An Overview of Human Plausible Reasoning

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ABSTRACT
The Human Plausible Reasoning is an area, which is based on possible responses and can be applied in several knowledge based systems. This paper will introduce Human Plausible Reasoning theory along with reasoning processes and rationality theory. Human Plausible Applications will be explored along with its focus on Enterprise Information System. Finally challenges in this field will be discussed and future trends in this direction will be explored.

General Terms
Human Plausible Reasoning, Enterprise Information System.

Keywords
HPR, EIS, HPR Applications, HPR Challenges.

1. INTRODUCTION
Information System clients frequently come across scenarios where they feel lack of intelligence in information retrieval, either they might misinterpret the system's response or they possibly will disregard information provided by the system. The client's frustration may be growing in scenarios when clients suppose that they have presented sufficient data for the computer to comprehend what their actual objectives were. Though, the Information System does not reason in the similar method as a human observer would and this is a few fixations that frequently go round the information system into a distant assistant. The information systems faces lack of necessary way of thinking ability for producing plausible deduction with reference to the client's objectives and viewpoint, which may be either correct or incorrect. Human Plausible Reasoning (HPR) theory is an area in which independent hypotheses initially stand on a quantity of people's response to each day query. Preliminary as of a query ask to a person the hypothesis attempt to replicate the reasoning that this person utilizes in order to discover a plausible answer, presuming that she/he does not have a complete answer. In this aspect, the theory attempts to replicate people's reasoning base on similarities, which is engaged when they construct plausible deduction in relation to something that they do not recognize well [1]. According to Collins at el. [2], in HPR theory there are four types of expression. The expression may contain one of four types such that Generalization (GEN), Specialization (SPEC), Similarity (SIM) and Dissimilarity (DIS). There must be at least four statements driven from the core theory of Collins at el. Consider an example, "Dubai is located at coast side of the UAE". The first four expressions transformed as follows:

- First plausible inference can be that "Beaches exist in UAE" – generalization is transformed.
- It can be also plausible that "Dubai has a free port" – specialization is transformed.
- "Doha is similar in location to Dubai also has a port" - similarity has transformed.
- "Riyadh which is dissimilar in location has no port" – dissimilarity is transformed.

According to [2] HPR has following characteristics:

Typicality: Characteristics affects generalization and specialization transform – the more distinct Dubai is regarding its location to UAE the more certain is inference.

Similarity: It affects the similarity and dissimilarity transform – the more similar Dubai is to Doha and the more dissimilar Riyadh is to Dubai with respect to location, the more certain is the inference.

Uncertain Possibilities: Uncertain Possibilities reflects the measure to which location and other variable cause the city – the more effect of location on city, the extra clear-cut any of these inferences.

Occurrence: This reveals the features in reason; although as a permanent inconsistent. When functional to example resembling UAE, occurrence barely build logic, if occurrence of coast in different part of the UAE. The more part of UAE is coast, the more probable there are beaches in Dubai and other cities of UAE.

Influence: It concern to generalization and specialization inferences and reflect the scale the division encompasses a great fraction of the set. For case in point Dubai is smaller as compare to Abu Dhabi, having beaches is less certain than for northern part of the UAE.

This paper is organized as follows: Section 2 will explore reasoning processes; section 3 will discuss plausibility accordance with rationality theory; section 4 will review HPR applications; section 5 will focus on HPR application in EIS and finally section 6 will discuss and conclude this study along with challenges and future direction in this field.

2. REASONING PROCESSES
According to Fetzer [3], one has to be able to say that – when a reasoning process is correct? And/or when a reasoning process is incorrect? Creating principles are very crucial for known rational processes to calculate logic. However, in factual existence, types of reasoning and proof can be observed as fundamentally associated through logical action in the actual world. According to Chiasson [3] the utilization of various types of reasoning in real life circumstances, representing how dissimilar combinations influence our actions in the real world. Separating various types of

reasoning from one another and disconnect reasoning from proof might provide better certainty; however it is probable to turn interest away from the realistic effectiveness of logic. According to Rizzi and Peirce [3] logic can be divided into three forms and can be seen in human mind as paired operations. The first form known as "deduction", which is resulting a conclusion and that is no doubt certain. The second form known as "induction" which constructs a conclusion in the form of rule(s) and that is always valid until unless a dissimilar instance is found. The third form is known as "abduction" which constructs a conclusion case and that is always uncertain or in other words merely plausible.

The term deduction according to the famous philosopher Aristotle is a type of logical conclusion stand upon rational and arithmetical demonstrations. Furthermore; deduction engages depiction of rational consequences from situations. The job of deductive logic is to classify the strength of one truth as it guides to a further truth. While deduction presumes the reality of truth and falsity; it limits the conclusion to divide into two part answer (Valid or Invalid) [4].

