systems can take. The load only gets heavier, and we will need to rely more on computers to do heavy tasks.

With the logical capabilities that computer systems have, one can also learn from a computer system. This is a process we all go through, learning the different ins and outs that a computer system has. We, therefore, understand the processes that a computer system can perform, and then eventually the logic behind the processes. As technology continues to evolve, there will be more logical concepts and processes that will only need further explanation. Computer systems will be our aid through this.

3. STATEMENT OF THE PROBLEM

Logical reasoning is a concept that most people know about, yet do not completely understand. We perform processes requiring logical reasoning. This logical reasoning can come in the form of but is not limited to, a step by step process. Through this step by step process, problems are solved systematically. This logical reasoning is not universally understandable, however. There are different concepts that some users do not completely understand, and thus they are not able to completely implement it in different circumstances. Through computer systems and their capabilities in logical reasoning, it will be foreseen that they can be a great avenue to understand logical reasoning. This understanding can be through whatever concept and avenues possible. For example, logical operators in program languages are basic yet great examples for showcasing the logical reasoning within a computer system.

4. SIGNIFICANCE OF THE STUDY

This study is aimed at all users of computer systems. The efficiency that a computer provides is unparalleled. Most of our processes and heavy workloads are used with the aid of computers. To better understand why we must look at what makes up a computer. A computer system is made up of multiple components. A CPU, or central processing unit, is responsible for arithmetic, logic, control, and Input/Output operations [9]. This means the CPU contains most of the logical reasoning and operations. Without the CPU, most operations that a computer must perform will not be performed. Aside from the components of a CPU, the programs that utilize the CPU's full capabilities also contribute to understanding logical reasoning. Programming programs such as MATLAB utilize the logical and arithmetic capabilities of the CPU and also showcases how they arrive at each output of the program.

Aside from all users of computer systems, this study also aims at specific professional fields such as computer-related professionals. Computer engineers and scientists must know the logic behind the programs that a computer system runs [10,11]. This logic may still be confusing once becoming a professional. The importance of the CPU still comes into play here because of its responsibility for logic in the entire system.

5. DESCRIPTION OF THE SYSTEM

MATLAB is a data analytics platform that is commonly used by engineering and IT teams to support large amounts of data analytics processing. This enables the user to access data from various sources and formats such as databases, data warehouses, distributed file systems, OPC servers and the like. This software offers a full set of functions related to statistics and math, which provides users with advanced methods like system identification, algorithms, nonlinear optimization, and modeling. This software also proved an image sensor, video, and other physical world data.

Sisense is a data analytics software that brings analytics to all professions. It simplifies the data inputted by the user and with the set of tools and features, solutions are instantly given to the user. Some of the features that make this software help people with their logical reasoning are that it provides an interactive visualization of the problem and the other perspectives that cannot be seen in a short period. Alongside this is the in-chip technology that provides users with a more productive and faster solution-based analytics.

Periscope Data which is also made by the developers of Sisense, combines the idea of artificial intelligence and analytics to a single platform that provides professions in need of collecting data and analyzing them, into a more productive environment alongside the colleagues. What sets this apart from the software mentioned above would be the natural language processing capability which analyzes unstructured data, which can be deemed helpful in other professions like business-related careers. The data engine of this software ensures users that the performance is efficient and it is also paired with data ingestion that guarantees the fast time in analyzing the data regardless of how complex and big data is.

6. METHODOLOGY

Since computers, today are capable of self-learning, data projection, and processing Big Data; this study revolves around computer systems and the logical reasoning they use for their processes and computations. There is a big demand for various programs and applications that can help process the complex data and problems inputted in the computer system. A majority of these applications are those that do simulations of the inputted sample to see the possible outcomes of situations. These programs are used to help process and compute for possible outcomes and in turn help with deciding the most efficient and best way to tackle the given problem.

The researchers have chosen the following programs, namely: MATLAB, SciSense, and Periscope Data because the following systems are established in their respective fields. For example, MATLAB is used for simulations and predictive analysis for calculations in all of the fields that involve data analysis and calculations.

7. REVIEW OF RELATED LITERATURE

Rough set theory is a new logical approach to computer systems to imperfect knowledge. This problem is tackled by mathematicians, philosophers, and logicians. In the area of Artificial intelligence, there have been attempts and approaches on how to understand and work around people who lacked skills. This theory has been contributed significantly in regards to technological advancements. Artificial intelligence and the cognitive sciences are developed through the rough set theory. Some of the main advantages of this theory are that it provides both sufficient and productive methods and algorithms in solving problems and analyzing the problem given the data supplied [12].

In the academic study of McAndrew entitled “An Introduction to Digital Image Processing with MATLAB,” through MATLAB spatial imaging utilizes logic reasoning. Spatial imaging, also mentioned in the academic paper as being synonymous with image processing, improves and renders better human and autonomous machine perception [13]. Spatial imaging utilizes logic reasoning within image enhancement, restoration, and segmentation. MATLAB can function through commands and matrices that are inputted into the system into a command-line driven instruction [14].

