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Connection and Application of Logic In The Field Artificial Intelligence

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Abstract: This paper discusses the connection and implementation of logic as one of the sub-fields of discrete mathematics within other fields of informatics, namely artificial intelligence or artificial intelligence (artificial intelligence). The discussion is preceded by an introduction in the form of the definition of the field of artificial intelligence that we will review is also equipped with history and research discussion of other fields under the field of artificial intelligence. Next, we will discuss the relationship between logic and artificial intelligence. On the way will a new discussion emerges, namely the representation of knowledge as the basis for the construction of a logical system complex. In addition, in discussing the implementation of logic in our artificial intelligence field requires good reasoning. So here will also be explained the definition of various type of reasoning.

Keywords: Logic; artificial intelligence; knowledge representation; causative resoning; spatial reasoning.

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INTRODUCTION

Artificial intelligence is one of the fields of computer science that aims to create a program that makes a computer visible, broadly, showing, what we call with intelligence[1][2]. Most of the research in fields of artificial intelligence, such as planning route or speech to speech (speech to speech) translation, carried out within a narrow. But the main purpose of artificial intelligence is to make programs that are smart in every way field and can stand alone [3].

Artificial intelligence has a purpose to create computers that can think (and also) can see, hear, walk, talk, and feel urge. The main part of artificial intelligence is development of normal computer functions combined with human intelligence, such as give reason, draw conclusions, learn and solve the problem.

These days, artificial intelligence too make a significant contribution to the management field. There is a support system decisions, and management information systems also can not

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be separated from the contribution of artificial intelligence. The existence of slices of the use of artificial intelligence in various disciplines causes quite complicated to classify artificial intelligence according to different disciplines use it. To make things easier that, then the classification of the scope artificial intelligence is based on the output that given that is on commercial applications (even though its actually artificial intelligence it self is not a commercial field)[2][4].

The role of logic in artificial intelligence applications can vary from personal use to weak where logic informs the process implementation from the point of view of analysis, to strong use where the algorithm we can prove the implementation is correct and finish. In some cases a system that work develops from ideas that comes from logic, as the system goes it also gets visible features logical problem namin later we can explain how develop new ideas in logical theory[5]. Things like this happen, for example, happen in logic programming.

LITERATURE REVIEW

In the 1950s scientists and researchers began to think about how machines could do their jobs as humans could. Alan Turing, an English mathematician, first proposed a test to see whether a machine could be said to be intelligent. The results of these tests are known as Turing Tests, where the machine is disguised as if it is in a game that is able to respond to a series of questions submitted. Artificial Intelligence itself was presented by a professor John McCarthy from the Massachusetts Institute of Technology in 1956 at the Darmouth Conference which was attended by researcher Al. Several Al programs were made in 1956-1966, the first was Logic Theorist, this program was able to prove mathematical theorems. Logic theorist introduced at the Dartmouth Conference. Second Sad Sam, programmed by Robert K. Lindsay (1960). This program can find out simple sentences written in English and is able to provide answers from facts heard in a conversation. Third ELIZA, programmed by Joseph Weinzenbaum (1967). This program is able to perform therapy on patients by asking several questions. An artificial intelligence researcher named Samuel wrote a chess game program that was not just playing chess, the program was created so that he could use his experience to improve his abilities. Meanwhile Newell, a logical theorist, tried to prove mathematical theorems.

The rapid development of technology causes the development and expansion of the scope that requires the presence of artificial intelligence. Intelligent characteristics have begun to be needed in various disciplines of science and technology. The intersection between psychology and artificial intelligence gave birth to an area known as cognition and psycolinguistics. The intersection between electrical engineering and artificial intelligence gave birth to sciences such as image processing, control theory, pattern recognition and robotics.

The main scope of the first Artificial Intelligence, Expert System. Computers are used as a means to store expert knowledge. Second, Natural Language Processing. With natural language processing, users are expected to be able to communicate with computers using everyday language. Third, Speech Recognition. Through speech recognition, humans are expected to be able to communicate with computers using voice. Fourth, Robotics & Sensory Systems. Fifth, Computer Vision, trying to be able to interpret images or objects that appear through the computer. Sixth, Intelligent Computer-aided Instruction. Computers can be used as tutors who can train and teach. Seventh, Game playing. Along with the development of

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technology, several technologies emerged that also aim to make computers smarter so that they can imitate everyday human work[6][7][8][9][10].

RESULT AND DISCUSSION

In response to the need for designing declarative components, subfields of artificial intelligence known as knowledge representation representation) emerged in the 1980s. The representation of science, especially dealing with the challenges of representation and reasoning of the separate components. The best place to study this field is a conference that is now held every year.

