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# NOVEL TRENDS OF ARTIFICIAL INTELLIGENCE

**Shraddha Pattewar*, R. V. Sugave[1], Dr. S. S. Thonte, Mayuri Chandrawanshi and Rohini Bhalekar**

Channabasweshwar Pharmacy College, Kava Road, Latur, Maharashtra.

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***Corresponding Author**
**Shraddha Pattewar**
Channabasweshwar Pharmacy College, Kava Road, Latur, Maharashtra.

## ABSTRACT

AI is digital technology most valuable to companies that tackle to independent and enhance their human workforce. In the current situation AI plays vital role in various fields such as medicine, robotics, etc. A robot is a reprogrammable, an automatically controlled, multipurpose, manipulator programmable in three or more axes, which may be either fixed in place or mobile for use in industrial automation applications. Innovative educational technologies have started to open new ways of interacting with students with special educational needs (SEN). Hence, a need for introducing AI techniques arises in order to develop both diagnosis and intervention processes. Neural network concepts, like so many important advances in AI. Neural networks have a number of other potentially important medical applications, such as modeling the brain and nervous system functions, speech analysis and synthesis, X-ray and bacterial culture screening (for recognition of special types of disease patterns), patient monitoring, as control units for prosthetic devices, automatic diagnostic systems and the dynamic solution of complex allocation and routine problems in drug dosage administration, hospital resource allocation, and health care service.

**KEYWORDS:** Artificial Intelligence, Robotics, Fuzzy Logic, neural networks.

## INTRODUCTION

Artificial intelligence mention to the ability of a computer or a computer-allow robotic system to process information and produce outcomes in a manner similar to the thought process of humans in learning, decision making and solving problems. By addition, the goal of AI systems is to develop systems ability to solve complex problems in ways similar to human logic and reasoning.[1] Artificial Intelligence is the science and engineering of making

intelligent machines, especially intelligent computer programs. AI used in biomedical applications diagnosis of various diseases like lung cancer, also used in the diagnosis of acute leukemia and pancreatic cancer. AI technology used in future application and development of AI their industries. As a part of research, 10 industries were surveyed- Retail fast moving consumer goods, Utilities, Financial service, Healthcare, Pharmaceuticals, and Life sciences, Manufacturing, Automotive and Public sector. In Pharmaceutical field identify that these technologies can add important value to research and development, making it more efficient and improving success at the early stages of drug development. Applying more data strategies to better information decision making can help optimizing innovation and improving efficacy of research and clinical trials, build new tools for physicians, consumers, insurers and regulators. For Eg. The MIT clinical machine effective and understanding the working of Diabetes and designing more precise and effective treatments for diabetes mellitus 2. They can also characterize MRI images of brain tumours ultrasound images of the breast, ultrasound. Fuzzy logic controllers have been designed for the administration of vasodilators in the peri-operative period to control blood pressure. Effectively utilizing big data will help pharmaceutical companies better identify new potential drug candidate and develop them into effective, approved and reimbursed medicine more quickly. Predictive analytics can work with much bigger and more varied data, including that sourced from social media and hospital visit, and combine it genetic information to identify the most suitable candidates for clinical trials. This would make the trials more focused, besides reducing their cost and lead time. A little over 40 percentages of the respondents say they have experienced cost savings and productivity improvement by using AI.

**AI for better treatment and outcome**

Improving the experience of customers or patients say 48 percent of the respondents, and identifying their new needs 35 percent are two of the top three strategic priorities of pharmaceutical and life sciences organizations over the next three years. Complete cures and saved lives are important determinants of experience, and AI is contributing to both. Detecting this deadly cancer early before it progresses to the lymph node makes all the difference, taking survival rates to 98 persent from an abysmal 16 persent. Today, the Translational genomics Research institutes center for Rare Childhood Disorders in the U. S. is running extremely complex algorithms to analyse massive quantities of genetic and molecular data to diagnose medical condition and develop personalized treatments. And

google brain is working on detecting diabetic retinopathy early so that blindness may be prevented.

**AI for new products and services**

43 persent the respondents say developing new products and services is a top strategic priority in the next three years. Here AI and robotic process automation and improving drug development to enable pharmaceutical companies to launch products faster and earn a better return on investment. AI can identify one for a drug with 55 percent accuracy.

