Artificial Intelligence Algorithms

Abstract:

Artificial intelligence is a technology that is already impacting how users interact with, and are affected by the Internet. In the near future, its impact is likely to only continue to grow. AI has the potential to vastly change the way that humans interact, not only with the digital world, but also with each other, through their work and through other socioeconomic institutions – for better or for worse. Artificial Intelligence (AI) is a rapidly advancing technology, made possible by the Internet, that may soon have significant impacts on our everyday lives. AI traditionally refers to an artificial creation of human-like intelligence that can learn, reason, plan, perceive, or process natural language.These traits allow AI to bring immense socioeconomic opportunities, while also posing ethical and socio-economic challenges.

keyword: Artificial Intelligence , Machine Learning , Deep Learning , Robotics.

Introduction

This paper represents review of artificial intelligence algorithms applying in computer application and software. Include knowledge-based systems.

 computational intelligence, which leads to Artificial intelligence, is the science of mimicking human mental faculties in a computer.

That assists Physician to make dissection in medical diagnosis.This paper reviews the field of artificial intelligence focusing on embodied artificial intelligence.

In mathematics and computer science an algorithm is a finite sequence of well defined, computer- implementable instructions , typically to solve a class of problems or to perform a computation. Algorithms are used for calculation, data processing, and automated reasoning. Algorithms are always unambiguous and are used as specifications for performing calculation, data processing, automated reasoning and other tasks. AI is a techinque that enables machines to mimic behaviour. Artificial Intelligence is the theory and development of computer system able to perform tasks normally requiring human intelligence, such as visualperception , speech recognition, decision – making and translation between language.

The word algorithm has become very popular recently. It has transitioned from something only mathematicians used to something most marketing teams use to promote AI-powered solutions.

During my projects, I realized that some startups just use the word algorithm without really explaining how does the fact that they use algorithms make the project "AI". I hope that this will article will help you understand the difference between "AI" algorithm and other algorithms.

Importance of Artificial Intelligence

Artificial Intelligence (AI) has made it possible for machines to learn from experience and grow to perform human-like tasks. A lot of flashy examples of Artificial Intelligence you hear about like **Self** Driving Cars, Chess Playing Computers rely heavily on Deep Learning and Natural Language processing. Using these technologies, computers can be trained to accomplish specific tasks by processing large amounts of data and recognizing patterns in the data.
It is no doubt that the sub-field of machine learning / artificial intelligence has increasingly gained more popularity in the past couple of years. As Big Data is the hottest trend in the tech industry at the moment, machine learning is incredibly powerful to make predictions or calculated suggestions based on large amounts of data. Some of the most common examples of machine learning are Netflix's algorithms to make movie suggestions based on movies you have watched in the past or Amazon's algorithms that recommend books based on books you have bought before.

It's important to point out that not all algorithms are related to AI or machine learning specifically algorithms are shortcuts that help us give instructions to computers. An algorithm simply tells a computer what to do next with an "and," "or," or "not" statement. Obviously, like most things related to mathematics, it starts off pretty simple but becomes infinitely complex when expanded.

Machine learning

Machine learning: set of algorithms that enable the software to update and "learn" from previous outcomes without the need for programmer intervention. It is fed with structured data in order to complete a task without being programmed how to do so.

Machine Learning is made up of a series of algorithms. Basically, AI (Machine Learning is a subset of AI) is designed to learn in the same way as a child. Thanks to a dataset, an AI can find patterns and builds assumptions based on those findings.

Machine learning algorithms can be divided into 3 broad categories — supervised learning, unsupervised learning, and reinforcement learning.

