

# **Trends In AI and DS**

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**Abstract:** *The research paper comprises of a detailed study of the two diverse fields AI and DS. Artificial intelligence (A.I.) is a multidisciplinary field aimed at automating tasks that currently need human intelligence. Data science encompasses a set of principles, problem definitions, algorithms, and processes for extracting non-obvious and useful patterns from large data sets. Many of the elements of data science have been developed in related fields such as machine learning and data mining. In fact, the terms data science, machine learning, and data mining are often used interchangeably. Despite its lack of general familiarity, artificial intelligence (AI) and Data Science (DS) is a technology that is revolutionizing every aspect of life. This article aims to educate laypeople about AI and DS and encourage them to utilize it as a tool in many disciplines to rethink how we combine data, analyze it, and make choices. The concept of artificial intelligence (AI) and Data Science (DS) is covered and an emphasis on utilizing these terms in a modular way is made.*

**Keywords:** *Artificial Intelligence (AI), Data Science (DS), Machine Learning (ML).*

## **I. INTRODUCTION**

Artificial intelligence (AI) is defined as the ability of an artificial entity to solve complicated problems using its own intelligence. Computer science and physiology are combined in Artificial Intelligence. In layman's terms, intelligence is the computational component of one's capacity to attain goals in the real world. Intelligence is defined as the capacity to think, envision, memorize, and comprehend, see patterns, make decisions, adapt to change, and learn from experience. Artificial intelligence is focused with making computers behave more human-like and in a fraction of the time it takes a person to do it. As a result, it is known as Artificial Intelligence. Artificial intelligence is also concerned with pushing the boundaries of practical computer science in the direction of systems that are adaptable, flexible, and capable of forming their own analyses and solution techniques by applying general knowledge to specific situations. We are surrounded by data, which grows fast at an exponential rate.

An estimate is that, by 2025, we have to deal with 160 ZB, that is 21 zeros after 160. As a comparison, the Bible contains 783,137 words. Lots of important decisions are made based on the data that we have collected. A good example is that our FICO credit score is purely based on the data that the credit companies have collected, showing our trustworthiness. We clearly need something special to work with this huge amount of data, and often visually display them, so that we can make some sense out of it and use such data wisely. Hence, data analysis has become an important area of computer application.

## **II. FUNDAMENTAL CONCEPT OF AI AND DS**

The development of AI has reached a critical level. The work has been going on for almost two decades. The advancement of AI concepts has resulted in a slew of new ideas. Big data, AI applications in medical initiatives, and self-driving cars are all examples of AI technological trends.

Using such technology can render an efficient system of inventory management with an absolute benefit. An artificial neural network is made of multiple layers of mathematical probability. Like machine learning, it requires large data examples to train. Deep learning is often used for things like speech recognition and understanding language.

In the world of data space, the era of Big Data emerged when organizations are dealing with petabytes and exabytes of data. It became very tough for industries for the storage of data until 2010. Now when the popular frameworks like Hadoop and others solved the problem of storage, the focus is on processing the data. And here Data Science plays a big role. Nowadays the growth of data science has been increased in various ways and so on should be ready for the future by learning what data science is and how can we add value to it.

### III. SUBFIELDS OF AI

AI is frequently misplaced on an island with robots and self-driving cars, according to popular belief. This method, however overlooks one of artificial intelligence's most important practical applications: analyzing the massive volumes of data created everyday. Insight gathering and job automation may be done at a previous inconceivable velocity and scale by carefully applying AI to particular activities. AI systems execute sophisticated searches through the mountains of data generated by people, deciphering both text and pictures to detect patterns in complicated data and then acting on their findings. Computer systems that can grasp the meaning of human language, learn from experience, and make predictions, thanks to cutting-edge technologies. Following are a few subfields of AI.



**ML:** "Machine Learning examines the study and construction of algorithms that can learn from data and make decisions and predictions by developing models." The key purpose is for the system to make accurate predictions. Machine Learning refers to a machine's ability to study data through the use of data. As a result, there's no need to be programmed to do a specific duty. Machine learning is used for teaching computers to recognise patterns without any defined rules, other than the things.