**AI for efficiency and other advantages**

The combined pharmaceuticals and life sciences industry is the most mature in AI adaption. 90 percent of the respondents agree that AI is fundamental to the success of their company's strategy. AI improving efficiency in pharmaceutical field. The application of artificial intelligence (AI) techniques to medical problems has been a goal of computing since the development of high-speed digital computers. In the 1970s, medical artificial intelligence (MAI) was responsible for the highly successful MYCIN program, the very first expert system.[2] In the 1980s, the rapid proliferation of AI technology, combined with the greater availability of computers in the medical environment, led to an increasing number of medical expert systems, such as PUFF, CADUCEUS and INTERNIST.[3] As in the business world, expert systems in medicine validated themselves when compared against human "experts".[4] For the first time, AI began to play a role in medical education as well.[5] Conspicuously absent on the MAI scene, however, is a firm sense of priority and direction for the development of new applications, and a sound program for their implementation into the mainstream of medicine. It is the goal of this paper to suggest, from a clinician's viewpoint, directions and priorities for the next decade of MAI applications, and suggest a mechanism to implement them.

**Neural Networks in Medical Applications**

Neural networks (also called parallel distributed processors, neurocomputing, connectionist models and artificial neural systems) are one of the fastest growing and most innovative areas of computing. Neural networks represent an attempt to simulate biological information processing through massively parallel, highly-interconnected processing systems. Neural networks offer the potential for solving complex, non-deterministic problems at very high speeds, the ability to recognize complex patterns, and the capability of rapidly storing and retrieving very large amounts of information. Neurocomputing has received considerable

attention from the U.S. Department of Defense in a number of application areas, including data fusion (the rapid analysis of data from several different and diverse sources normally from a variety of electromagnetic sensors), decision assistance, signal processing and intelligence gathering. Neural networks also have a number of important commercial applications, such as the dynamic solution of routing problems, image and handwriting recognition, systems modeling, speech generation, robot control and expert less expert systems.[6,7] Several of these applications are also of interest in medicine.