Types of Machine Learning
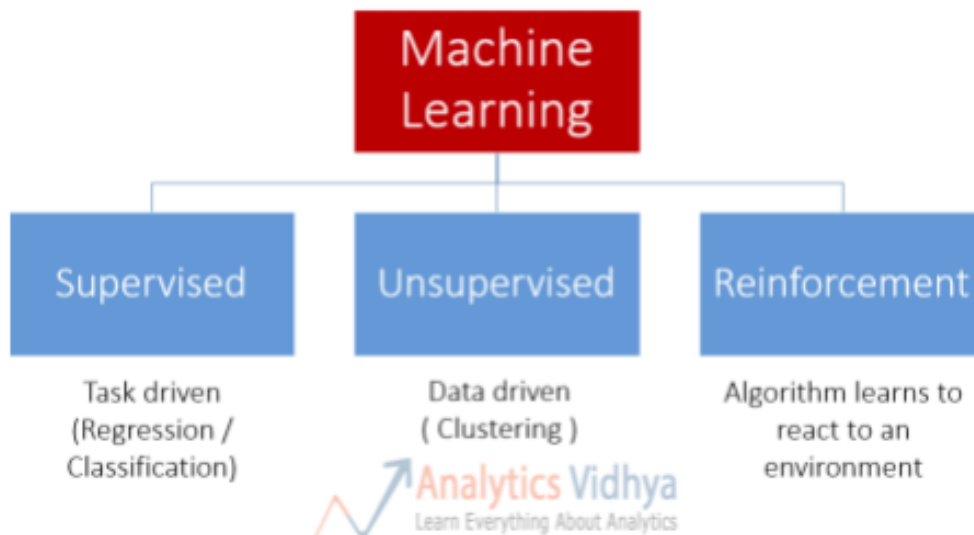
Supervised learning is useful in cases where a property (label) is available for a certain dataset (training set), but is missing and needs to be predicted for other instances.

Unsupervised learning is useful in cases where the challenge is to discover implicit relationships in a given unlabeled dataset (items are not pre-assigned). Reinforcement learning falls between these 2 extremes — there is some form of feedback available for each predictive step or action, but no precise label or error message. Since this is an intro class, I didn't learn about reinforcement learning, but I hope that 10 algorithms on supervised and unsupervised learning will be enough to keep you interested.

Supervised Learning

Decision Trees: A decision tree is a decision support tool that uses a tree-like graph or model of decisions and their possible consequences, including chance-event outcomes, resource costs, and utility. Take a look at the image to get a sense of how it looks like
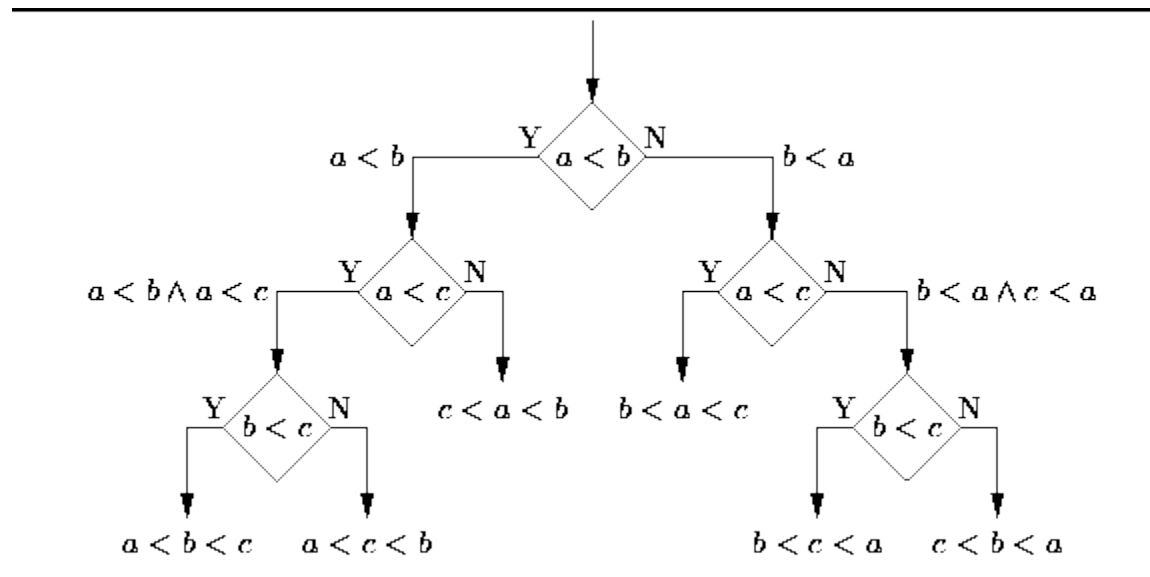

From a business decision point of view, a decision tree is the minimum number of yes/no questions that one has to ask, to assess the probability of making a correct decision, most of the time. As a method, it allows you to approach the problem in a structured and systematic way to arrive at a logical conclusion.

