Artificial intelligence application development, complexity assessment and envisaging the process difficulties.

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**Abstract**

There is a big boom of Ai based software development all across the world.AI with machine learning as these have been research out in its newest forms are providing wonderful results in the forms of accuracies and other performance parameters which were never available in past times. Natural language processing, deep learning and other techniques are revolutionizing the application software worlds as per their inherent characteristics. The growth of industry is very fast and some form of organization and engineering is required to face this rapid growth which is happening and surfacing some challenges. In our work we have proposed and adverted a complexity assessment tool which can tell way before about the complexity of the AI project being undertaken. It will also tell about the process level difficulties which may come on the way of developers while developing such applications we have also attempted to recommend some remedial solutions to overcome specific difficulties likely to be faced. This work we believe will facilitate this growing industry in developing the software in much comfortable and organized way and will bring many benefits on project and process

Performance metrics.

**Keywords Artificial** Intelligence, Applications, Complexity, Program difficulties.

1. Introduction to Artificial Intelligence

Artificial intelligence (AI) is defined as intelligence exhibited by an artificial entity to solve complex problems and such a system is generally assumed to be a computer or machine with the help of AI software and computer can easily performs some task which currently humans are doing. This is currently temporary as it excludes some major area like problems and complexity that can be solved by computer or people so with the help of artificial intelligence through neural network we can easily find out the complex problems. AI is a field of research that bound Analytical techniques for performing some task, that is require for understanding when performed by people, The ideal specific of artificial intelligence is its ability to justify and take a proper decision that is beneficial in achieving a best result ,A division or subset of artificial intelligence is [machine learning](https://www.investopedia.com/terms/m/machine-learning.asp), through which easily understand the concept and automatically change the data according to requirement. Nowadays everywhere AI techniques are using whether it is related to software, healthcare, agriculture in any fields, it can be widely used and AI technique is a way that moves knowledge. This paper represents review of artificial intelligence applying to find out software complexity. AI is an combination of computer science and tries to resolve the difficult problems in very less time. Intelligence is the ability to think to imagine creating memorizing and understanding, recognizing patterns, making choices adapting to change and learn from experience.

Artificial intelligence is a technology that uses human cognitive processes and key AI elements for in-depth learning, artificial neural network, feature Engineering, AI programs include planning, learning, consultation, problem solving and decision making. Artificial intelligence (AI) refers to the simulation of human intelligence in machines designed to think like humans and imitate their actions. The term can also be applied to any machine that displays features that are relevant to the human mind such as learning and solving problems. Artificial intelligence means imitating human ingenuity in machines. The objectives of artificial intelligence include learning, consultation, and vision. AI is used in a variety of industries including finance and health care.

2. Examples of AI

Manufacturing robots

Smart assistants

Proactive healthcare management

Disease mapping

Automated financial investing

Virtual travel booking agent

Social media monitoring

Inter-team chat tool

### 3. [Challenges in AI](https://www.upgrad.com/blog/top-challenges-in-artificial-intelligence/#Top_Common_Challenges_in_AI)

**3.1 Confidence Building.**

The challenge in this is people don’t know how to take decision and how it is done and then people not feel comfortable .The problem with AI is that it is like a black box for people. People don’t feel comfortable when they don’t understand how the decision was made. For instance every basic and simple maths and formulas are used for algorithms to perform and calculate output from given input. people don’t have trust on AI and the only way seems to this trouble to tell people that this technology is the way for better and fast results on the bases of predictions that are more appropriate and accurate. With the help of Artificial Intelligence a part of the order shows people have the rights to think to ask about their decisions which they have taken.

**3.2 Resolve the exact Data Set**

AI systems are developed by good quality data and with this correct data start the implementation of AI. It is actually very hard to decide that which data we need to use for improving the correct decision and better learning selection of right data is very important. For this purpose it is always good to take advice and always be in touch with the expert for better and desired result.