**Types of intelligence[8,9]**

1. Assisted intelligent
2. Augumented intelligence
3. Autonomous intelligence

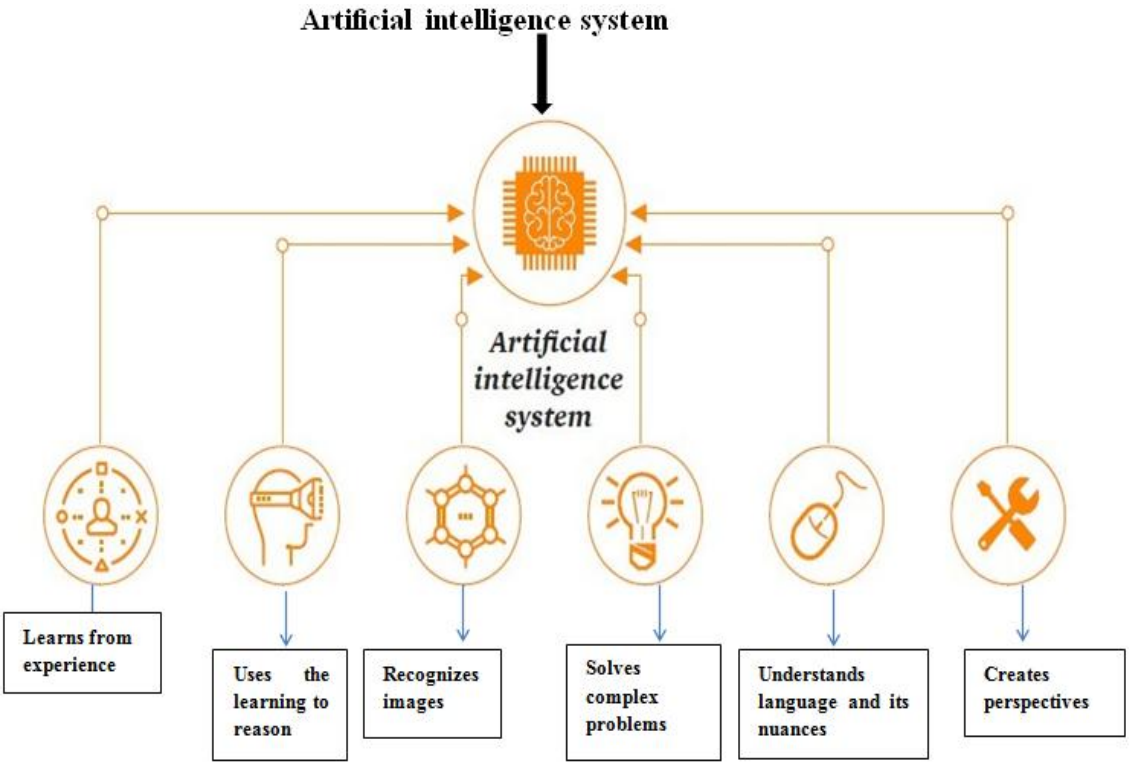



**Fig. 1: Artificial intelligence system.**

1. **Assisted intelligence:** Humans and machines learn from each other and redefine the distance of what they do together. Under these situations, the human and the machine share the decision rights.

**Fig. 2: Assisted intelligence.**

2. **Augmented intelligence:** Enhancing human ability to do the same tasks faster or better. Humans still make some of the key decisions, but AI carry out the tasks on their group. The decision rights are only with humans.

**Fig. 3: Augmented intelligence.**

3. **Autonomous intelligence:** Adaptive/continuous systems that take over decision making in some cases. But they will do so only after the human decision maker starts trusting the machine or becomes a responsibility for fast transactions. In this type of intelligence, the decision rights are with the machine and hence it is fundamentally different from assisted intelligence.

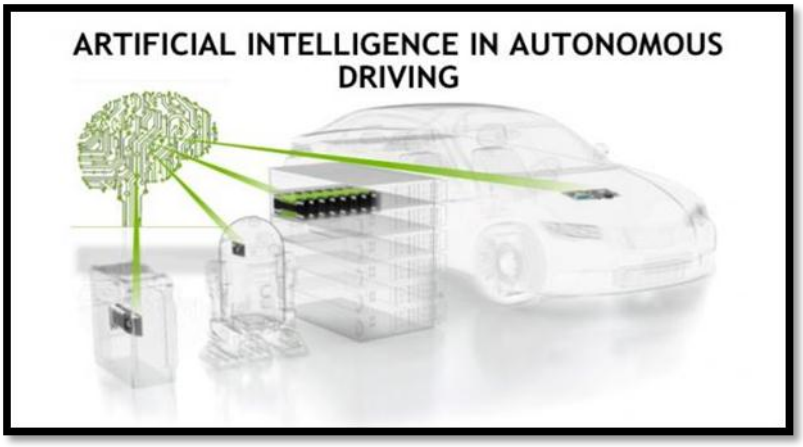



**Fig. 4: Autonomous intelligence.**

**Objectives**

- To identify the potential of AI-based technologies in assisting the medical personnel.
- Learn the methods solving problems using Artificial intelligence
- Introduce the concept of expert system & machine learning
- To recognize the type of diseases that can be diagnosed, treated or predicted with the assistance of AI tools.
- To approximate further growth and future prospects of AI in the health-care industry.

**Areas of AI and Some Dependencies**


❖ **Advantages of artificial intelligence**[10]

- **Error reduction**

Artificial intelligence helps us in reducing the error and the chance of reaching accuracy with a greater degree of precision is a possibility. It is applied in various studies such as observation of space. Intelligent robots are supply with information and are sent to explore space. Since they are machines with metal bodies, they are more resistant and have greater ability to undergo the space and aggressive atmosphere. They are created and adjusted in

such a way that they cannot be modified or get disfigured or breakdown in the opposed environment.

- **Difficult exploration**

Artificial intelligence and the science of robotics can be put to use in mining and other fuel exploration processes. Not only that, these complex machines can be used for exploring the ocean floor and hence overcoming the human limitations. Due to the programming of the robots, they can perform more laborious and hard work with greater responsibility. Moreover they do not wear out easily.

- **Daily Application**

Computed methods for automated reasoning, learning and perception have become a common phenomenon in our everyday lives. Smartphone in an apt and every day is an example of the how we use artificial intelligence. In utilities, we find that they can predict what we are going to type and correct the human errors in spelling. That is machine intelligence at work. When we take a picture, the artificial intelligence algorithm identifies and detects the person's face and tags the individuals when we are posting our photographs on the social media sites. Artificial Intelligence is widely employed by financial institutions and banking institutions to organize and manage data. Detection of fraud uses artificial intelligence in a smart card based system.