Unsupervised Learning case, target output is not given, and the model is expected to form a template from the given inputs.Reinforcement Learning is a special case of supervised learning. This learning case, you are give a rating that specifies how accurate the output of the model is.In the supervised learning method, the model is fed with different data and the results of the model are compared with the actual target outputs. The errors are tried to be minimized by the model. Unsupervised learning is often used in finding patterns in inputs. The clustering algorithms are under the heading of unsupervised learning. Clustering algorithms can be used under both supervised and unsupervised methods in situations such as anomaly detection (awareness of abnormal situations). Likewise , artificial neural networks are also under the heading of regression and clustering.
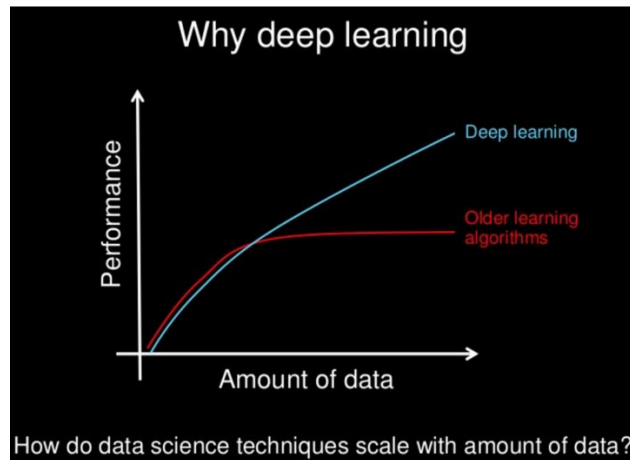
Simple Regression

Ordinary Least Squares Regression
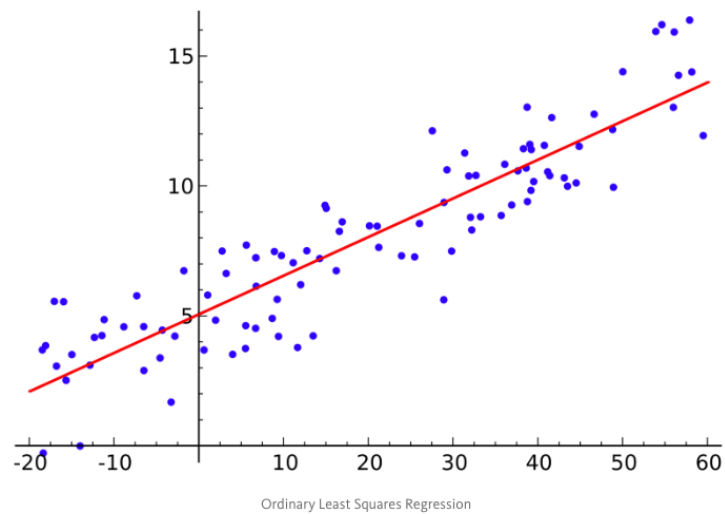
SVM (Support Vector Machine)

Support Vector Machine
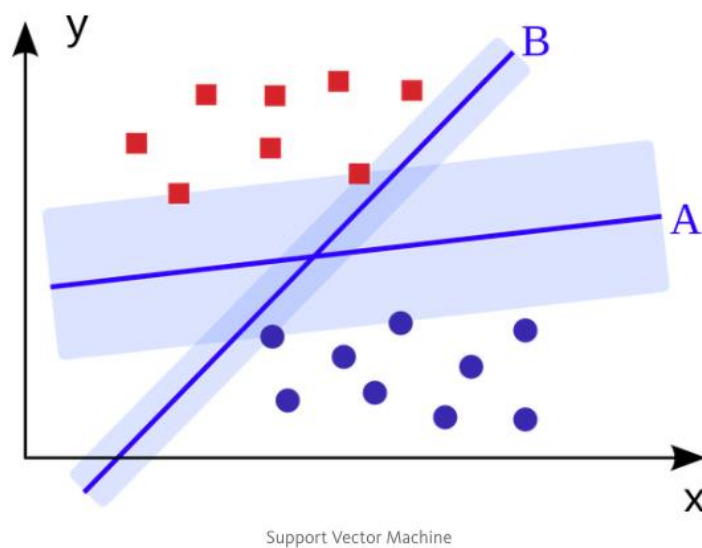
Deep Learning:

Besides the above algorithms, many algorithms are used in the artificial intelligence.

