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A Review on Scope of Reinforcement Learning

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Abstract: ***Reinforcement Learning has been considered a kind of Machine Learning. It is also a branch of Artificial Intelligence. Reinforcement Learning allows the machines and software agents to work automatically. It helps devices to handle the idyllic movements in a specific situation. Reinforcement Learning is capable to maximize the performance of devices. It is a type of Machine Learning algorithm which allows software agents and machines to automatic. Reinforcement learning has been considered as the particular application of device. But deep learning techniques are used to deal with challenges. Deep Learning is a function of AI. It emulates to the functioning of human brain in processing data. That formulates patterns that are useful in decision making. It can be referred as deep neural learning or deep neural network. This review is a discussion that has been made on artificial intelligence, fuzzy logic, neural network, deep learning and the scope of deep learning.***
Keyword: Reinforcement learning, Deep Learning, Artificial Intelligence, Neural Network, the Fuzzy logic

I. INTRODUCTION TO AI

Artificial intelligence is intelligence exhibited by machines. An Intelligent machine that has been considered as a changeable ideal agent, distinguish the setting of it. It takes the actions and enlarges the chance of accomplishment at similar objective. This paper has several subfields. It concentrated on particular issues along with particular reviews. This AI research also has focused on efficiency of specific device as well as satisfaction of specific applications.

Main challenges of this paper are reasoning, knowledge along with planning. Learning and natural language processing are also considered here. It also includes perception, ability to move and alter in objects. GI has been considered in large time objective of field. Reviews are including the statistical technique, computational intelligence, soft computing and traditional symbolic AI. Machine learning is the example of soft computing.

There are several devices that are applied in Artificial intelligence.

That research also has search versions and optimization of mathematical, logic, techniques related to probability and economics. AI sector sketches on computer science, mathematics, psychology, linguistics, philosophy, neuroscience and artificial psychology. This sector has the capacity to fulfill the below given objective.

These objectives are the Speech Recognition including transcription and alteration of human speech. Human speech is altered into understandable configuration for computer applications. There are Artificial Intelligence based devices that have design and programming in a manner. In this manner the devices have the ability of thinking and these perform like human being. AI has been formulated as an essential component of our routine. It has brought many changes in our life. It is due to its uses an extensive sector of daily services.

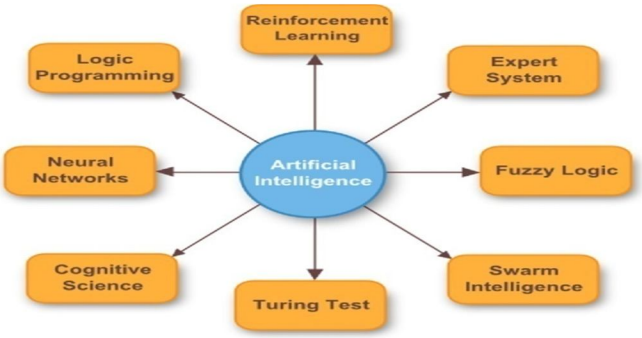


Fig 1. Application of Artificial Intelligence

A. Early Application of AI Based fuzzy Applications

There was Japanese first who use the method of fuzzy logic in case of general requirements.

An Initial remarkable application was on the high-speed train in Sendai. In that fuzzy logic had the capability and could progress the economy, comfort and accuracy of journey.

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II. LITERATURE REVIEW

Numerous previous researches have been presented in the field of artificial intelligence.
In below table, here are authors, titles, technology and benefits and limitation of researches with their explanation.