- **Digital Assistants**

Highly advanced organizations use manifestation which is replicas or digital assistants who can actually interact with the users, thus saving the need of human resources. For artificial thinkers, emotions come in the way of rational thinking and are not a distraction at all. The complete absence of the emotional side makes the robots think logically and take the right program decisions. Emotions are associated with moods that can cloud judgment and affect human efficiency. This is completely ruled out for machine intelligence.

- **Repetitive Jobs**

Repetitive jobs which are unvarying in nature can be carried out with the help of machine intelligence. Machines think faster than humans and can be put to multi-tasking. Machine intelligence can be employed to carry out dangerous tasks. Their parameters, unlike humans, can be adjusted. Their speed and time are calculation based parameters only. When humans play a computer game or run a computer-controlled robot.

- **Medical Applications**

In the medical field also, we will find the wide application of AI. Doctors estimate the patients and their health risks with the help of artificial machine intelligence. It educates them about the side effects of various medicines. Medical professionals are often trained with the artificial surgery simulators. It finds a great application in detecting and monitoring neurological disorders as it can simulate the brain functions.

- **No Breaks**

Machines, unlike humans, do not require frequent breaks and refreshments. They are programmed for long hours and can continuously perform without getting bored or distracted or even tired.

❖ **Disadvantages of Artificial Intelligence**

**Robots Superseding Humans**

There is a fear of robots superseding humans. Ideally, human beings should continue to be the masters of machines. However, if things turn the other way round, the world will turn.

**Unemployment**

If robots begin to replace humans in every field, it will eventually lead to unemployment. Thinking machines will govern all the fields and populate the positions that humans occupy, leaving thousands of people jobless.

**Cost incurred in Management and Repair**

Programs need to be updated to suit the changing requirements, and machines need to be made smarter. In case of a breakdown, the cost of repair may be very high. Procedures to restore lost code or data may be time-consuming and costly.

**Abilities of Human may diminish**

With the heavy application of artificial intelligence, humans may become overly dependent on machines, losing their mental capacities.

**Wrong Hands**

If the control of machines goes in the wrong hands, it may cause destruction. Machines won't think before acting. Thus, they may be programmed to do the wrong things, or for mass destruction.

❖ **Applications of artificial intelligence**[11,12]

