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Impacts of Machine Learning and Artificial Intelligence on Mankind

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***Abstract*—With each passing day and gradually as we move into future, smart or intelligent machines will slowly replace and enhance human capabilities in many areas. The intelligence exhibited by machines or softwares are often termed as "Artificial Intelligence" which is a subfield of computer science. Artificial intelligence along with machine learning is now a potential game changer in the history of computing backed with strong data analytics. Study in this area of artificial intelligence has rapidly influenced the emergence of smart technologies that has a huge impact on our daily lives. The field of science, engineering, business and medicine has become smarter with prediction capabilities to smoothen our lives in our daily activities. The areas employing artificial intelligence has seen an increase in the quality and efficiency which has been illustrated in this paper**

***Index Terms*— Artificial Intelligence(AI), Machine Learning, Artificial Neural Network, Non Player Character (NPC).**

I. Introduction

Machine learning is gradually evolving and is a potential game changer in the history of computing, logical algorithm patterns and design of complex data structures. The growing interest in machine learning, backed with artificial intelligence, influenced by the same factors that had made data mining and Bayesian analysis more popular than ever [1]. It's quite possible to analyze a model which is even bigger, with more complex data capable of delivering faster accurate results at a very large scale.

Models are designed on complex algorithm which would help achieve an adaptable system that would continuously grow intelligent depending on the nature of search hits, human interactions and the response it generates. It is claimed that artificial intelligence is portraying a key role in the research of machine learning and the study of computation makes it possible to perceive reason and act. This helps in emphasizing on perception, reasoning and action. It makes computers both smarter and useful as it works on artificial neural network and mathematical & logical theorems. Machine Learning along with artificial intelligence is more advantageous over natural intelligence as it is consistent, reliable and efficient but not prone to mood swings thus being able to do certain tasks faster and better than the human brain.

II. Areas of Machine Learning

Machine Learning is a fine tuning a system with tunable parameters. It has numerous applications and provides solutions to many real-world problems. Some of the applications include:

1. Face Detection and Recognition - Cameras can detect when someone smiles more accurately now better than it used to before because of advances in machine learning. Similarly because of machine learning, an individual's photo can be identified due to a computer program.

2. Visual Perception - Analyzing and interpreting visual information surrounding us sums up the visual perception of an individual. This has two more sub-categories:

1. Pattern Recognition
2. Scene Analysis

3. Classification - The modeling algorithms used in Machine Learning help in segregating the piece of information received based on the content it has. It is based on training set of data containing observations that leads to classification according to the problem asked for.

4. Adaptive systems - Adapting behavior based on previous experiences and developing rules according to that, refers to adaptive systems. This includes:

1. Cybernetics : communication between automatic control systems .
2. Conceptual clustering : Models of concept formation that increments and clusters according to that.

5. Modeling - To predict the behavior and relationship between real-world objects or entities, set of transformational rules have been written [2].

1. Problem solving systems
2. Hobot world Modeling(Perceptual and Functional Representations)

6. Speech and Image Processing - Deep learning, another subcategory of machine learning plays an integral role in speech recognition and image classification and processing. Machine learning also helps in:

1. Language and Speech understanding
2. Semantic Information Processing
3. Retrieval of information

7. Automation - A combination of most or all of the above abilities with the ability to move over terrain and manipulate objects [3].

1. Transportation
2. Industrial Automation
3. Military
4. AI in Household (Smart Homes)

8. Solving Problems - Ability of planning a solution on the basis of formulation of the given problem .

1. Interactive Problem Solving
2. Heuristic Search
3. Inference

9. Genetics - Clustering algorithms or data mining are used in genetics to help finding genes associated with a particular disease.

10. Anomaly detection - Insider trading in a stock market can be detected; thanks to machine learning. Fraudulent transaction in high volume business can be tracked because of machine learning.

11. Games - Translating the rules into a structure that helps in reaching adequate level of performance.

1. Games like Chess, Bridge.

III. Applications of Artificial Intelligence

I. Artificial Neural Network - ANNs or simply Neural Networks refer to a type of learning model that functions the way synapses works in human brain. While traditional computing is dependent on logic statements to perform tasks, neural networks use nodes (neurons) and edges (synapses) to process the given data [4].

- Series of outputs are generated depending on the inputs run in the background.
- The output generated is then compared to known data.
- The system checks the pathways through the neural network that led to the correct answer. The results become more and more accurate over time.

There are two types of ANN topologies :

1. FeedForward
2. Feedback

1.1 FeedForward ANN

Here the flow of information is unidirectional. A unit sends information to different units but does not receive any information. No feedback loops are present. So they are mostly used in pattern recognition.

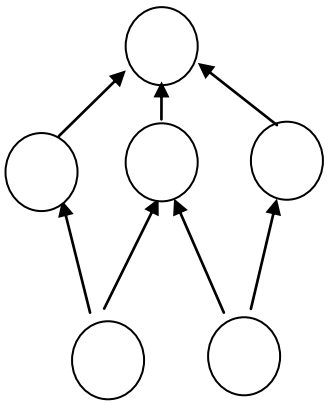

Fig. 1. FeedForward ANN

1.2 FeedBack ANN

Here the feedback loops are allowed; so the flow is not unidirectional. Content addressable memories uses this ANN.