**3.3 AI Integration into Existing Systems**

Introducing AI into old business or an existing business system is very challenging task for most of the businesses, when trying to introduced AI it is very challenging also because in business proper implementation of AI required solution providers having extensive expertise and experience in the field of AI, from conception to deployment. Use of AI to enhance the usability of systems also identifies the problems for which we can integrate AI for getting better results and idea. Most of the businesses now days are fully working on AI based technologies ,the production and The function of business intelligence are depended on mathematical and decision taking work related to AI algorithms .as AI have a very clear idea that how AI based technologies will work and get the proper output. Once AI-based algorithms created you will come to know that continuous sessions of ML or AI models require manpower which is very for the business.

### 3.4 [Limited Knowledge](https://www.upgrad.com/blog/top-challenges-in-artificial-intelligence/#3_Limited_Knowledge)

We can use Artificial Intelligence at many places in business, agriculture, in technologies, Expert system and so on in a better way to the established systems. The real challenge is the knowledge of Artificial Intelligence. Apart from technology enthusiasts, very few people are aware with the potential of AI.

For example, there are many Small and Medium businesswhich actually want to increase their performance and want to manage their resources and mange their business online like product purchase selling finance related things just to know and understand the behavior of customer how they react with service providers, they are learning and gaining new ideas and implementation process to implement their business online

###  [3.5 Human-level](https://www.upgrad.com/blog/top-challenges-in-artificial-intelligence/#4_Human-level)

### This is one of the most important challenges to AI, which has kept researchers at the forefront of AI activities in any startup. These businesses can boast of more than 90% accuracy, but people can do better in all of these situations. For example, let our model predict that the image is a cat or a dog. One can predict the correct output almost always, eliminating an astonishing accuracy of more than 99%. For an in-depth learning model to perform the same task would require unprecedented money, the use of a hyper parameter, a large database, and a well-defined and accurate algorithm, as well as great computer power, uninterrupted training in train data and testing data testing. That sounds like a lot of work, and actually a hundred times harder than it sounds Another way to avoid doing all the hard work is to use a service provider, as they are able to train in-depth learning models using pre-trained models. . They are trained in millions of photography and are well-organized with high accuracy, but the real problem is that they continue to show flaws and will struggle hard to achieve human performance.

### [3.6](https://www.upgrad.com/blog/top-challenges-in-artificial-intelligence/#5_Data_Privacy_and_Security) Processing Unstructured Data

Scattered data have huge value for a business, but many companies are not able to submit useful awareness because it can’t be think with standard systems. The data cannot be stored in Relational Database Management System (RDBMS) that’s why it is very tough to perform and analyze it. Scattered data includes web content, video audio files, pictures and texts. It is very important for business to show strong and logical decision because in AI and ML data which is unstructured can be break in some parts and then perform and analyze some specific task for better results. If data will not be up to the mark or not good enough than results will be very bad because AI work on high quality of data. As we are working with big data world organizations are storing and increasing levels and amount of data but sometime data is not up to the mark so we are using AI marketing strategies for it.

**3.7 AI Integration with Cloud**

Cloud solutions also needed in current society. Cloud reduces the burden of keeping data and files on device. Instead, it allows you to store them in an online pool or data center, or better known as "clouds". The combination of AI into cloud solutions will make system production much faster as it can bypass and handle large amounts of data in the cloud. This, in turn, allows the system to focus on more important tasks. On a larger scale, the power of AI works in the computer cloud business to enable organizations to operate efficiently, strategically and efficiently. Cloud computing gives businesses more flexibility, speed, and cost savings by managing data and applications in the cloud. The power of artificial intelligence is now computerized and helps organization manage their data, search for patterns and insights into information, deliver customer experience, and improve workflow. A great percentage of that value will emerge as the power of artificial intelligence using cloud-and, and, as cloud computing acts as an engine to maximize the size and impact AI can have on the big market.

**4. Applications of AI**

The applications for artificial intelligence are so many. The technology are using in various sectors and industries like in education, artificial creativity process automation in healthcare ,business, social media, tourism ,robotics, facial recognition and so on.

4.1 **AI in Agriculture**

In Agriculture field so many various sources requires like manpower, financial stability, and time for better output. According to present scenario agriculture is becoming integral, and AI is turn up in this field. Agriculture is using AI as agriculture robotics, solid and crop monitoring, forward looking analysis. In agriculture for farmers AI is very useful various techniques now days are using in this field. As we all are aware that world population is increasing with this cause recourses and land water are not that much sufficient for agriculture work so just to overcome this we need to use and follow a smart approach to farm and can be more productive. With the help of AI approach we can work smartly.