**A) Artificial Intelligence in Medicine**

**1. Fuzzy Expert Systems in Medicine (Diagnosis of various diseases)**

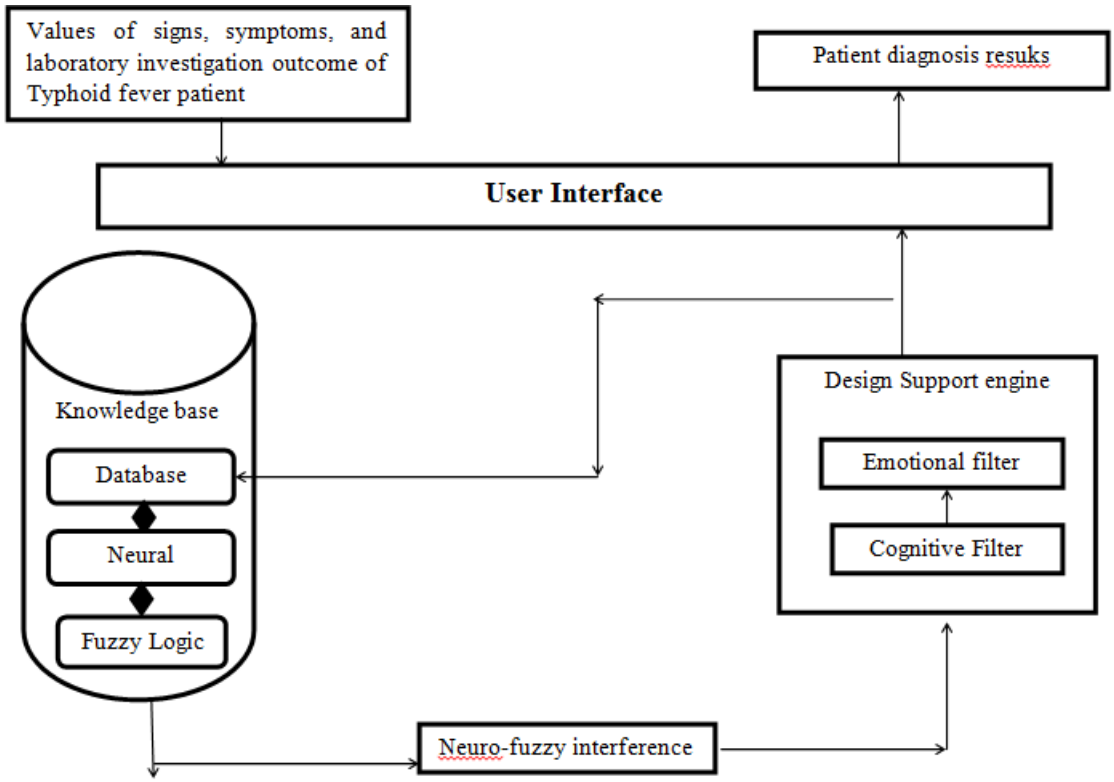
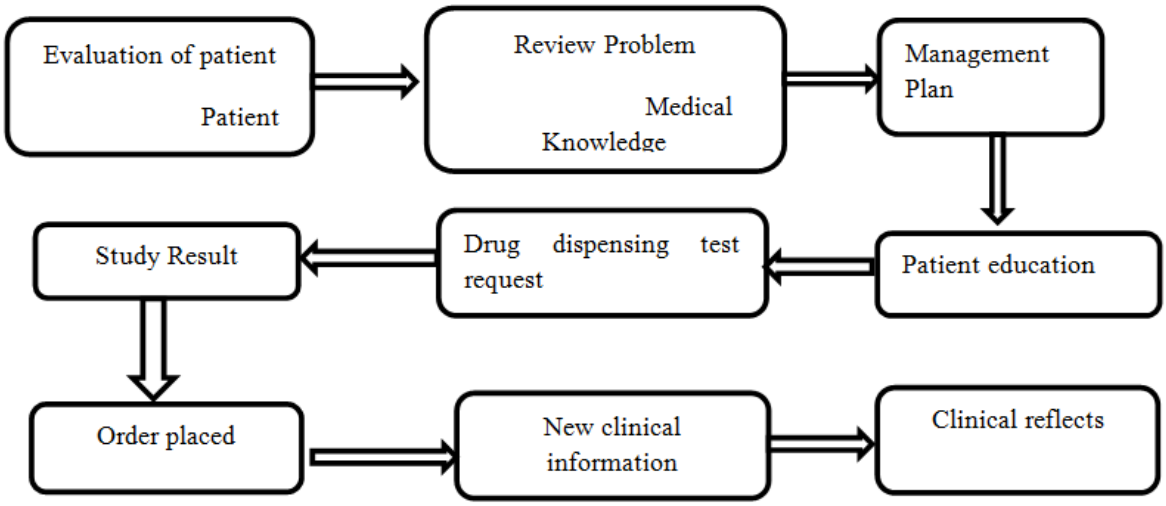



**Fig. 5: Fuzzy expert system.**

**2. Evolutionary Computation in Medicine:** Evolutionary computation is the general term for several computational techniques based on natural evolution process that imitates the mechanism of natural selection and survival of the fittest in solving real-world problems. The most widely used form of evolutionary computation for medical applications are Genetic Algorithms. The principles of Genetic algorithms have been used to predict outcome in critically ill patients. MRI segmentation of brain tumours to measure the efficacy of treatment strategies is also done through evolutionary computation.

**Fig. 6: MRI Scan machine.**

**3. Using Artificial Intelligence to Improve Hospital Inpatient Care: Clinical decision support systems (CDSS)**




**B) Artificial Intelligence Approaches for Medical Image Classification:** Artificial intelligence techniques are used for diagnostic sciences in biomedical image classification. Model-based intelligent analysis and decision-support tools are important in medical imaging for computer-assisted diagnosis and evaluation. CAD helps radiologist who uses the output from a computerized analysis of medical images as a second opinion in detecting lesions, assessing extent of disease, and improving the accuracy and consistency of radiological diagnosis to reduce the rate of false negative cases.