Ref	Author, year	Title	Technology	Advantages	Disadvantages
1	Robert Pearl	Artificial Intelligence In Healthcare_ Separating Reality From Hype	Artificial Intelligence	It is helpful in the health care sector.	It can't be helpful to do progress of healthcare.
2	D.DouglasMiller,a EricW.Brown	Artificial Intelligence in Medical Practice: The Question to Answer?	Artificial Intelligence	helpful in medical sector	It is only restricted to theory
3	Sandeep Reddy	Use of Artificial Intelligence in Healthcare Delivery	Artificial Intelligence	important role in health care	It has merely discussed Theoretically.
4	H. Alharthi	Healthcare predictive analytics_ An overview with a focus on Saudi Arabia	Predictive analytics	Helpful in the health care program.	it is restricted to Saudi Arabia
5	Paul Bleicher	Artificial Intelligence in Health Care		beneficial in health care	It can't process in the query processing speed
6	Fei Jiang, et al	past, present and future of Artificial intelligence in healthcare	Artificial Intelligence	beneficial in health care	It has described only present and past of healthcare rather that presenting technical improvements.
7	Tapas Ranjan Baitharu, Subhendu Kumar Pani	Analysis of Data Mining Techniques For Healthcare Decision Support System Using Liver Disorder Dataset	Data mining	Beneficial for health care	restricted to Liver Disorder Dataset
8	Ionuț ȚĂRANU	Data mining in healthcare: decision making and precision	Data mining	Beneficial for health care	There is the requirement to improve technology for healthcare
9	Dr Saravana kumar N	Predictive Methodology for Diabetic Data Analysis in Big Data	Predictive Methodology	Beneficial for Diabetic patients	Only applicable to Diabetic Data.
10	Vimal L. Patel	The coming of age of artificial intelligence in medicine	Artificial Intelligence	significant for the medical field	Can't make improvement in query processing speed
11	Wan Hussain Wan Ishak, Fadzilah Siraj	Artificial intelligence in medical application an exploration	Artificial Intelligence	significant in medical field	Requirement to improve the methodology for medical use
12	Lee Spector	Evolution-of-artificial-intelligence	Artificial Intelligence	Use to know AI scope.	Research has only made Evolution discussion.
13	Terry winograd	Shifting-viewpoints--Artificial-intelligence-and-human	Artificial Intelligence	Beneficial for Expert system enlargement	It could not progress the healthcare performance.
14	Melanie Mitchell (2	Complex-systems--Network-thinking	Artificial Intelligence	Beneficial for complex AI related system	restricted to network thinking
15	Saksham Kukreja	A Comprehensive Study on Applications of Artificial Intelligence for Medical Diagnosis	Artificial Intelligence	Significant for cure of Asthma patient	Only used to cure Asthma related diagnosis

III. FUZZY LOGIC

Fuzzy logic has been considered as a set of several-valued logic. It makes dealing with approximate not with the predetermined and valid reasoning. In traditional binary logic there are variables works with values. These values might be false or true. On the other hand the variables of fuzzy logic work with a truth value. This value exists in the range of zero and one. It has been observed that Fuzzy logic is applicable to tackle partial truth concept. In which truth data could exist among fully true and fully false. Moreover, during time of using linguistic variables, these degrees are arranged with particular functions. The term named Fuzzy logic has been proposed in 1965. Lotfi A. Zadeh proposed the Fuzzy set theory. Fuzzy logic is capable to use in several sectors. These sectors may be from control theory to AI. The study of Fuzzy logic was made in 1920s.

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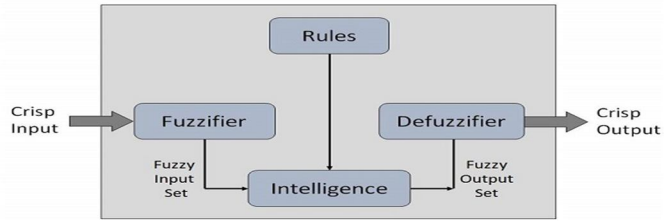


Fig 2. Fuzzy input/output model

A. Classical Fuzzy logic

Classical logic merely allows propositions include a truth value or falsity. Notion of whether 1+1=2 is a fixed, unchallengeable and according to mathematics. Thus, there are certain propositions with variable answers, like as inquiring people in recognizing a color. After that, here it has been determined two concepts that are empty and full. A particular fuzzy set have the ability to describe the Meaning of them. Then one might describe glass that is 70% empty and 30% filled. It is observed that concept of emptiness could be subjective. Therefore there might be dependency over detector.

On other side probability has been considered a mathematical model of ignorance.

Fuzzy set theory describes the fuzzy operators on fuzzy sets. The Challenge of using this may be unknown suitable fuzzy operator. For instance, in general temperature regulator that is making use of a fan is shown where T is temperature, C is cold, F is fan as and H is hot:

IF T IS very C THEN stop F
IF T IS C THEN turn down F
IF T IS normal THEN maintain F
IF T IS H THEN speed up fan

The &(and), |(or) , ! not operators used in boolean logic. These have existence in fuzzy logic. That normally described like minimum, maximum, and complement. Then these operators are expressed as this method. Such operators are known as *Zadeh operators*. Thus for fuzzy variables a & b where T is truth:

NOT a = (1 - T(b))
a and b = min(T(a), T(b))
a or b= max(T(a), T(b))

Other operators that have linguistic nature are known as *hedges*. These have the ability to uses. Usually "very", or "somewhat" adverbs are used. That alters the set meaning with the use of a mathematical formula.

Define with multiply

a and b = a*b
a or b = 1-(1-a)*(1-b)
1-(1-a)*(1-b) comes from this:
a OR b = NOT(AND(NOT(a), NOT(b)))
a OR b = NOT(AND(1-a, 1-b))
a OR b = NOT((1-a)*(1-b))
a OR b = 1-(1-a)*(1-b)

IV. NEURAL NETWORKS

It is expected that the human mind is having complexity along with literally. Most strong computing machines are considering inner-workings in brain of human. It is considered as biological networks of neural.