It also saves excess water, pesticides, maintains soil fertility and herbicides, and contributes to the efficient use of human energy and increases productivity and improves quality. AI has the ability to deliver the much-needed solution.AI-based technological solutions have allowed farmers to produce more products with fewer inputs and improve yields, and ensure faster purchasing of produce. The various ways in which AI has contributed to the agricultural sector.

**4.2 AI in education**

AI has the potential to expand both learning and teaching, helping the education sector to develop for the benefit of students and teachers alike. AI can help students achieve this goal by simplifying the learning process. By providing access to appropriate courses, improving teacher communication and freeing up more time to focus on other aspects of life, AI can make a significant impact on students ’academic journey.AI can adapt to each learner's level of knowledge, learning speed and desired goals to get the most out of their education. Also, AI-enabled solutions can analyze students' past learning history, identify weaknesses and provide lessons that are better suited for development, providing more opportunities for personal learning experiences. AI tools can help students sharpen their skills and develop vulnerable areas outside the classroom. They offer a personal reading experience without having a teacher when they answer questions at all times of the day

4**.3 AI in Healthcare**

The healthcare industries use NLP to categorize certain data patterns. Artificial Intelligence can be used in clinical trials, to hasten the searches and validation of medical coding. This can help reduce the time to start, improve and accomplish clinical training. In simple words, medical coding is transmitting medical data about a patient into alphanumeric code. The connection between [AI and healthcare](https://www.analyticsinsight.net/how-telemedicine-and-ai-can-benefit-healthcare-providers/) can be functional only with the availability of healthcare IT infrastructures, GAVS technologies which allow healthcare providers to easily step into the latest digital infrastructure. Cost, transparency is some of the healthcare compliances which can be overcome if the business strategies involve AI. Following, are some of the ways through which artificial intelligence can be utilized in healthcare, Countless numbers of smart devices are evolving and are overpowering the consumer environment. Even in the healthcare industry, there are several devices that can be used in the ICU for monitoring patients. The intelligent algorithms in the device can reduce the cognitive burdens for physicians while ensuring the patients’ care on time. There are smart phones that have in-built AI software and hardware that can collect images of skin, infections, wounds, or any other part. This trend is of great benefit for the dermatology and ophthalmology fields. With the help of artificial intelligence and mobile applications, it has become easy for patients to stay in touch with their doctors and vice-versa.

**4.4 AI in E-commerce**

AI-enabled Email Marketing that sends email related to marketing for product publicity which shows the services and product details which is of interest for receivers. In addition to automatic over-human learning, these email marketing tools make intelligent user analysis based on their feedback and are highly tailored to the needs of individual customers.AI-based results are utilizing a mix of AI and machine learning, natural language processing, and computer vision to reduce the gap between stores and online consumer experiences. The use of artificial intelligence in online shopping change the E-commerce industry by predicting shopping patterns depending on the products consumers buy and when they buy them. For example, if online shoppers tend to buy a certain type of rice every week, an online retailer can send a customized promise to these buyers about the product, or use machine-enabled recommendations for additional product compatible with rice dishes.

**4.5 AI in Cyber security**

AI and machine learning play an important role in reducing fraud, data theft on a large scale, A I security involves using AI to identify and stop cyber threats with less human intervention than expected or required by traditional security measures. The AI-based cyber security posture management system is able to sort out many problems. Technology is there to properly train the self-study system to collect data continuously and independently across all your business information systems.AI analysis can help you set up and improve controls and processes to effectively improve the cyber security of your organization. AI can also be used to detect threats and other potentially dangerous activities. AI programs can be trained to detect even the slightest behavior of ransom and malware attacks before entering the system and separating them from that system. AI programs can also be used in multi-factor authentication to provide access to their users. AI can intervene to protect cyber security firms and their customers from attack even when there are many skilled attacks happening. Here are the so many types of frauds that attackers can use on IoTs, depending on the aspect of the program they are selecting and what they hope to gain from this attack. As such, there is a lot of cyber security research surrounding the IoT.