**Fig. 7: Radiological Dignosis.**

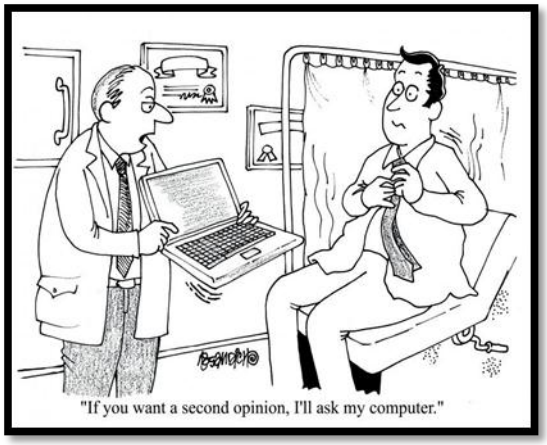



**Fig. 8: Computr assisted dignosis.**

**1. Artificial Neural Networks Approach on Diagnostic Science:** The following subsections will discuss how ANN is utilized for image classification over generations.

**2. Endoscopic Images:** Image classification is an important step in CAD. In classification of endoscopic images a hybrid implementation by advanced fuzzy inference neural network which combines fuzzy systems and Radial Basis Function (RBF) was proposed. The concept of fusion of multiple classifiers dedicated to specific feature parameters with an accuracy of 94.28% but RBF was characterized by a very fast training rate than fuzzy. It extracted both texture and statistical features.[13]

**3. MRI Brain Tumor Analysis** For the MRI brain tumour images a general regression neural network (GRNN) based automatic three dimensional classification method was proposed. This method had good time consuming rate and classification accuracy. Another intelligent classification technique proposed was Least Squares Support Vector Machines (LS-SVM). It identifies normal and abnormal slices of brain MRI data. This technique had a higher accuracy of classification over other classifiers as the false negative in LS-SVM was very low compared. Due to automatic defects detection in MR images of brain, extensive research is being performed.

**In future technology of Artificial intelligence in Healthcare system**

**Fig. 9: The future of Cardiology.**

This is why an AI-driven application is able to out-perform dermatologists at correctly classifying suspect skin lesions or why AI is being trusted with tasks where experts often disagree, such as identifying pulmonary tuberculosis on chest radiographs.[14] Although AI is a broad field, this article focuses exclusively on ML techniques because of their all over usage in important clinical applications.

**AI excels at well-defined tasks**

Research has focused on tasks where AI is able to effectively demonstrate its performance in relation to a human doctor. Generally, these tasks have clearly defined inputs and a binary output that is easily validated. In classifying suspicious skin lesions, the input is a digital photograph and the output is a simple binary classification: benign or malignant. Under these conditions, researchers simply had to demonstrate that AI had superior sensitivity and specificity than dermatologists when classifying previously unseen photographs of biopsy-validated lesions.[15]

**AI supports poorly resourced services**

A single AI system is able to support a large population and therefore it is ideally suited to situations where human expertise is a short resource. In many TB-prevalent countries there is a lack of radiological expertise at remote centres. Using AI, radiographs uploaded from these centres could be interpreted by a single central system; a recent study shows that AI correctly diagnoses pulmonary TB with a sensitivity of 95% and specificity of 100%. Furthermore, under-resourced tasks where patients are experiencing unsatisfactory waiting times are also attractive to AI in the form of triage systems.[16]

**Future Possibilities in General Practice**

- AI will extract important information from a patient's electronic footprint.
- At first this will save time and improve efficiency but following adequate testing it will also directly guide patient management.
- Take the example of a consultation with a patient with type 2 diabetes; currently a clinician spends significant time reading outpatient letters, checking blood tests, and finding clinical guidelines from a number of disconnected systems.
- In contrast, AI could automatically prepare the most important risks and actions given the patient's clinical record.
- It could also automatically convert recorded dialogue of the consultation into a summary letter for the clinician to approve or modify.
- As these systems become better validated, they will be given more responsibility. For the patient with type 2 diabetes, the threshold of statin commencement could be determined by AI on an individualized basis given difficult of the patient's history rather than a rigidly defined 'one-size-fits-all' algorithm.
- The research required for this personalized medicine would only be possible through AI intelligently summarising enormous quantities of medical information. Furthermore, because AI is able to simultaneously monitor millions of inputs, it will have a significant role in preventative medicine.
- AI could proactively suggest consultations when it determines that the patient's risk of developing a particular diabetic complication warrants intervention. In contrast, it would be impractical to task a human being with the responsibility of closely monitoring every test result and appointment of every diabetic patient in a practice in real time.
- AI-based systems will also bring specialist diagnostic expertise into primary care.
- Patients identified as low risk would receive instant reassurance while high-risk patients would experience lower referral waiting times because clinics would only be receiving selected cases.
- This concept is not limited to skin lesions, AI has shown potential in interpreting many different types of image data including retinal scans, radiographs, and ultrasound.[17]
- Many of these images can be captured with relatively inexpensive and widely available equipment.
- Future AI research should be directed towards carefully selected tasks that broadly align with the trends outlined in this article.

