ARTIFICIAL INTELLIGENCE: PRESENT AND FUTURE

Akshay Nair , Rohitkumar G. Singh
Department of Humanities and Sciences
Thakur College of Engineering and Technology
Kandivali (East), Mumbai - 400 101, India
nairakshays@hotmail.com
rksingh2480@gmail.com

Abstract **:** *Artificial Intelligence is to develop computers/machines that resembles human thinking so as to make it efficient and develop human reasoning and decision making power. This paper examines the features of Artificial Intelligence, introduction, growth, applications, future and social challenges.*

Keywords: Artificial Intelligence, Fuzzy Logic, Gaming, Robotics, Self-driving cars

1. Introduction

Artificial intelligence (AI) deals with development of machines with an ability of human reasoning. Artificial Intelligence is replacing the traditional methods and in near future intelligent machines would take place of current human workers and other machines. It makes machines more smart to solve same problem more accurate if compared with humans which would cause human errors and thus smarter and more useful. Artificial Intelligence is achieved by various modern techniques like neural networks, fuzzy logic, expert systems [1], [2], [3]. Artificial intelligence has its own pros and cons like other revolutions in technology. Some of its advantages are that they are more efficient and leave less room for errors unless if the machine undergo breakdown.

2. History for Foundations of Artificial Intelligence

From Francis Bacon's search technique for his emerging methodology (an approach to concept learning which is now used in modern AI program in Version Space Search) to first calculating machine abacus contributed to early development of intelligent machines. After abacus many computing machines were developed and such another famous machine created by Blaise Pascal 'Pascaline'. The development of computing machines and calculator along with 'Turing Machine' contributed to invention of first computer 'ENIAC', invented by J. Presper Eckert. It occupied large amount of space and weighed about 45-50 tons. With development of semiconductor devices and integrated circuits we now could develop more efficient processors used in computers now. Continuing this revolution now with help of semiconductors and new methods like neural networks and fuzzy logic we are creating Intelligent machines that we now commonly use in our life from air conditioner to washing machines, from driverless car to robots, Artificial Intelligence is changing our way of living [2].

3. Goals of Artificial Intelligence

1. To Create Expert Systems: The systems which exhibit intelligent behaviour, learn, demonstrate, explain, and advice its users.
2. To implement decision making power in computers.

4. Needs for Artificial Intelligence

1. To make computers more efficient.
2. To use computer's artificial intelligence to understand how humans think.
3. To avoid human errors.
4. To do work in more efficient ways.

5. Applications of Artificial intelligence

Artificial Intelligence has its application in day today life like our personal assistants in smartphones like Siri, Cortana also in other areas which include medical, remote sensing, drones and driverless cars. Google driverless cars are being under tested and have few objections in society to implement it. Recently Tesla also undertook same idea like google and is trying to make such car. Many automobile companies like Audi, BMW, Mercedes and so on are under the race of developing the safest driverless cars.

5.1 Self-driving cars

Google recently launched its self-driving car. It is being tested on road and being checked if it is safe to implement on road. The project was renamed and is now called as "Waymo". Recently Tesla is also coming up with the same concept.

5.1.1 Components:

1. **GPS:** Global positioning system(GPS) is used to find out a route from position A to B. It could be linked with goggle maps and helps in real time traffic.

International Journal of Science and Research (IJSR)
www.ijsr.net
Licensed Under Creative Commons Attribution CC BY

2. Collision Detecting systems/Sensors: It is much similar with the collision detecting systems in aircrafts. It helps preventing accident with any other car or obstacle. These includes IR sensors, lasers, LiDAR or also cameras. The output from it is given to main computer in car which then reacts as per the data.

3. Computer: The car contains a computer which helps in control of the entire car. The driver is now replaced with computer. The computer has been coded with long sets of instructions and algorithms depending on various situations.

5.1.2   Issues with Driverless cars

There has been constant upgradation in driverless cars with minimising the crashing possibilities, nearly safer than human errors. But however, there is a risk if the software, one of the sensors, the GPS or the computer itself goes breakdown or malfunctioning. This situation could lead to an accident. We could avoid accidents in such situations by stopping the car if any one of it goes under failure, but that's not the solution. Situations like rain, snowfall risks the safety parameters. Sensors does not remain trustworthy under those situations. Also in snowfalls, the lines of roads disappear which makes it difficult as cars are programmed by street rules, they scan the marking which are now vanished. It could also spoil the comfort level; these cars do not understand whether there is pothole present ahead or not. Also it cannot handle the tough situations. Consider if the car has only three options left in a situation; whether to injure a child in front of lane ahead, or harming a motorcycle, or to strike the car of the nearby pole; which one should be given priority. This is one of the ethical issues.