**4.6 AI in Data Science**

The term “AI” is employed so often nowadays that we've a basic understanding of what it means: a computer’s ability to perform tasks like is holding, speech recognition, decision-making, and language translation. Humans make quick use of all the info around them and may use what they need stored in their minds to form decisions. However, AI doesn't yet boast such abilities; instead, it's using huge chunks of knowledge to clear its objectives. This ultimately means AI might require huge chunks of knowledge for doing something as simple as editing text.AI is not a simple machine learning it is much more than it. here data is not for learning purpose as well as not obtained through a machine. Data science is not only related to the mathematical aspect of the process, but it feeds the process and benefits from it through data engineering. Data engineers and data scientists have a major role to play in advancing AI. A computer, powered by AI, can collect, use , and process data much faster than humans and in speech recognition Due to the use of AI and the many efforts made by Smartphone manufacturers, you can request speech recognition software to find the nearest ice cream store or pizza order, without typing a name. It is the creation of artificial neural networks that compels discerning computers to have this say.

**4.7 Robotics**

AI software that makes the device list more intelligent. Already integrated into more than nine million devices, the technology is improving intelligence on cars, phones, drones and cameras. It is also used by large organizations such as NASA, DARPA, Motorola and NVIDIA.Another area where AI has helped, will help build more efficient robots. Robots have been developing since time immemorial and have greatly improved. The cause of this development will be AI, because, AI enables robots to perform things as humans while performing tasks. Many robots have been developed in areas such as Medical to assist doctors with complex surgeries. Artificial Intelligence in the Aviation Sector: Airlines use aircraft specialist systems to monitor atmospheric conditions and system conditions. The flight can be arranged for a self-employed person when a local course is planned. Researchers have recently developed a model of a smart flight system with a powerful neuro-fuzzy control system that enhances the ability to withstand the flaws of a high-speed public aircraft during arrival in the face of strong winds and failures such as attached control areas.

**4.8 Artificial Intelligence in Games**

Modern computer games often use animated 3D images (and more recently 3D sounds) to give a realistic picture. The AI ​​found in most computer games is not AI.but a combination of strategies that or AI-related in particular interacts with the creation of a clever illusion of intelligence. Neural-network, as well as models of emotional and social conditions, state-of-the-art systems, governance systems, tree learning, and many more. Artificial intelligence (AI) is used to produce responsive, consistent or intelligent behavior especially in non-actors (NPCs) such as human-like spies. ... It works to improve the game player's experience rather than decision making. It is very important as the engineers bring the gaming experience to various devices. There is no longer just playback to choose between console or desktop computer. Instead, players anticipate what’s going on in the immersive game on a plethora of mobile and portable devices, from smart phones to VR headsets, and more. AI allows programmers to deliver console-like operations to device types

**4.9 Deep Neural Networks**

The neural artificial network (ANN) is a piece of computer system designed to mimic the way the human brain analyzes and processes information. It is the foundation of artificial intelligence (AI) and solves complex problems that may seem impossible or difficult at human or mathematical levels. I, as its name implies, is the intelligence that the machines have shown to work in the same way as humans and to work towards the goals they are given. Another AI application could be to provide protection against current cyber threats, car hijackings etc. The visual acuity of the machine is increasingly correct these days. And it may be because of AI. AI has developed DNN’s so that machines can detect an object, the body accurately. It has shown to see things better than the naked eye in some cases. There are many types of detection processes. One such method is random selection of pixels and create a circular image.

# 5. SCORING OF DIFFICULTY LEVELS

# 5.1 Processing levels:

* Data processing, report generation (one unit/function 1 point)
* Image processing (2 points per function)
* Data analysis (2 points per function)
* Data Mining, pattern recognition ( 2 points per function)
* Data modeling (5 points per unit)
* Data Integration, visualization (2 points per instance)
* Knowledge processing (3 points per instance)
* Inference, knowledge representation, interpretation, reasoning (3 points per function)

We will find these words in each requirement and assess its difficulty/processing level. Scoring will be based on—requirements difficulty level, class diagram difficulty level, and code complexity Requirement difficulty scoring: 1 point for each functional requirement 2 points for each non- functional requirements, for each functional requirement there will be a additional point of .1 for each level—for example any requirement falling in 9th level the functional requirement will weigh 1 + 0.9 = 1.9