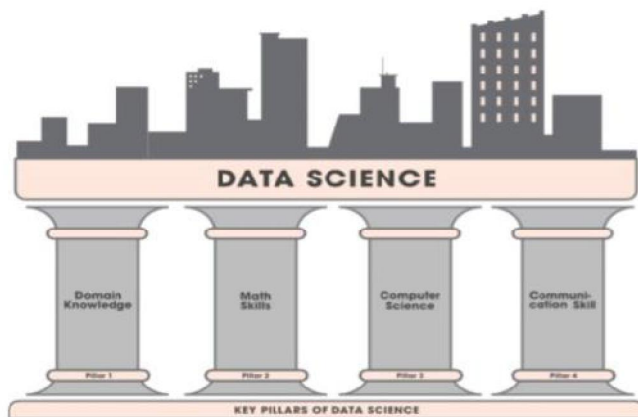
**DL:** "Deep learning is part of machine learning approaches based on meaningful data representations or features from the raw data". The category is working on a machine that can pass information in bits and pieces. As a result, the information comes from a variety of sources. They're looked at and used to solve problems when they arise. Differential programming is another name for this type of machine learning. The technique of instructing a machine to perform many jobs in a predetermined order.

**COGNITIVE COMPUTING:** Cognitive computing is another essential component of AI. Its purpose is to imitate and improve interaction between humans and machines. Cognitive computing seeks to recreate the human thought process in a computer model, in this case, by understanding human language and the meaning of images. Together, cognitive computing and artificial intelligence strive to endow machines with human-like behaviors and information processing abilities. Another form of deep learning is speech recognition, which enables the voice assistant in phones to understand questions like, "Hey John! How does artificial intelligence work?"

**COMPUTER VISION:** Computer vision is a method of interpreting image material, such as graphs, tables, and photographs within PDF documents, as well as other text and video, using deep learning and pattern recognition. Computer vision is a branch of artificial intelligence that allows computers to recognize, analyze, and interpret visual input. This technology's applications have already begun to transform area such as research and development and healthcare. Computer Vision and machine learning are being used to analyze patients' x-ray images in order to diagnose patients faster.

#### IV. PILLARS OF DS

Data science is the science of analyzing raw data using statistics and machine learning techniques with the purpose of drawing conclusions about that information. So briefly it can be said that Data Science involves:



**DOMAIN KNOWLEDGE:** The foremost objective of data science is to extract useful insights from that data so that it can be profitable to the company's business. If you are not aware of the business side of the company that how the business model of the company works and how you can't build it better than you are of no use for this company. There are some visualization tools used on the business end like Tables that help you display your valuable results or insights in a proper non-technical format such as graphs or pie charts that business people can understand.

**MATHS SKILLS:** Linear Algebra, Multi-variable Calculus & Optimization Technique: These three things are very important as they help us in understanding various machine learning algorithms that play an important role in Data Science.

**Statistics & Probability:** Understanding of Statistics is very significant as this is a part of Data analysis. Probability is also significant to statistics and it is considered a prerequisite for mastering machine learning.

**COMPUTER SCIENCE:** Programming Knowledge: One needs to have a good grasp of programming concepts such as Data structures and Algorithms. The programming languages used are Python, Java, C++, etc.

**Relational Databases:** One needs to know databases such as SQL or Oracle so that he/she can retrieve the necessary data from them whenever required.

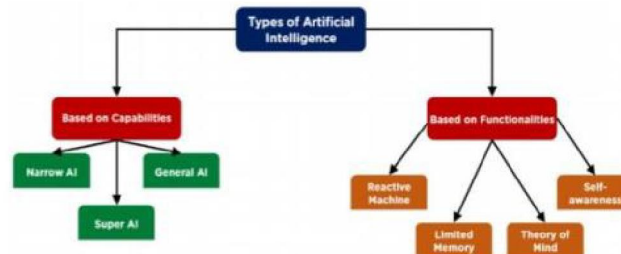
**Non-Relational Databases:** There are many types of non-relational databases but mostly used types are Cassandra, HBase, MongoDB, CouchDB, Redis, Dynamo.