In this chapter, we will learn the rules in represent knowledge in Artificial Intelligence. Representation is meant to capture the essential properties of the problem and make the information accessible by problem solving procedures. Language representation must be able to make a programmers are able to express knowledge needed to get a solution to the problem.

Here we will discuss two kakas mathematics (mathematical tools) for represents knowledge, i.e propositional logic (propositional logic) and first order logic (predicate calculus).

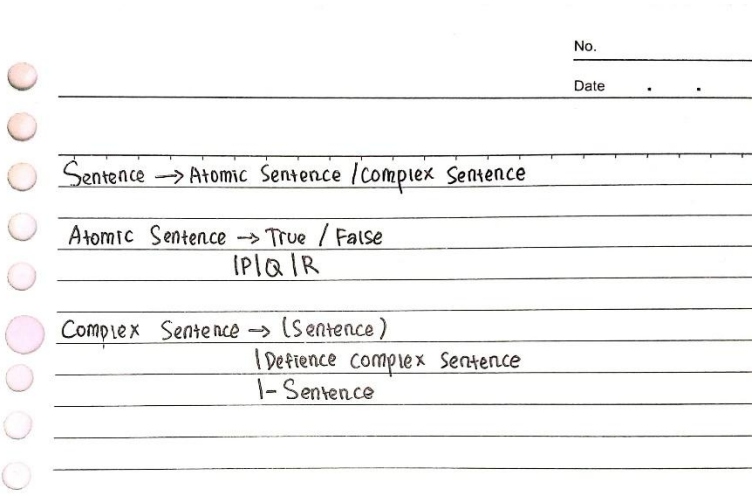

Figure 1: *BNF Syntax (Backus-Naur Form) in Proportion Logic*

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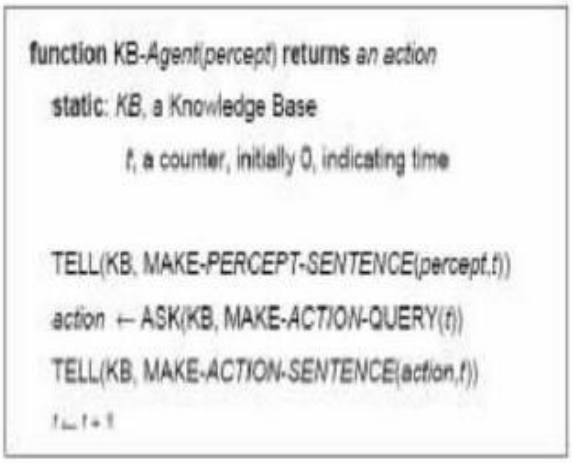

Figure 2: *A knowledge-based agent normal*

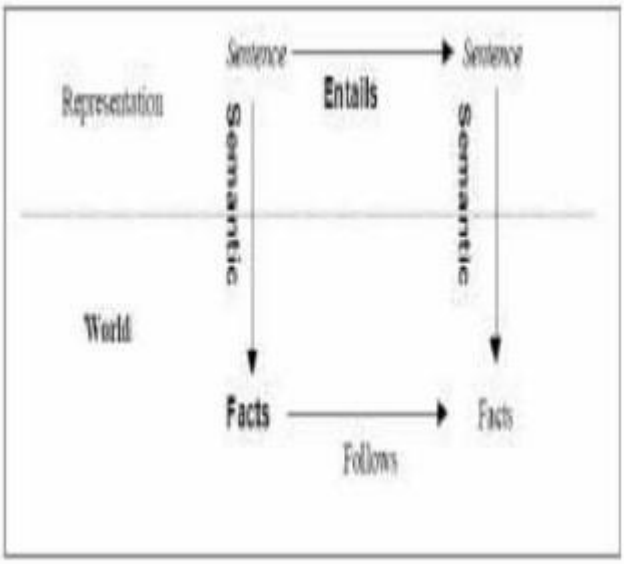

Figure 3: *The connection between sentences and fatcs provided by the semantics of the language.*