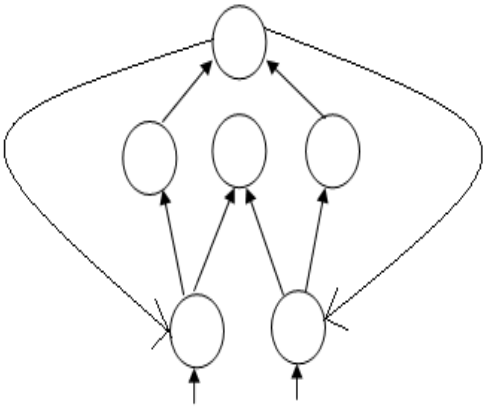

Fig. 2. FeedBack ANN

Neural Networks are mostly helpful in language translation and pattern recognition since it gets a known data to compare the output with.

II. Applications in Medical Sciences - AI in healthcare and medicine could help in planning better treatment for patients and it can also provide more accurate information to the physicians about the patient [5]. Some applications include:

- Usage in genomics and genetics that helps in identifying huge data sets of genetic information about the patient.
- Drug creation using AI takes lesser time than what it could have taken through clinical trials.
- Image recognition and analysis can be now easily done because of AI. Complex images can be automatically interpreted that subsequently helps in MRI scanning.

IV. NON PLAYER CHARACTER (NPC)

Artificial intelligence has a great importance in computer games when a user plays with the computer itself. The system needs to be designed to achieve an adaptive model of networks. A NPC or a non player character is sometimes known as a non-person character which is not controlled by any player.

In order to achieve the important aspects of NPC's personae the following psychological models are used:

- Personality Model: Personality plots across two orthogonal axes introversion-extroversion and neuroticism-stability, allowing the creation of characters with personality types such as aggressive, timid or defensive.

- Mood Model: Moods are measured based on valance and arousal, where valance is referred to a positive or negative mood and arousal refers to the intensity of the mood.

- Relationship Model: This is a technique in which the model plots the relationship between four axes: character liking among each other, physical attraction, dominance or submissiveness and intimacy. This helps in realizing the interest level of a particular character indicating that characters share a number of common subjects of interests and are thus more likely to converse.

Non Player character is based on a "Realistic" & "Reactive" model which has a cognitive thinking capability as per the adaptive algorithm created by the developers matched with the player's thoughts and his inputs made during the time of game-play. The efficient process of decision making is achieved through artificial intelligence controllers in games which are achieved by using a reactive intelligence bound by the underlying relationship with the players and the objects in the gaming world. Relationship modelling finds a key role in the development of the smart algorithm as it is based on several attributes.

The attributes include origin, regularity, strength, polarity and validity. Relationships are usually affected in many ways. Filtered and processed gaming events are one of the direct methods where one entity in the gaming world observes the actions of another, those actions can directly impact the relationships which must be added, updated or removed. Indirect events are triggered through various relationships within the network which are inter-dependent on each other.

V. CHALLENGES

Artificial intelligence is indeed a bright and a stunning future in the field of technology but an insidious threat which might have a serious potential of endangering mankind.

- Avoiding Negative Side Effects: An AI system that would not disturb its own environment while performing its task is one of the most bugging questions. For example a robot cleaning a vase should not knock it off as it can clean faster by doing so.

- Scalable Oversight: To ensure a given AI system that respect aspects of the objective are too expensive to be frequently evaluated during training. For eg: If an AI system gets human feedback during its task operation, the feedback utilization should be done efficiently as re-asking would be too annoying.

- Safe Exploration: It's quite difficult to prevent an AI system to control its own self exploratory movements. For example: May be a cleaning robot should experiment with mopping strategies, but clearly it shouldn't try putting a wet mop in an electrical outlet.

- Replacing humans: As more and more research goes into machine learning, artificial intelligence would gradually become very smarter and self developing on its own. This has a potential to replace humans in almost every dimension and moreover be a serious threat in the job market.

- Self Destruction of Mankind: Scientists and mathematicians feel that when the cognitive sense of thinking over rules the data models, it would result into a serious threat to the existence of mankind.

VI. CONCLUSION

Machine Learning despite many challenges have now a potential to really fast pace itself as significant research is going into it for its development. All round the globe each and every individual would like to have a smart home in a smart city. For this to achieve, most of the technologies that we use need to be automated and reduce human friction as much as possible. These might be one of the few reasons for machine learning backed with artificial intelligence to be one of the hot topics. Sometimes it is felt that artificial intelligence might replace human beings in almost every dimension that we think of but when we realize that it's one of the only solution of bettering our quality of life, we give in to the advantages of AI.

VII. REFERENCES

[1] Jensen, F. V. (1996). An introduction to Bayesian networks (Vol. 210). London: UCL press.

[2] Han, J., &Kamber, M. (2001). Data mining: Concepts and techniques. China Machine Press, 8, 3-6

[3] Bakar, A. A., Othman, Z. A., &Shuib, N. L. M. (2009, October). Building a new taxonomy for data discretization techniques. In Data Mining and Optimization, 2009. DMO'09. 2nd Conference on (pp. 132-140). IEEE.

[4] A. Globerson, S. Roweis, "Metric Learning by Collapsing Classes", *Advances in Neural Information Processing Systems*, 2005.

[5] A. Frome, Y. Singer, J. Malik, Advances in Neural Information Processing Systems 19, 2007.