**Machine Learning:** It is one of the most vital parts of data science and the hottest subject of research among researchers. One at least needs to understand basic algorithms of Supervised and Unsupervised Learning. **Distributed Computing:** It is also one of the most important skills to handle a large amount of data because one can't process this much data on a single system. The tools that mostly used are Apache Hadoop and Spark. The two major parts of these tools are HDFS (Hadoop Distributed File System) that is used for collecting data over a distributed file system. Another part is map-reduce, by which we manipulate the data. One can write map-reduce in programs in Java or Python. There are various other tools such as PIG, HIVE, etc.

**COMMUNICATION SKILLS:** It includes both written and verbal communication. What happens in a data science project is after drawing conclusions from the analysis, the project has to be communicated to others. Sometimes this may be a report you send to your boss or team at work. Other times it may be a blog post. Often it may be a

presentation to a group of colleagues. Regardless, a data science project always involves some form of communication of the projects' findings. So it's necessary to have communication skills for becoming a data scientist.

## V. TYPES OF AI



1. **Narrow AI:** Narrow AI is a sort of AI that is capable of doing a certain task intelligently. In the area of artificial intelligence, narrow AI is the most frequent and currently accessible AI. Because narrow AI is exclusively educated for one single activity, it cannot perform outside its field or boundaries. As a result, it's also known as "weak AI." When narrow AI reaches its boundaries, it might fail in unexpected ways. Apple Siri is an excellent example of Narrow AI, yet it only performs a restricted set of duties. Playing chess, purchasing suggestions on an e-commerce site, self-driving automobiles, speech recognition, and picture identification are all examples of narrow AI.
2. **General AI:** General AI is a sort of intelligence that is capable of doing any intellectual work as well as a human. The goal of General AI is to create a system that can learn and reason like a person on its own. Currently, no system exists that can be classified as general AI and execute any work as well as a person. Researchers from all across the world are now concentrating their efforts on creating robots that can do general AI tasks. Because generic AI systems are still being researched, developing such systems will take a lot of work and time.
3. **Super AI:** Super AI is a degree of system intelligence at which machines may outsmart humans and execute any task better than humans with cognitive qualities. It's a result of AI in general. Some fundamental properties of powerful AI are the capacity to understand, reason, solve puzzles, make judgements, plan, learn, and communicate independently. Super AI is still a futuristic Artificial Intelligence idea. The creation of such systems in the actual world is still a world changing effort.

## VI. DATA IN DS

A set of values of qualitative or quantitative variables. This definition focuses more on what data entails. And although it is a reasonably short definition Let's take a second to parse this and focus on each component individually.

**A set of values:** The first term to concentrate on is "a set of values" – to have data, we require a set of values to include. In statistics, this set of values is known as the population. For example, that set of values needed to answer your question might be all websites or applications or it might be the set of all people getting a particular drug or set of people visiting a particular website. But generally, it's a set of things that you're going to make measurements on.

**Variables:** The next thing to focus on is "variables" – variables are measurements or characteristics of an item. For example, you could be measuring the weight of a person, or you are estimating the amount of time a person visits on a website or app. Or it may be a further qualitative characteristic you are trying to measure, like what a person clicks on a website, or whether you think the person visiting is male or female.

**Qualitative and quantitative variables:** Finally, we have both "qualitative and quantitative variables". Qualitative variables are information about qualities. They are things like country of origin, gender, religion, etc. They're usually represented by words, not numbers, and they are not indexed or ordered. On the other hand, quantitative variables are

information regarding quantities. Quantitative measurements are normally represented by numbers and are estimated on a constant ordered scale; they're something like weight, height, age, and blood pressure.