Naive Bayes Classification: Naive Bayes classifiers are a family of simple probabilistic classifiers based on applying Bayes' theorem with strong (naive) independence assumptions between the features. The featured image is the equation — with P(A|B) is posterior probability, P(B|A) is likelihood, P(A) is class prior probability, and P(B) is predictor prior probability.

Some of real world examples are:

- To mark an email as spam or not spam
- Classify a news article about technology, politics, or sports

- Check a piece of text expressing positive emotions, or negative emotions?
- Used for face recognition software.

This is called model-based learning, and it allows AI to make better decisions than humans because it can take many more factors into account and analyze them in milliseconds. you get something that goes beyond the sum of its parts by using ML. As we have seen an algorithm is a mathematical technique. It is derived by statisticians and mathematicians for a particular task, for instance, prediction.

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There are a lot of Areas which contribute to Artificial Intelligence namely:

- Mathematics
- Sociology
- Philosophy
- Computer Science
- Psychology
- NeuroScience
- Biology

If we have a look at the Importance of Artificial Intelligence:

- AI **automates Repetitive Learning** and discovery through data. Artificial Intelligence performs frequent, high-volume, computerized tasks reliably and without fatigue

- AI **adds intelligence** to existing products. In most cases, AI will not be sold as an individual application. Rather, products you already use will be improved with AI capabilities, much like Google Assistant was added as a feature to a new generation of Mobile Phones.

- AI **adapts through progressive learning algorithms** to let the data do the programming. The algorithm becomes a classifier or a predictor. So, just as the algorithm can teach itself how to play any game, it can teach itself what product to recommend next online.

- AI analyzes **more and deeper data** using neural networks that have many hidden layers. You need lots of data to train deep learning models because they learn directly from the data. The more data you can feed them, the more accurate they become.

- AI **achieves incredible accuracy** through deep neural networks, which was previously impossible. AI techniques from deep learning, image classification, and object recognition can now be used to find cancer on MRIs with the same accuracy as highly trained radiologists.

Now, Let's continue this Artificial Intelligence Tutorial and understand the various applications of Artificial Intelligence in the industry.

Applications of Artificial Intelligence
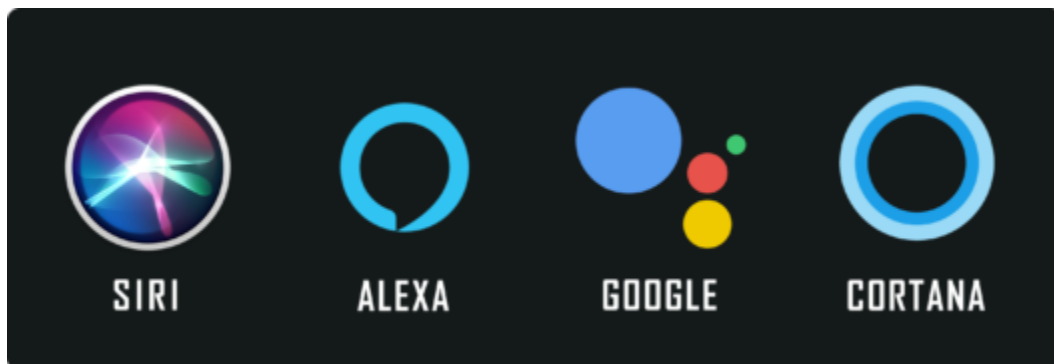
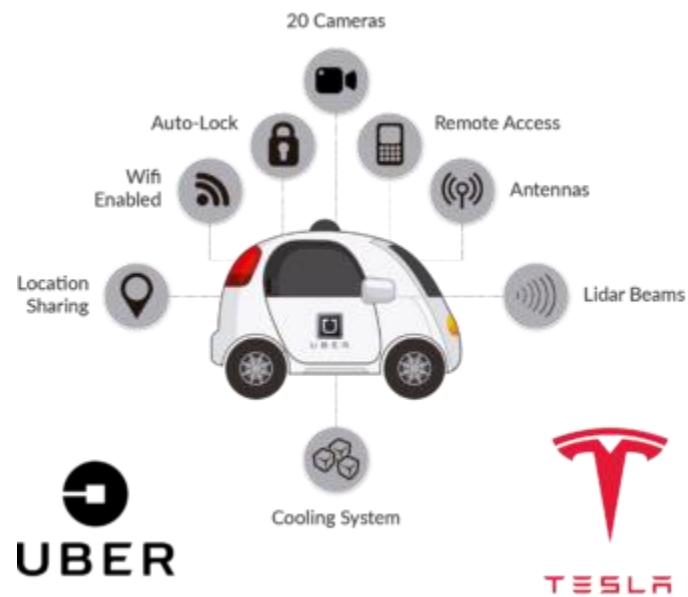- **Speech Recognition**