- Integrating these systems into clinical practice necessitates building a mutually beneficial relationship between AI and clinicians, where AI offers clinicians greater efficiency or cost-effectiveness and clinicians offer AI the essential clinical exposure it needs to learn complex clinical case management.
- Throughout the process it will be critical to ensure that AI does not obscure the human face of medicine because the biggest impediment to AI's widespread adoption will be the public's hesitation to embrace an increasingly controversial technology.[18]

**The challenges of the AI field**

**Expert system**

The third aspect of AI discussed here is expert system. An expert system is computer software that can solve a narrowly defined set of problems using information and reasoning techniques normally associated with a human expert. It could also be viewed as a computer system that performs at or near the level of a human expert in a particular field of endeavor.

**Natural language understanding**

Natural language generation (NLG) systems are computer software systems that produce texts in English and other human languages, often from non-linguistic input data. NLG systems, like most AI systems, need substantial amounts of knowledge that is difficult to acquire. In general terms, these problems were due to the complexity, novelty, and poorly understood nature of the tasks the systems attempted, and were worsened by the fact that people write so differently.

**Knowledge representation (KR)**

Knowledge bases are used to model application domains and to facilitate access to stored information. Research on KR originally concentrated around formalisms that are typically tuned to deal with relatively small knowledge base, but provide powerful reasoning services, and are highly expressive.

❖ **Robotics**

A Robot is an electro-mechanical device that can by programmed to perform manual tasks or reprogrammable multifunctional manipulator designed to move materials, parts, tools, or specialized device through variable programmed motions for performance of variety of task.

- **Automatic programming**

Automatic programming is the generation of programs by computer, usually based on specifications that are higher- level and easier for humans to specify than ordinary programming languages.

- **Future of AI**

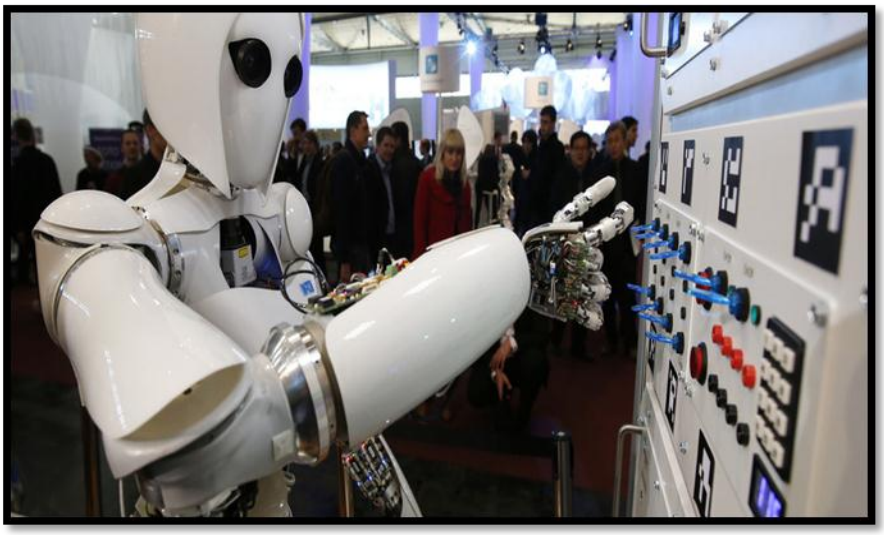


**Fig: 10 Future training of AI.**

**Two different kind of AI**

1. Positive
2. Negative

**1. Positive imagination of future**

**Fig. 11: Positive imagination of AI.**

**2. Negative imagination of future**

**Fig. 12: Negative imaginations.**

It may end in other way too. Some day there will be a knock at our door as we open it, we will see a large number of robots marching into our house destroying everything we own and looting us.