5.1.3 Future Driverless Cars

Ford has come with a prototype using LiDAR sensors that can even work in extreme weather conditions of rain, snow. The laser is deflected to ground when it hits snow, or raindrops. Then the echo from the ground is recorded and comes to a conclusion that it is the raindrops or snowflakes not an obstacle. With this algorithm Ford car have been successfully driven in several millimetres of rain. And many other automobiles also trying its best to work in such situations. With development of efficient LiDAR sensors and high resolution cameras, the efficiency of such machines could be increased. No algorithm has been created for the problem of that tough situation with those three possibilities. With algorithm working under extreme weather conditions and with efficient sensors and cameras driving autonomously would be safer with the only problem related with the ethics which would be more dangerous if the car was driven by a human. So the self-driving cars are safer. We would achieve in future the roads in which these cars would run.

5.2 Gaming

5.2.1 Development of games with help of AI

Artificial Intelligence is used in games like chess, poker. Tic-tac-toe, here computers makes large no of possible combination of positions. Games require large space and to reduce complexity heuristic technique is used. In video games, artificial intelligence is used to create intelligent behaviors primarily in non-player characters (NPCs), often resembling human-like intelligence. Path finding is another way of finding how a NPC can change its coordinates with respect to the obstacles and by avoiding collisions with the environment and other NPCs [1], [2].

5.2.2 Future possibilities

Games developed till now have generally a NPC which is then mapped in the surrounding. These games are generally controlled by joysticks, consoles or other remotes. With help of 'Virtual Reality' (VR) concepts the player would have a virtual experience of its surrounding. The database building of the surrounding would be easier as compared to present, we could create a virtual environment of the natural surrounding with help of VR cameras, recording in the database and then using the same database for gaming. We could also install the GPS module in those VRs so as to get the location in environment to map it with the virtual environment. We could create jacket, gloves and such wearable things that would be packed with all kinds of pressure sensors, so as to act same in virtual world. The gamer could easily wear these things and there would be no need of joystick. Hence, gamer would be able to experience more realistic environment with help of VR and sensor jackets.

5.3   Artificial Intelligence in Robotics

Robotics is a branch of Artificial Intelligence which is combination of Electrical, Mechanical Engineering, and Computer Science. Robots are used in various domains like medicine, Industry, military, entertainment, space exploration etc. Robots are now manufactured by various companies like Boston Dynamics, Honda, Yaskawa Electric Corporation and many more.

5.3.1 Components of Robots

The basic components of Robots include:

1. **Power Supply:** The robots are powered by batteries, solar power. The batteries are generally rechargeable.
2. **Actuators:** They are implemented to covert energy into movement. The common examples of actuators are electric motors which helps in movement of robots.
3. **Electric Motors:** They are required for rotational movement. This can be of both AC and DC depending upon the use.
4. **Pneumatic Air Muscles:** They are used in robots to resemble like human muscles which have ability to contract or expand. This mechanism works by sucking in air and throwing out
5. **Muscle Wires:** They contract or expand like Pneumatic Air Muscles.

International Journal of Science and Research (IJSR)
www.ijsr.net
Licensed Under Creative Commons Attribution CC BY

Paper ID: NCASH201706   21

6. **Piezoelectric Motors and Ultrasonic Motors:** Best for industrial robots.
7. **Sensors:** They are used to obtain information about the environment. Sensors like vision sensor, tactile sensors are used. Tactile sensors are used to resemble touch receptors provide [4].

5.3.2 Future Ahead

Robots manufactured now looks like a machine with different mechanical and electrical parts. We could now develop robots that now can walk, interact like humans like Honda Asimo or robots resembling like animals for e.g. Cheetah robot by Boston Dynamics. However, they do not exactly look like humans or animals. With development of 3D printing technology, we would be able to create robots looking exactly like humans, depicting all the complex looks like humans with 3D printers. Also we are one step closer in developing emotional intelligence in robots. However, first there is a need in understanding whether to create robots that have emotions. Emotions would be needed in certain situations, like if we want to replace doctors by robots then we have a need in implementing Emotional Intelligence in Robots because it is doctors who deals with psychology of person and makes more confident and comfortable. However, there are situations like to make robots more practical for e.g. like in defense and to work consistently unlike humans that performs as per emotions.