Figure 4: *Rules of inference in Logic Proposition*

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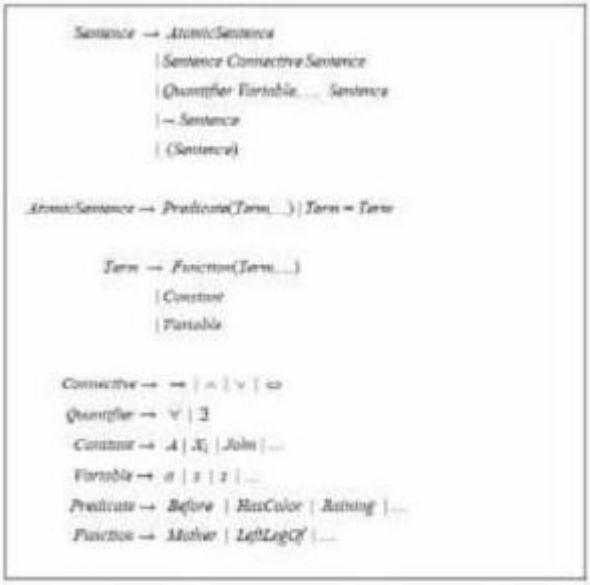


Figure 5: *Syntax of First-Order Logic (with equation) in BNF (Backus-Naur forms)*

Forward and Backward Chaining

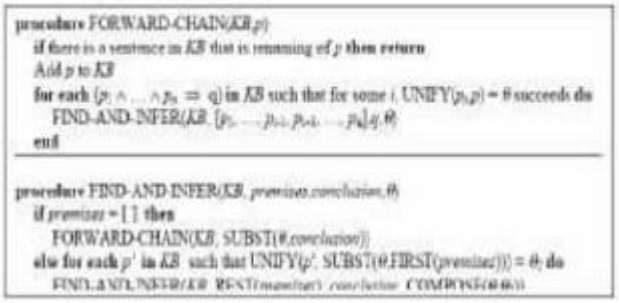
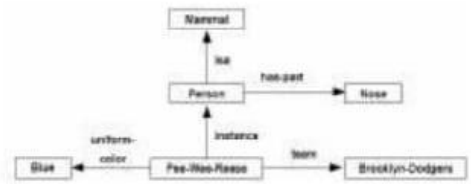


Figure 6: *Forward Chaining Inference Algorithm*

All sentences that can be inferred from sentence p is entered into KB. If p is new, consider any implications that have premise that corresponds to p. For each such implications, if all the premises are remaining are in KB, then conclude conclusion If the premises can be matched in several ways:

1. Semantic Nets

   There is an important relation for inference, like isa and instance.



2. Representasi Nonbinary Predicate

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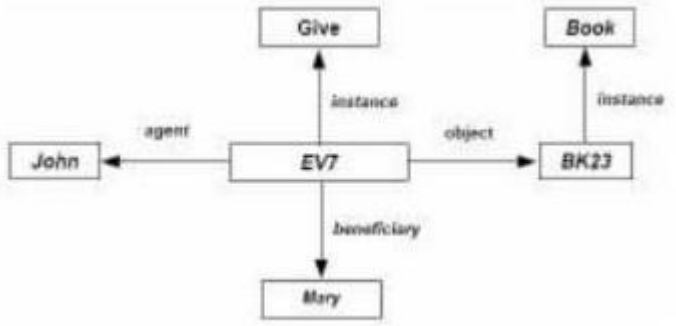
Semantic Network to describe aspects of certain events.

For example: “John gave the book to Mary”.



Causality provides a qualitative picture of reasoning about the device. Related programs the most developed causality in artificial intelligence is a creation of Judea Pearl and her students, who started from use of causality diagrams in formalism for reasoning in the field probability known as Bayesian Belief Networks.

The need to support reasoning computational space in applications such as motion planning and manipulation inside physics space, indexing and reception of images, information systems geography, diagrammatic reasoning, and design high-end image processing program has been give interest to spatial representations and spatial reasoning. Of course, the geometry that the need requires mastery very strong mathematician in this area. But as in other related fields with artificial intelligence, still not clear what mathematical theory is available now it is appropriate to inform these applications, and many computer scientists who feel the need to develop a foundation new.

Epistemic logic is another area where There are many influences from philosophical logic. Jako Hintikka shows below model approach to epistemic behavior single-agent can be informative.

In general, philosophical logic deals with contextual effects in the interpretation of expressions, but also in today's dynamic logic, context is more formally emphasized as assignment of values to variables, and the language is designed to make reasoning explicit about very limited context or not even possible.

$$ist(c,\varphi)$$

Where ist is read as “is-true”. This is analogous to the Holds . construction in situational calculus c stands for context and stands for complex proportional, which usually refers to to a sentence.

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CONCLUSION

Artificial intelligence is a field of computer science that aims to create programs that make computers appear, broadly speaking, to represent what we call intelligence. Robert C. Moore distinguishes the use of logic in artificial intelligence as a tool for analysis, as a basis for scientific representation. , and as a programming language. Knowledge representation is intended to capture the essential properties of the problem & make that information accessible to problem solving procedures.

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