

# Knowledge Based on Weighted Generalized Fuzzy Petri Net Model

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## 1) Abstract

This research paper will represent the field of knowledge, giving a high value summary of Reasoning, with key issues and aims. The escalating curiosity to understand symbolic representation, with reasoning, brought their backstage functionalities into the forefront to precisely identify the technicality of subfields of KBS in GFPN and APN models of AI.

This OR study is to encompass a complete array of problem-solving logics, methods and techniques in our pursuit to enhance decision making process and efficiency. It is to understand the application and implications of Knowledge representation scheme, which become useless without its capability to reason of basis with them. In 1960, Marvin Minsky, John McCarthy, Herbert Simon, and Allen Newell were simply enthusiastic in conducting AI research and wrote astonishing programs.

Since that time, the basic knowledge, its representation and connected reasoning concepts have been examined, and debated by several philosophers of the early Greeks, and they are not yet completely demystified. KR is the main purpose in AI and cognitive science.

Thereafter, we will analyze prevailing requirement of different systems, and the fundamental essence, gathered from the system, and find its need for the system. We will also discuss and implement project details, and eventually conclude by drawing the threads of experimental results for our future extension and needs.

## 2) Introduction to human Artificial intelligence (AI)

The objective and the purpose of this research project is to evaluate, analyze and enhance various reasoning processes included in GFPN, to improve knowledge reliability and oriented system.

There is consistently tumultuous history of struggle for the search to cross the logical boundaries of AI, something more than what we presently possess. This is because, every human being has limitations in his mental and physical capabilities, approach, tendencies and reach (Genesereth & Nilsson,1987). The greed persists to acquire more than what we have, and the human being always struggles for dominance (Crevier, 1993).

How to Create a Mind, the 2012 book of Kurzweil informs about the human brain Neocortex, containing 300 million processing patterns accountable for human thinking, and that can be artificially replicated, permitting the artificial intelligence to outdo human capability (Kurzweil, 2005). By possessing an additional mental power, the living human creatures have the tendency to modify our performance and work, our sense of life, death and self, by setting various different goals for our societies and ourselves, by reinforcing an additional intellectual capability, going considerably beyond our history, beyond species. Hence, it is bound to lead to our new beings, by new way of being, to ensure all things inexorably much more dynamic and authoritative than

our prevailing selves. To bring that Might in our lifetime, we involve an extensive research in our career goals and plans. This acute mega trend will be held in our foreseeable future to gain that super mental power (Sutton & Barto, 1998). And all these theories are based on our Knowledge, Representation, and Reasoning. The methodology of KRAR is the main AI research strand today. It deploys emblematic source of information with the logical implications of various procedures to solve problems.

KRR adopts two processes, to represent Reasoning and knowledge, by which, two fundamental APN, and GFPN problems can be explained. Both generate results for KRR mechanism.

This kind of research project is essential because, all these tasks depend on reasoning, which depends on knowledge and method of reasoning. In view of reasoning applicability, a measurable reasoning enhancement course will play a vital role to enrich precise knowledge oriented procedure.

### **3) Knowledge, Data, Representation, and Illustration, ROL**

This is in the context of the social role, linked to human rights, behaviors, beliefs, obligations, and norms conceptualized in various social situations.

It points at the Data, which always remains in an unrefined manner, with unfiltered information, which needs to be cultured to evolve to the instant of being valuable and useful for certain form of analysis. The Knowledge functions in the user's brain, and only when the human insight, understanding and experiences are applied to data information, its representation happens.

By applying a prescribed, logical method of rational representation, our purpose is to get rid of irrelevant particulars of natural metaphors to reach at essential reasoning structure. To do this, we need to evaluate and understand the essential knowledge, which captures the purpose of any problem. Going even further, we need to discover the precise pattern and outline of abstraction; an apposite language representation through which problems as well as solutions can be articulated and expressed adequately. Thereon, we need to assess and ensure that the formalization problems and solutions are in the correct language to be understood well. Hence, we must have a logical model of reasoning theory to resolve the problem (Mylopoulos, 1980).

The Representation involves Philosophical and Motivation issues, representational formalisms, logical and fundamental principles of analysis, and practicality of KR approach.

### **4) Materials and Methods**

The GFPN is based on logic based neuron applications to understand the total utilization of learning abilities, along with its APN, both provide distinctive KRR mechanisms. Two different problems were analyzed to assess; The Diagnosis type problem of Liver Disease, and Loan Application and Assessment Classification. This happens because of knowledge variations in human perception, cognition, reasoning, judgment, and thinking (Pedrycz & Gomide, 1994).

The AFPN provides neural network learning ability, can be used for representation, and reasoning of dynamic knowledge, which in Engineering, Science and Medicinal fields continue to contribute towards development and research. Hence, it has value in designing a knowledge based system, that helps to adjust human thinking and cognition, as per knowledge dynamics (Ghidini & Giunchiglia, 2001). With this objective, for specialist systems, AFPN models are proposed, which features FPN has the neural network learning ability. It normally represents dynamic knowledge, with inference. Based on this AFPN model of reasoning algorithm, learning with weight was developed. Based on transitional firing rules of AFPN, a modified learning algorithm can be developed to ensure weight convergence (Li, Yu & Lara-Rosano, 2000). It also evaluates FPN model with a rule-based system. This determines the antecedent relationship and consequences exist using proposal  $d/sub s/$

to proposal  $d/s$ , where  $d/s \neq d/j$ . Provided certain truth measures of proposal  $d/s$  are given, the true measure of proposal  $d/j$  could be assessed (Chen, Ke & Chang, 1990).