The Rough Set Theory gained recognition due to the various applications that rely on the industrial, cognitive and database applications [15]. Different intelligent control system design using the Rough Set Theory, which is then more useful when implemented in a decision-making system. With all the technological innovations, this theory can be found in many computer systems that concern data analysis, voice recognition, image processing and the like [16].

Sisense and Periscope Data apply logical reasoning through the rough set theory. Sisense as a company can cater to their clients’ concerns within logical reasoning [17]. In the study of Chen entitled “Big Data Applications in Business Analysis,” the study focuses on the approach wherein big data analysis is converted into profitable business results. Datasets and algorithms are used to utilize the rough set theory in logical reasoning.

Some of the devices that are constantly being innovated are the sensor. It may translate physical characteristics, but it can also be embedded in the software [18]. An example of an application that uses sensors would be MATLAB. It is an application that is designed to analyze how the item in the picture works and what are the other mechanical components that work with the said item.

In the study of Teodor Lucian Griogorie entitled “The Matlab/Simulink modeling and numerical simulation of an analog capacitive micro-accelerometer,” the MATLAB application is seen to be using logical reasoning through electronic sensors [19]. In the academic study, MATLAB is utilized to curate a simulation of the accelerometer mounting blocks. The accelerometer functions to accurately interpret and measure acceleration forces [20].

Spatial Analysis suggests that interactions with the problem can lead to proper and accurate spatial entries. Agent-Based modeling is a structure that is a commonly used software agent that has a purposeful goal that can help interact and modify the problem as the user seeks for the objective [21]. Through this component in a computer system, educational applications are developed to help students with the visualization of certain mathematical figures. Applications such as MATLAB, Sisense and Periscope Data all have this component.

In the study of Hatch, the Logic Scoring of Preference (LSP) is used as a decision-making method. Sisense can use the same component while utilizing logic reasoning [22]. LSP in the academic study of Hatch is used to be able to integrate the GIS-based MCE methods to be applied to real geospatial datasets for real estate development in Canada.

The Artificial Neural Networks used by Sisense, Periscope Data, and MATLAB as a platform of logical reasoning [23]. In the study of Khan, Artificial neural networks are used as a means to forecast diagnostic predictions of cancer, further being relative to the function of Sisense, Periscope Data, and MATLAB using logical reasoning as a basis for forecasting results and solutions [24].

In a workload-aware database monitoring and the combination is by Curino 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 [25]. One of the applications that show this component is MATLAB, in which the application can utilize non-linear optimization and near-zero performance degradation through database monitoring.

8. THEORETICAL CONSIDERATIONS

For this study, no theoretical considerations are seen as it is a straightforward process of understanding the logic behind programs. The processes and algorithms behind each program are to be reviewed under the discretion of the users themselves.

9. DATA AND ANALYSIS

MATLAB is a programming platform designed specifically for engineers and scientists. MATLAB allows one to analyze data, develop algorithms, and create models and applications.

To install MATLAB, you will first need a license. Most academic institutions are provided with a license already, so when signing up you must sign up through your academic institution. Once signed up, simply download the installer from their website <https://www.mathworks.com/> and run the installer. The installer will require the log-in details you used to sign up for MATLAB. After verification of your details,

you will be given the option of what to install. The developers of the program, MathWorks, already have a suggested list of programs to install, so it should be safe to continue with what they suggest. The download for MATLAB and the other programs will start, and you will be notified once the download is finished.

Sisense is an analytics program that helps identify organize data for instances such as data projection and creating a more efficient system. To use Sisense, the data has to come in forms of Elasticubes these data can come from databases and online web-services.

Periscope Data helps professionals in need of collecting data and analyzing them into a more productive environment alongside their colleagues. To use the charts and tables available in Periscope Data can be accessed and manipulated through SQL language.

10. CONCLUSION

Logical reasoning has been a stable concept over time, starting from the original philosophers such as Socrates and Plato [26]. As the concepts have been refined for learning purposes, more people have come in touch with logic and logical reasoning [27]. These can be seen with the different fields now seen for Philosophy alone. The integration between computer related professionals and logic has been around for a long time. This integration is now seen in most computer systems. We can only see that these concepts will be refined further, so that anyone can easily access and learn about logic and logical reasoning [28]. With old school computers requiring a lot of manual labor to process different algorithms, we can see the technological advancements that bring us to this current point. Aside from computer systems as a whole, the different programs that are available have gone through a lot of changes [29]. We can see programming applications becoming more and more advanced. They are now able to store hundreds of lines of code and execute it, to create other programs that will contribute to problem solving. Advancements in technology will continue to amaze users, and it will better explain logical reasoning with the new found power and efficiency from these advancements [30,31,32]. With technological advances arising, users are able to understand programs more. Programs are made simpler and faster to be recognized.

11. RECOMMENDATIONS

The use of more programs aside from the ones currently used is advised. With a limited set of programs, the data that we can receive from these is severely limited. With the expansion of the different programs that will be used, data that was not previously recorded will be seen and recorded. Aside from this, computer systems with the top of the line equipment are the most desired for this study. Limitations based on the hardware were seen throughout this study. This reduces the

bottleneck and strain on a computer so that it may perform heavier tasks.

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