The term Inductive logic is defines as representing conclusions from a huge quantity of data. All arguments are in detail hardened by study and testing before the last process to be executed. In result, every established argument develops into a fundamental foundation for advance point of conception, by means of the majority universal argument in lieu of the last phase of the query. In concise, induction is a conclusion from practical facts to simplification [4].

The term abduction is an analysis method intending to detect for design construct in event and propose assumption. Rational analysis is divided into symbolic logic and critical thinking or plausible reasoning. In contrast to deduction and induction, abduction is a kind of decisive judgment somewhat than symbolic logic. Subsequent to study several unforeseen patterns, the investigator develop them in as numerous ways as feasible in anticipation of a plausible "tale" of the data appears. Abduction can be defined as two key thoughts, that is, pattern-recognition and plausible reasoning [4].

3. PLAUSIBILITY ACCORDANCE WITH RETIONALITY THEORY

Even though plausibility has not been defined thoroughly in recent history of artificial intelligence, as of now there is an uneven agreement that it has something to perform with the rationality of theory, which supports lying on preceding familiarity. This analysis embraces that various theories, circumstances, happenings, or conversation is plausible if it is theoretically reliable by means of what is identified to have happened in the earlier period [5]. For instance, a small-winged creature that build nests on the tree and doesn't fly is less plausible than a large-winged creature that build a nests on the ground and doesn't fly. According to Rehder [7]; Keil [8]; Murphy & Medin [9]; function of how well object's feature fit together with one another category of plausibility is all according to its preceding knowledge of that causal relations between category features. Thus, in our previous example the latter creature has only feature that is typically can be found in birds and that is it has wings; and the former has three features – size is small, has wings and nests on tree. The latter creature seems to us more plausible as it is mixture of non flying and nesting on ground is no doubt consistent with our former knowledge of birds. In addition to plausibility of category relationship, the theory rationality approach is well exists, as functional to plausibility of incident situations. To review plausibility through this explanation engages primary, illustration on applicable previous information to construct the indispensable conclusions and, subsequent, one way or another evaluating if the situation is a high-quality equivalent to what has been practiced in the earlier period [5].

4. HUMAN PLAUSIBLE REASONING APPLICATIONS

Following are few important HPR applications:

4.1 Software Design

Human plausible reasoning plays a vital role in software design. No doubt, there is a limited consideration on how it works effectively. From software design point of view the use of reasoning techniques are important in at least two ways: (a) design structuring influences the amount of context switching in design, thus affecting design effectiveness; (b) identification of relevant problems through inductive reasoning and other reasoning techniques helps designers create better design. It is common in the software industry, software designers use different reasoning techniques to design, with different design results. We have preliminary evidence to show that the appropriate use of contextualization helps designers to focus and explore key design problems effectively. Creating scenarios helps verify abstract design ideas, and explicit reasoning facilitates communication of design ideas. Inductive reasoning is essential in helping designers identify design problems in the problem space, thus facilitating design problem-solution co-evolution. Further exploration of inductive reasoning and other reasoning techniques will improve the way we design software because of the improved understanding of how we think and solve software design problems. This is no doubt fundamental to the software development processes [10].

4.2 LISA (Learning and Inference with Schemas and Analogies)

LISA is a software application, which shows promising as a neuron computational model of symbolic thought. For example, user hypothesizes that the LISA is using mapping that corresponds to neurons and these neurons rapidly produce modifiable synapses. LISA is playing an important role in integrative theories that are fundamental to high level human cognition in the field of neurobiology. LISA not only models several aspects of normal cognitive functions, for example, relations between effortful, reflective; forms of reasoning and effortless, reflexive reasoning; but also the human ability to exploit perceptual representations. Current form of LISA doesn't address several important questions about relational thinking, among them are relation discovery – how do people learn new relational concepts? And meta-cognition – how do people monitor their own progress towards solving problems? [10].

4.3 Precision Retrieval System

The Plausible Information Retrieval (PLIR) system is an experimental system and is based on the theory of the plausible reasoning. PLIR is high precision retrieval system. It retrieves documents through plausible inferences and these inferences are the sources of evidence. In this research a series of experiments were conducted with different hypothesis and situations using the digital library of titles and abstracts of the Communication of the Association for Computing Machinery (ACM). In this research two different approaches in merging evidences of plausible inferences were discussed and hence proved that their overall usefulness in

retrieval has improved the quality of ranking of the system [11].