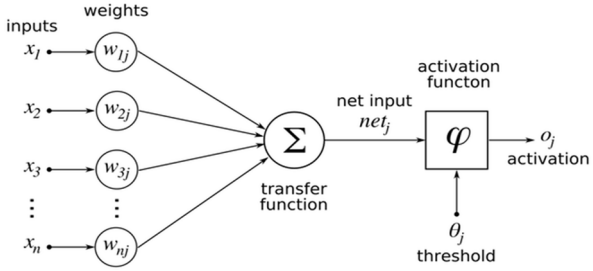


Fig 3.Neural Network

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V. REINFORCEMENT LEARNING

Reinforcement Learning is a mathematical outline to develop the computer agents. These agents have the ability to study an optimal behavior. It has been done to relate the generic reward signals to the previous activities of ist. There are numerous several efficient applications in business intelligence. A number of applications are in plant control as well as gaming. With these applications, RL outline has been considered perfect to make decision in not identified setting with big side of data. Reinforcement Learning is an approach to computerize goal-oriented learning and decision-making. This review has been presented to handle the issue. In which an agent deals with an environment and gets reward signal at the successful completion of each phase. The objectives of RL algorithms is to search a policy. That means a mapping from state to action. It enlarges the expected cumulative reward under that policy.

VI. REINFORCEMENT LEARNING VS DEEP LEARNING

Reinforcement learning has been considered the particular application of device. But the deep learning techniques are used to deal with the challenges.

The progress in algorithms for Deep Learning has given an innovative wave of successful applications in Reinforcement Learning. Its reason is that it provides the chances to proficiently task with high dimensional input data (like images). The trained deep NN can be seen as a type of end-to-end RL review. Here the agent has the ability to study a state abstraction and a policy approximation directly from its input data.

Deep learning has been encouraged with structure and brain function, namely internally attaching of several neurons. Neural Networks are algorithms that imitate biological structure of mind. These are compactly internally attaching. Mostly neural nets of today have been arranged in several node layers. These are “feed-forward. Mean to say that the information shifts only in one direction. An individual node might be attached to many nodes in layer beneath it. From these nodes, it gets the information. It is also connected to the nodes. These nodes are on layer. To these nodes, it transfers the data. A reinforcement learning algorithm is used for neural networks with incremental learning ability. A neural network has been used to approximate the action-values of Reinforcement Learning agents. These networks are also used in interference.

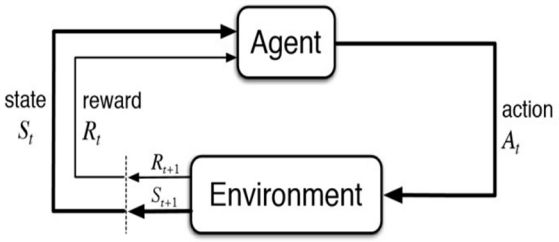


Fig 3.Reinforcement learning

VII. OBJECTIVE OF RESEARCH

A. The Objectives Of Research Are As Follow

To study the existing artificial intelligence based researches and investigation regarding their loopholes.

To review the usage fuzzy logic and neural network in artificial intelligent system

To perform study of reinforcement learning environment.

The relation between reinforcement learning and deep learning. Proposal of suitable algorithm in order to improve efficiency of reinforcement learning environment.

To sort out the issues of time complexity and space complexity in reinforcement learning using clustering mechanism along with neural network.

VIII. PROBLEM FORMULATION

However there have been several researches in field of artificial intelligence, neural network, fuzzy logic and deep learning. Reinforcement learning has been proven specialized application of machine. A reinforcement learning algorithm is have used for neural networks with incremental learning ability. But there are some issues regarding time and space complexity. In real application it actual usage of reinforcement learning could be time consuming. Moreover the lot of space is consumed when same information is required in distributed environment. Thus there is need to integrate the clustering mechanisms to enhance the performance.

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IX. PROPOSED MODEL

In proposed work the integration of clustered approach would reduce the time consumption along with space in reinforcement learning system.

The clustering of similar task in agent would reduce the time consumption and this would reduce the overhead of agents connected to reinforcement learning environment. The action would be taken on independent activities parallel.