5.3.3 Ethics of Robotics

There is always a fear among humans that if intelligent robots dominate humans. Always with development of technology bring new problems considering this fact Three laws of robotics were put. The Three Laws, quoted as being from the "Handbook of Robotics, 56th Edition, 2058 A.D.", are [5]:

1. A robot may not injure a human being or, through inaction, allow a human being to come to harm.
2. A robot must obey the orders given it by human beings except where such orders would conflict with the First Law.
3. A robot must protect its own existence as long as such protection does not conflict with the First or Second Law

5.4 Shopping

Online shopping has been revolutionary in past ten to fifteen years. With help of graphics interface, and online database management the shopping is now became more simple. However, we could experience the product just by looking at images and reading its review. Therefore, here traditional method would be preferred. But it takes effort to go to shop, add the required things to cart, standing in queue and done with checkouts. What if we experience the convenience like online shopping and the experience of traditional shopping?
How would future shopping be like?
We could implement the convenience of online shopping with traditional experience. With help of Virtual Reality(VR) we could create a virtual shop model which would be connected to online stores presently available. Customer would be required to wear a VR and gloves made of sensors. Customer would experience the traditional shop in VR. A model of shop would be generated in VR. With help of sensor gloves, the product picked by the customer would be experienced in 3D model much better than the images in website. Then the customer would be proceeded for checkout where his mobile wallet or internet banking would be linked with and order would be placed. The delivery would be done with help of drones. Customer's location would be initialized and the drones would do the required delivery. Hence this method of shopping would be more convenient, easier and faster.

5.5 Fuzzy Logic

Fuzzy Logic (FL) is a method of making decisions like human thinking and human arguing or reasoning. Fuzzy logic is used in automobiles and consumer electronics like washing machines, air conditioners, ovens.

5.5.1 Pros of Fuzzy Logic

Fuzzy logic is a simple approach to problem which resembles human intelligence. It is easy to design such model comparing with human decision and thinking. Fuzzy logic has an important advantage that modification is simple. There is no need to change entire algorithm for small changes. It could be done by adding or deleting some rules.

5.5.2 Cons of fuzzy logic

Although it is a simple approach but it is not systematic manner. This method of approach can make some situations more complicated. Hence, it can be implemented and understandable if it is simple.
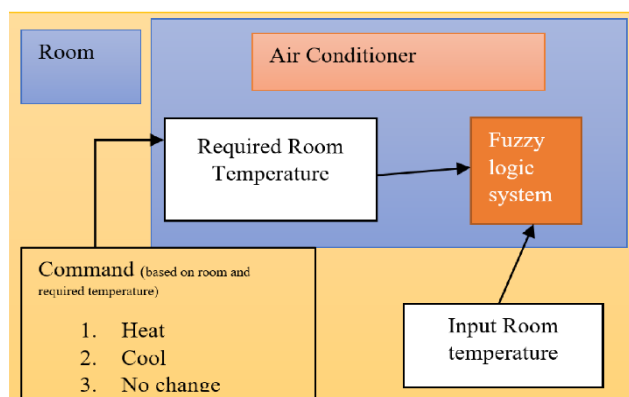
5.5.3 Fuzzy logic in Air conditioner

Figure 1: Fuzzy logic in Air Conditioner

Air Conditioner is good example of Fuzzy logic
Algorithm [4]:
1. Initialize linguistic Variables and terms (start)
2. Create membership functions for them. (start) (Membership function is the range of temperature that lies within a certain parameter, say warm. Two temperatures must be defined for warm region T5-T8. (Refer Figure 2))
3. Construct set of rules (refer Table 1).
4. Convert crisp data into fuzzy data sets using membership functions (fuzzification)

International Journal of Science and Research (IJSR)

5. Evaluate rules in the rule base (inference engine)
6. Combine results from each rule (inference engine)
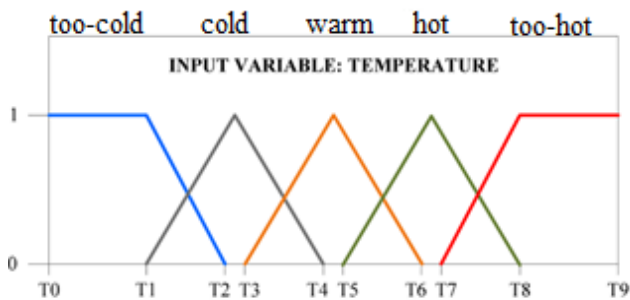7. Convert output data into non-fuzzy values. (defuzzification)