- **Machine Translation**
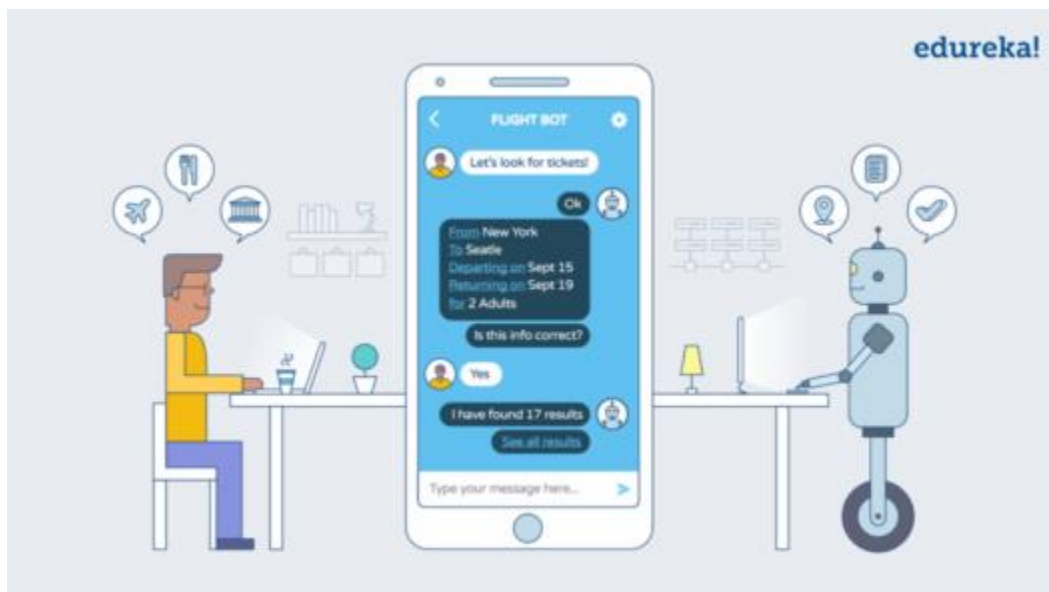
- **Facial Recognition and Automatic Tagging**

- **Virtual Personal Assistants**

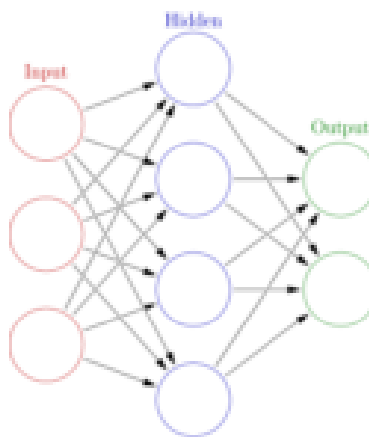- **Self Driving Car**

- **Chatbots**

Domains of Artificial Intelligence

Artificial Intelligence covers a lot of Domains Nowadays. Let's continue this Artificial Intelligence Tutorial and discuss the Major Domains with heavy research going on which are namely:

- **Neural Networks:**

Neural Networks are a class of models within the general machine learning literature. Neural networks are a specific set of algorithms that have revolutionized machine learning and Artificial Intelligence.

- **Robotics:**

Robotics is a branch of AI, which is composed of different branches and application of robots. AI Robots are artificial agents acting in a real-world environment. Artificial Intelligence Robot is aimed at manipulating the objects by perceiving, picking, moving, and destroying it.