**5.2 Approach which we are following**

|  |  |  |
| --- | --- | --- |
|  | Type/Level | Score |
| A | Image processing | 2 |
| B | Expert System | 2 |
| C | Neural Network | 2 |
| D | Deep neural network  | 3 |
| E | Data mining  | 2 |

Flowchart for Scoring is

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 **Fig 1.Flowchart for scoring**

**5.3 Challenges levels**

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 **Fig 2.Challenges levels**

**5.4 Solutions**

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 **Fig 3. Solutions**

We are following the approach in which finding the scoring and difficulty levels, complexity type and their challenges which will be resolve by challenge finder and get the solution type and for each challenge we will get the solutions through solution suggested and also through matlab program example we will find out the levels of complexity

**6. Tool development**

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**6.1 Working of diagram**

We are working for tool software solution in which we are taking several types of AI and its complexity finder in M1 and through which we are finding the AI applications and its complexity also in M3 and M3 is sending complexity to M1 and then M1is sending complexity to M2 and M2 is sending difficulty to difficulty solver which will see the level of difficulties and send the solutions to development point to M2 and than M2 is sending the solution of difficulties to output module M5 which will display difficulty type and its corresponding solution for the development of tool.

**6.2 Facing the process difficulties**

A process difficulties may occur during analysis, designing, coding, testing if the artificial intelligence software to be developed is of high complexity then it is very lightly that analysis and all subsequent phases of software development may be subjected to lots of difficulties which can be solved by using appropriate techniques and activities which are the part of software process models suggested and recommended for artificial intelligence software development

**7. AI software development process models are**

**7.1 Explain a Use Case**

The first and most important rule of AI software development is to spend some time explaining the specific problems or challenges you want AI to solve. If you make this clear, it will improve your chances of success in AI software development. The case for the use of AI software development is highly structured based on achievable objectives that have a positive impact on the company and end users of the software being implemented.

**7.2 Check Availability of Data**

Once you will know about the problems or difficulties you want the AI ​​to solve, the next step will be to ensure that the systems and processes are in place to capture and monitor the data needed to perform the necessary analysis. More time is required to dispute data entry. Therefore, you should ensure the availability of relevant information in the right quantity with appropriate or flexible features. This will allow you to quickly go through the AI ​​software development process.

**7.3 AI or ML Model**

To develop specific AI or ML models, you will need to define performance measures that make evaluating, comparing, and analyzing results from multiple algorithms easier. For example, a good performance measure for a case-by-case operation would be Classification Accuracy. The process of defining an AI or ML model validation process involves dividing data into two sets. One training setup while another test set. The training set is used to train the algorithm while the test set is used for testing purposes. Sample processes will depend on the complexity of the algorithm. It is important to verify the findings to ensure that everything goes smoothly.

**7.4 Test the AI Software**

Another critical step in the process of developing AI software is testing. Today, software developers in many parts of the world are using AI to test and validate ever-increasing source code. The real world of software testing, AI-driven software testing involves creating test cases, creating test documents, and maintaining test case and script. AI-driven software testing improves the accuracy of software testing.

**8. Applications of this work**

Development will be eased out, Easily get the accurate result and Complexity will be found out earlier, as we the points at which development difficulties will occur, and the corresponding solutions shall be suggested by our tool. This is all being done and developed in the form of a tool, keeping in mind the fact that Artificial intelligence application area is not an established one but an emerging one lacking many process maturity aspects.

**9. Conclusion**

As the awareness about software development and what it can do for customers and clients is increasing and people are looking for better accuracies in their solutions, the challenges for software development community are increasing .To meet out these challenges and to facilitate the software development people we are developing a tool which will primarily performed jobs of complexity predetermination, predicting the development difficulty types, suggesting the corresponding solutions and eventually making the job of AI application development much convenient knowledge supported and faster. We have developed all above aspects with reference to artificial intelligence application development in the form of an approach which we intend to make much precise through our upcoming research efforts. The scoring method suggested by us is an original work attempted which can be followed and applied in complexity determination at the earlier stage of software development in any kind of software type. This way of working and thinking can make this work very versatile and applicable for the benefits of developers.

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