Figure 2: Membership function example

Table 1: Fuzzy Matrix Example

Room Temperature	Desired Temperature				
	Too-cold	Cold	Warm	Hot	Too-hot
Too-cold	No-change	Heat	Heat	Heat	Heat
Cold	Cool	No-change	Heat	Heat	Heat
Warm	Cool	Cool	No-change	Heat	Heat
Hot	Cool	Cool	Cool	No-change	Heat
Too-hot	Cool	Cool	Cool	Cool	No-change

6 Social Challenges

Self-Driving cars, assistants in smart phones, fuzzy logics in air-conditioners, Robotics are improving our way of living and making more comfortable. With new developments in technologies brings new social problems. Artificial Intelligence applications should bring peace rather than any issues.

6.1 Social Issues

6.1.1 Unemployment
With increase in production of efficient robots there is a risk for people to be fired from their jobs as Robots are highly efficient and take more work load than humans. Physical workers may be replaced with robots in near time which can lead to unemployment.

6.1.2 Inequality

With help of robots any company can reject human workers and would prefer robots. This would cause other firms or organisations to do the same to increase their profits at faster rate. Therefore, the companies that use Robots would make more money than others which would lead to inequality [6].

6.1.3 Threat to Privacy

The more powerful a technology becomes, the more can it be used for nefarious reasons as well as good. Any of database even of government can be misused and can lead to privacy issues [6].

6.1.4 Threat to Safety

Robots are being replaced by human soldiers or autonomous weapons. If there occurs a breakdown or if some because of technical issues can lead to dangerous situations in nations' defence [6].

6.2 Pros of Artificial Intelligence
Artificial Intelligence is changing the way of our living. With help of Artificial Intelligence, we can get consistent and efficient performance. Whereas humans lack that ability of perfection. There is always a room for error with respect to humans because of human error or emotions Robots lack emotions which could be considered as an advantage over humans to achieve consistent accuracy. Artificial Intelligence can be used to perform dangerous tasks. For e.g. Robots are sent to explore. Robots supported with high definition cameras are used to capture images of earth and space. In near future, driverless cars would be a common thing on roads. Robotics surgery would help doctors for complex surgery very much easily. Shopping and gaming would be convenient with help of VR

6.3 Cons of Artificial Intelligence

Although, with help of robots we could achieve a greater accuracy but, it would cause a reason for unemployment. Robots would be preferred more over human labourers to maximise profit. There is always a risk of breakdown or malfunction of robots, this could be unreliable, and can cause economic losses. Also the data would be insecure due to data hacking. Lastly, what separates robots from humans is the emotions. Although, robots without emotions might be helpful in industry to achieve greater profits but, humans are attached with each other because of emotions. There is also measures taken to develop "Emotional Intelligence" in robots.

7 Conclusion

Like other technologies, Artificial Intelligence brings its own pros and cons. Artificial Intelligence is being used at larger scale in various fields today. However, we have not achieved like the robots described in science fiction movies but might in near future develop such robots. Future robots would be very much different from present. They design would be created easily with development in 3D printing. Robots completely resembling like human skin and muscles would be replaced by current Pneumatic Air Muscles. Although there are lot of social problems related with AI but if guided properly according to ethics and three laws of robotics can lead a bright future. Driverless cars would dominate on roads. With help of VR and sensors, gaming experience could be changed, no joysticks, no remotes. Traditional and current online method of shopping would be replaced with help of VR and Drones.

International Journal of Science and Research (IJSR)
www.ijsr.net
Licensed Under Creative Commons Attribution CC BY

Paper ID: NCASH201706   23

References

[1] Stuart J. Russell and Peter Norvig, "Artificial Intelligence" A Modern Approach "Second Edition" Pearson Education

[2] George F Luger "Artificial Intelligence" Low Price Edition, Pearson Education, Fourth edition 2001.

[3] https://en.wikipedia.org/wiki/Artificial_intelligence

[4] https://www.tutorialspoint.com/artificial_intelligence/artificial_intelligence_tutorial.pdf

[5] https://en.wikipedia.org/wiki/Three_Laws_of_Ro botics

[6] http://www.webopedia.com/TERM/A/artificial_intelligence.html

International Journal of Science and Research (IJSR)
www.ijsr.net
Licensed Under Creative Commons Attribution CC BY

Paper ID: NCASH201706   24