❖ **Advantages of Robotics**[19]

1. Robots can carry out simple and repetitive work for human beings.
2. Robots do not take rest and so can work continuously for a longer period. The productivity is raised.
3. They can be used in assembly work with high precision and density. The quality of products is enhanced.
4. Robots can replace workers without laboring cost, and robots can achieve stable production rate as robots will not be late to work, resign, take day off or strike.
5. The program can be modified easily so robots can increase the flexibility in manufacturing.
6. They can work in unfavourable circumstances, e.g. removing the high-temperature artifact from a casting machine, welding task, spraying task, transportation of chemicals, etc., such work will affect the health of the workers.
7. The manufacturing speed can be increased and the cost be reduced when robots are used.
8. Using robots may minimize the wasting of materials.
9. Using robots can improve the quality of a product by its ability to assemble precise components.

❖ **Applications of Robotics in Pharmaceutical industry[20]**

**1. Research and Development (R&D)**

Robots now also play an essential role in the development of new drugs. In high throughput screening (H.T.S.) for instance, millions of compounds are tested to determine which could become new drugs. There is a need for the use of robotics to test these millions of compounds. The use of robotics can speed this process up significantly, just as they can any other process where a robot replaces a person completing any repetitive task.

**2. Control Systems**

Most robots have onboard controllers that communicate with other machines' programmable logic controllers (PLCs) or with personal computers (PCs) networked to the line. Robot controller is an industrial VME bus controller that connects to PCs for networking and for graphical user interfaces.

**3. Vision Systems**

A vision system provides a valuable tool for determining the accuracy of text and graphics in pharmaceutical and medical packaging. The chief benefit offered by adding a robot to the vision system is speed. It inspect insert in less than two minutes. The same inspection performed by one operator and checked by a second operator could take from 30 minutes to an hour.

**4. Sterilization and Clean Rooms**

Robotics can be adapted to work in aseptic environments. Clean room robots have features that protect the sterile environment from potential contamination. These features include low flake coatings on the robotic arm, stainless steel fasteners, special seal materials, and enclosed cables. Clean room robots reduce costs by automating the inspection, picking and placing, or loading and unloading of process tools. Benefits of robot use in the clean room include:

- Robots reduce fragment by minimizing mishandled or dropped parts caused by contamination.
- Robots reduce the use of clean room consumables such as bunny suits.
- Robots reduce the amount of costly clean room space by eliminating Passage and access ways typically required for human clean room workers.

**5. Flexible Feeding**

Robots are also better than hard automation at flexible feeding, a task that involves handling multiple types of products or packages whose orientation always varies. Traditionally, packaging lines have used high-speed, automated bowl feeders that vibrate parts and feed them to fillers, labelers, or product-transfer mechanisms. Bowl feeders, however, can't always handle a variety of products at once, and their vibration can damage fragile parts.

**6. Packaging Operations**

Packaging processes, like other pharmaceutical operations, benefit from the speed and repeatability that automation brings. Robotics in particular provides flexibility and accuracy. In some packaging applications such as carton loading, robotics also performs more efficiently than dedicated machines. Pharmaceutical packaging machines are often custom designed to handle specific product configurations such as vials.

## CONCLUSION

The way of Artificial intelligence in medicine and diagnosis of various diseases such as diabetes mellitus2, cancer, leukemia. It will identify many aspects of pharmaceutical and life science business, but will neither cure disease nor replace doctors. Improving the experience of patient and AI allowing for more objective diagnosis and treatments. While some human intervention may be essential at times, Basic advantages of AI strong data analysis make a significant impact on health outcome. AI is machine doing work like as human brain. It can help human being to identify the disease condition much faster, understanding the purpose of AI which to build human ability and achievement. Artificial Intelligence techniques have successfully been applied to solve problems in the field of special education. The identification of students with learning difficulties using AI techniques can provide us a valid and accurate diagnosis which later can help us choose the most appropriate intervention method which will be the revolution in the field of medicine and Pharmaceutical sciences in future.

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