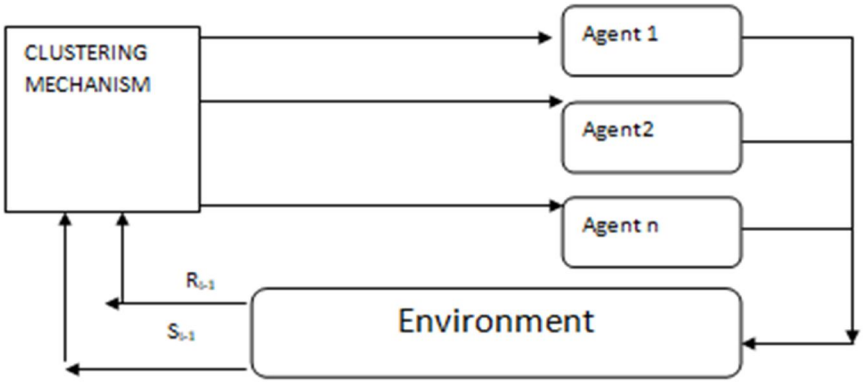


Fig 4.Proposed model

X. SCOPE OF REINFORCEMENT LEARNING

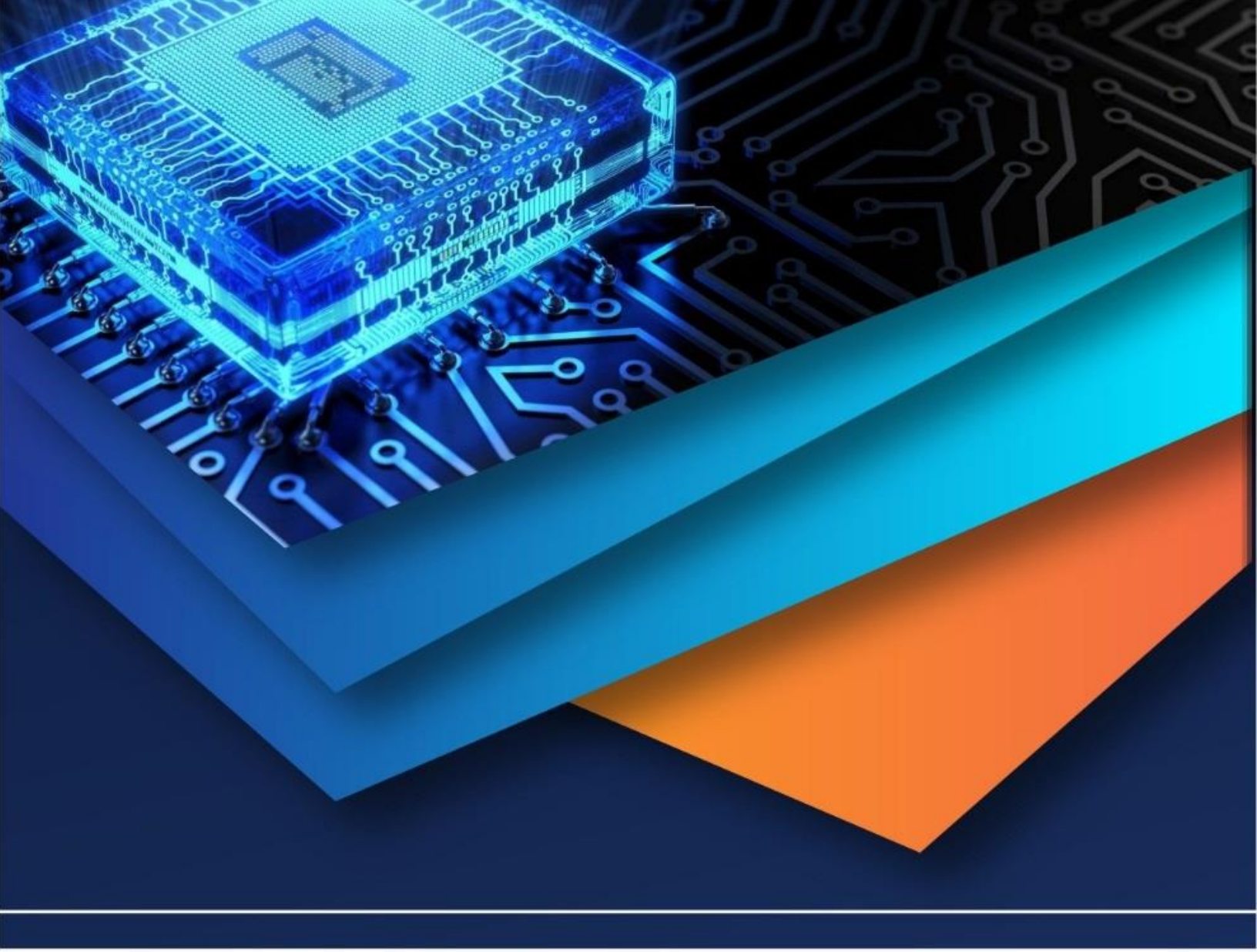
Reinforcement Learning (RL) has been considered as quickly progressing perception. It has been creating an extensive diversity of learning algorithms for several applications.

Reinforcement Learning in Artificial Intelligence would play an significant role in career opportunities.

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