KR is vital to AI and cognitive science. The predicate logic is the first logic order of knowledge represented with facts and rules, and its programming is processed through Prolog. The Semantic network provides information concerning people, objects, concepts and their specific relationship, while the ESNet provides semantic and logical network advantages (Sowa, 2000).

Deductive, Inductive, Bayesian and rule based, are the Reasoning Methods. Inductive reasoning provides data of facts, while Deductive Reasoning deduces particular belief derived from the hypothesis of inductive reasoning (Barbieri, Et. Al., 2010).

Fuzzy petri nets offer the means for fuzzy production rules of KBS. While APN and GFPN represent knowledge, these models are applied for reasoning processes. GFPN supports every transition statement as equal unlike APN, which needs cumbersome and time consuming process to find threshold values to support. In conclusion, to input links adding weights and support to GFPN transitions to reduce threshold needs to decide. System Analysis understands the existing system and decides whether it needs improvement (Stevens, Goble & Bechhofer, 2000). Reasoning System works based on fuzzy production rules, which generates several combinations based for GFPN production rules. The Requirement Analysis specifies accurate knowledge based Functional requirements to gain precision. The Non Functional Requirement needs a reliable reasoning system stored in the knowledge base for accuracy (Glover, 1986). By adding input weights, the reasoning process becomes more reliable. Usability means an easy way to use understandable software like, MyCin used for medical diagnosis. To develop this approach, we need JDK - Java Development Kit, 1.6, Drool's 5.0.1 version, MySQL 5.0 to store premises with specific details (Yeung and Tsang, 1997).

The system design is a problem solving process involves abstraction, and separation of design logics from physical aspects.

Knowledge acquisition uses extracting methods from the structured and organized expert human knowledge source. For this, we need to evaluate the type of domain knowledge suitable for the system, expert source should be identified and evaluated to ensure a precise knowledge level for the project is obtained. It is the basic process of knowledge acquisition. The major knowledge acquisition techniques and expertise source can be identified by intense, systematic and extended interview of domain experts (Pedrycz & Gomide, 1994),

In Jboss Drools, GFPN based Representation of knowledge is implemented, and the production rules use Algorithm 5.1 to define drools rule with transitions. The architectural design involves Rule Base and Inference engine, programmed in Jboss Drools. The network of GFPN called Reasoning System, for which the computation of Java program involves transition. The working and reasoning process depends on GFPN rules firing a series of transitions to obtain the goal. The procedure for Reasoning applies Algorithm 5.2, to describe a reasoning process, with Input marking starting places, and Output marking goal places (Looney, 1994),

The developed system can be implemented, designing with object-oriented programming language of Java, API, JBOSS community Drools of BRMS - business rule management system, based on the production rule system. Drools 6.0 involves PREAK algorithm, which handles many facts and rules. The Agenda Groups help improve performance (Ribaric & Hrkac, 2012).

KieSession runs timed rule engine, using FireAllRules, can be configured with a TimedRuleExectionOption. To execute, the Hardware platform contains

JBoss Drools 5.0.1, JDK 1.5 with Pentium-II 266 MHz processor, and RAM of 128 MB. The Software Platform is of Window 7, JDK 1.5 Software Development Package. JBoss Drools 5.0.1, a freeware to develop

JBoss community. MySQL Server 4.1, an easy to use RDBMS. Drools module defines rule base in .drl files, decides which method should be used to execute the Knowledge based work (Shih, Chiang & Lin, 2007).

Based on GFPN and wGFPN based reasoning approach of knowledge, the experiments identified causes of Liver Cirrhosis. There were several symptoms, whose values were taken as answers to identify the Liver disease assessment. The next reasoning process considered the loan application, based on bank policies. Finally, the liver disease assessment chart of wGFPN model is less effective for minor symptoms unlike the GFPN model, where weighty absence permits irrelevant symptoms to make valuable changes (Santos, Li & Korah, 2012).

## 5) Result and Discussion

The wGFPN Model reduces trivial factor effects on reasoning process output. The threshold of initially, knowledge acquired using expertise in knowledge domain, and secondly, GFP network deciding transition, the Weights input limits the input effect over output, unlike GFPN.

In view of GFPN, the wGFPN model reduces the needless input effect over output in all knowledge based reasoning processes using required input weights (Murata, 1989).

## 6) Conclusion

The wGFPN Model applies input weights, with threshold transition values, without precise results, because those values are derived from knowledge.

The integration and implementation of several Petri Nets models with advanced techniques will help enhance the model capability in FPN with FPN, D.S. Theory, and Rough set theory (Ferber, 1999)

## Acronym

AI - artificial intelligence.

APN- Associative Petri Nets,

AFPN - Adaptive Fuzzy Petri Nets

ESNet - Extended Semantic Network

FPN- Fuzzy Petri Nets

GFPN- Generalized Fuzzy Petri Nets,

KBS- Knowledge Based System

KR – Knowledge Representation

KRR - Knowledge Representation and Reasoning

KRAR - Knowledge Representation and Automated Reasoning

OR- Operational research

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