Expert Systems:

In artificial intelligence, an expert system is a computer system that emulates the decision-making ability of a human expert. It is a computer program that uses artificial intelligence (AI) technologies to simulate the judgment and behavior of a human or an organization that has expert knowledge and experience in a particular field.

Fuzzy Logic Systems:

Fuzzy logic is an approach to computing based on "degrees of truth" rather than the usual "true or false" (1 or 0) Boolean logic on which the modern computer is based. Fuzzy logic Systems can take imprecise, distorted, noisy input information.
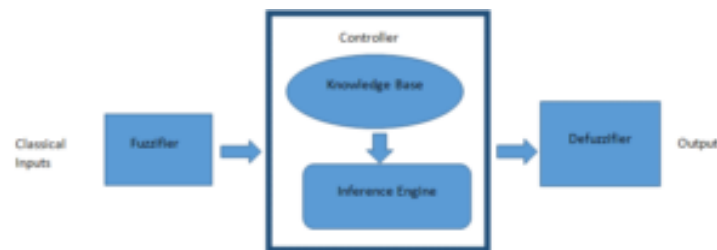
Fuzzy logic is a solution to complex problems in all fields of life, including medicine, as it resembles human reasoning and decision making.

Natural Language Processing:

Natural Language Processing (NLP) refers to the Artificial Intelligence method of communicating with intelligent systems using a natural language.
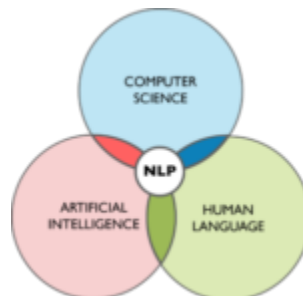
By utilizing NLP and its components, one can organize the massive chunks of text data, perform numerous automated tasks and solve a wide range of problems such as – Machine translation, Named Entity Recognition, Sentiment Analysis, Speech Recognition, and Topic Segmentation etc.

Future of AI:

The next steps in AI mostly include generalising the intelligence and creating as many use cases as possible, which eventually

can be converged into Human-Level Machine Intelligence (HLMI). OpenAI wants to further advance AI in a way that benefits society

as a whole and is freed from the need of generating revenues. As OpenAI has already made its reinforcement learning framework public,

it will create possibilities for other companies to create different use cases and contribute to the AI research as an open source project.

Other companies have also started to make use of AI technology into different domains. One such example is **Turing Robot**,

a Chinese company which is behind the HTC's Hidi, a voice assistant. Turing Robot offers voice recognition and natural

language processing for a wide variety of applications including Bosch's car system and Haier's home appliances.

Now Turing Robot is focused on developing Turing OS for service bots.

Another use case is being developed by Amazon, which is working on developing Alexa in the direction of recognising emotions.

Amazon is making significant advancements in Alexa – which is a virtual helper which sits inside the voice-controlled appliances offered by Amazon.

While people get irritated from the repeatedly wrong response from voice assistances like Google Now, Siri, Hidi etc.

Amazon focuses on emotion recognition from the voice tone and enable voice assistance to offer an apology for a wrong response.

Similarly, a Silicon Valley based company named Vicarious is developing an entirely a new way of information processing akin to the information

flow in human brain which they believe to help machines to become a lot smarter.

Toyota is developing a system which will predict where you are going before you tell it.

Toyota has recently announced its new subsidiary named Toyota Connect which will facilitate to collect torrents of data every day and

the battle to mine the data already been started. Thus, in the future, your AI will know more about you than you do. A start-up called Brain of Things is developing a smart home which they named 'robot home'. These robot houses keep an eye on each activity of the inhabitants-whether they are watching a movie, sleeping or doing something else. There are lots of advancements made in different domains all using AI

technology while developing it further in parallel to achieving their desired results

CONCLUSION

In the context of Artificial Intelligence, it is very difficult now to predict the future of humanity.
 We can accept AI as a new technology, but it should bring positive impacts for the welfare of the society and humanity
. An outstanding technology can exhibit positive impacts on society along with its severely negative impacts too. While applying this new technology,
we have to be ready to face consequences of the negative effects too.
Regarding this, we certainly need a legal policy framework to mitigate the challenges associated with AI and compensate the affected parties
 in case of a fatal error so that the serious threat to humanity could be minimised.

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