4.4 Question Answering Systems

It is a knowledge-based question answering (QA) system that is meant to replies questions with Plausible Answers. It is implemented using the HPR and tries to deduce reasonable answers when explicit information doesn't exist in the Knowledge Base (KB) using reasoning engine as its core. This research demonstrated promising results. It is no denying a fact that human being are learning pieces of knowledge from different sources and using them with different combinations simultaneously. For reasoning human being are using common sense, domain specific knowledge and lexical considerations and adding these to QA system will make this system robust, but no doubt there are no clear boundaries among them. It is predicted to use some common sense knowledge when using "axiomatizing" domain specific information. Paraphrasing by people is another issue for machines' comprehension and by employing lexical knowledge it may help. OpenCyc, ThoughtTreasure, ConceptNet and WordNet are the good sources of common sense and lexical knowledge examples [12].

5. HPR APPLICATION IN EIS

It is a primary setback for intelligent Enterprise Information System (EIS) to know how much, and what kind of support to offer users for such interaction. The procedures which are then measured to be important contained by the majority ideas of the Intelligent Enterprise Information System can be [13]:

- Representation of user's information problem, of texts in the knowledge resource: e.g. indexing;
- Comparison of representations of information problem and texts: e.g. retrieval techniques;
- Interaction between user and intermediary: e.g. reference interview or human-computer interaction;
- Judgment of appropriateness of text to information problem, by the user: e.g. relevance judgments;
- Modification of representation of information problem: e.g. relevance feedback or query reformulation

EIS program, which receive a query as input, and proceeds documents as result, exclusive of paying for the chance for decision, adaptation and particularly relations with text, or with the program, is one, which would not meet the criteria as an Intelligent EIS. Normal EIS would be unsuccessful to identify about the user's information difficulty (depending simply on query leads, some weak illustration of that difficulty), and would be unsuccessful to integrate that one process, which is known to get better retrieval presentation considerably, interaction (particularly, but not completely, during application response). These points of view direct us to the situation that intellect in intelligent EIS conceivably exists in not only in the design of EIS, but also in the user her/himself, and in appropriate handing over of responsibility and tasks to all of the various components of the EIS system. Obviously, few of the procedures pointed out must be accepted by the component and some information on which they are stand, for example, information of database formation and contents. Consequently, we might say that applying such knowledge and using these processes are very important to intelligent EIS [13].

In EIS abduction can be used for prediction, arrangement, rationalization, preparation, analysis, confirmation, authentication, illustrative reasoning and familiarity acquirement, decision support system and human cognition [14]. HPR must be able to predict, arrange and analyze query results in EIS, such that there be present a set of suppositions through which every of the acknowledged activities can be clarified. New information in EIS can be sent to monitoring procedure which evaluates the probable consequences when fresh facts come to light. Using HPR in EIS, a query might be viewed as one of the three general types: [15]

- When there are no or minimal, conflicting initial facts and one identification possibilities is correct.
- When there are conflicting facts but one possibility is still clearly correct.
- When there are many conflicting facts and there are no choice can be determined to be the correct identification.

The system output must always in line the outcome of the human reasoning given the identical preliminary information, the similar identification likelihood was preferred as being the mainly plausible, mutually by the human and system. The main domain for some additional concentration is to scrutinize more strongly the way in which queries are originally produced and afterward processed. This can be achieved by merging all identification possibilities with all of the acknowledged characteristics [15].

6. DISCUSSION AND FUTURE WORK

Human Plausible Reasoning is playing vital role in several applications and no doubt HPR can play an important role in Enterprise Information Systems; but there are few challenging issues researcher should keep in mind before implementing HPR in EIS. The first issue is regarding "abduction" and it is slow. Selman & Levesque show that even when only one abductive (plausible) explanation is required and then the theory is restricted to be acyclic, then abduction is NP-hard [16]. Second issue is divided into two parts, primary and secondary. Primary type of reaction to unawareness of difficulty corresponds to obtaining fresh information in order to explain the objective and complete an action; the secondary one relates to discarding the objective and put down in doubt, with no action taken. A third issue of plausibility, in which the objective leftover unclear, but still the hypothetical consequence is the base for a new achievement. The fourth issue is known as "conceptual analysis" the main problem remains in the selection of logical structure. Diverse alternatives direct to dissimilar illustration and this occurs because of different conception. The fifth issue is known as "principle deduction" refers to the dependable transfer of actions of principle to suggestion, with reference to conventional principle. Principle Deduction design, such as assurance reason model, fuzzy logic, and probability theory state the principle in Boolean amalgamation of suggestion particular measures of principle in module suggestion [17]. The future of EIS is bright as HPR can be implemented as it is an expressive philosophy of human plausible implication, which categorized reasonable implications in relations of a group of regularly repeated conclusion designs and group of alterations on these patterns. Also HPR attempts to prototypical human cognitive as it perceives the connection amongst a query and the information recovered from memory and initiate the link of interpretations. The future of EIS is also depending on adoption of HPR using Intelligent Agents

as Intelligent Agents has a vital role in knowledge discovery and also in new knowledge creation.

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