## **VII. APPLICATIONS OF AI**

Here are many ways in which the average technology consumer interacts with artificial intelligence technologies in their daily lives, but most people don't realize what technologies actually use AI. Here are a few examples of artificial intelligence technologies that many people encounter in their lives.

**Chat Bots:** If you've ever come across a chat bot on a website or social media messenger, it is powered by AI. Chat bots are one of the simpler examples of AI, since they are simply coded to send messages based on rules about how they should interact with users. Sort of an "if this, then that" type of programming.

**Smart Assistants:** Siri, Alexa, and all the other smart assistants are examples of artificial intelligence. They understand what users say to them and can follow directions and respond accordingly. These are like the next level of chat bots, since they use speech recognition and are connected to larger databases of information such as search engines.

**Disease Mapping and Prediction:** Epidemiologists have always worked to try to understand how diseases spread in order to be able to predict and hopefully avoid them. Artificial intelligence is making this easier. This is an example where it's easy to see how artificial intelligence simply allows for quicker progress on data analysis and prediction modelling than humans could do alone.

**Self-Driving Cars:** Although fully self-driving cars aren't widely available yet, they are well in the works with multiple companies, and some self-driving features are already available in cars today. Companies like Google and Uber are vying to be the first to develop consumer ready self-driving car, but you can already buy cars with sensors that alert you to close objects, break automatically, and can parallel park themselves. Just like how AI can detect cancer better than the human eye, self-driving cars can probably drive better than a lot of humans too.

## **VIII. DISADVANTAGES OF AI**

**High Cost of Implementation:** Setting up AI-based machines, computers, etc. Entails huge costs given the complexity of engineering that goes into building one. Further, the astronomical expense doesn't stop there as repair and maintenance also run into thousands of dollars.

**Doesn't Improve with Experience:** One of the most amazing characteristics of human cognitive power is its ability to develop with age and experience. However, the same can't be said about AIs as they are machines that can't improve with experience, rather it starts to wear and tear with time.

**Lacks Creativity:** As already mentioned above – AIs are not built for creative pieces of work. So, it should be crystal clear by now that creativity or imagination is not the forte of the AIs. Although they can help you in designing and creating something special, they still can't compete with the human brain. Their creativity is limited to the creative ability of the person who programs and commands them.

### **Risk of Unemployment:**

Due to usage of advance technology human identity has been under threat.

## **IX. DISADVANTAGES OF DS**

Following are the drawbacks or disadvantages of Data Science:

1. Mastering data science is difficult but not impossible.
2. Data science is a blurry term.
3. It requires large amount of domain knowledge to become data scientist.
4. There is concerns of data privacy in this domain as data is accessible by data science experts
5. Arbitrary data may yield unexpected results.
6. It is difficult to develop competencies in the data science team.

## **X. CONCLUSION**

Data Science and Artificial Intelligence are extremely advance technology areas giving vast scope to human development. Taking this into account, importance should be given to the exploration of these diverse areas. Data science education is well into its formative stages of development; it is evolving into a self-supporting discipline and producing professionals with distinct and complementary skills relative to professionals in the computer, information, and statistical sciences. However, regardless of its potential eventual disciplinary status, the evidence points to robust growth of data science education that will indelibly shape the undergraduate students of the future. AI has benefited computer science because it is the artificial psychology that made the machines to focus on the philosophical arguments. AI performs tasks faster than human beings and the major goal of Artificial Intelligence is to create the technology in an intelligent manner. It is proved that artificial intelligence is the computer knowledge that has human traits, however, these computers and robots help the environment to grow, and they respond rationally to help human beings. AI has already impacted lives of people in various fields and will surely continue to do more in the future.

## **ACKNOWLEDGEMENT**

The research has been concluded with the detailed study of the areas of AI and DS. We have gone through the estimation of usage of these diverse fields for the development of humans. Under this research, the advantages as well as drawbacks of the technological fields have been taken into consideration. The main sectors of the technologies have been studied thoroughly to make use of those for solving the problem or issue that have been arise.

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