M.A.M.COLLEGE OF ENGINEERING &TECHNOLOGY

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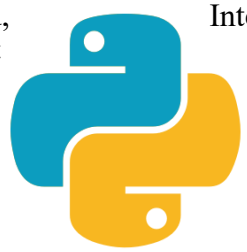
INTRODUTION TO PYTHON

Python is a High Level, Interpreted, Interactive and Object Oriented Program-ming Language. It was created in 1991 by Guido van Rossum.



Features include:

Beginners Language
Extensive Standard Library, Cross Platform Compatibility
Interactive Mode
Portable and Extendable, Databases and GUI Programming
Scalable and Dynamic Semantics.
Automatic Garbage

It is used for:
web development (server-side), software development, mathematics, system scripting

Author

Jagadeeshwari, Assistant Professor CSE Department,

What can Python do?

- Python can be used on a server to create web applications.
- Python can be used alongside software to create workflows.
- Python supports Database Connectivity
- Python can be used as a Scripting language.
- Python can be used to handle big data and perform complex mathematics.
- Python can be used for rapid prototyping, or for production-ready software development.
- Python works on different platforms (Windows, Mac, Linux, Raspberry Pi, etc).

A year spent in artificial intelligence is enough to make one believe in God." —Alan Perlis

Why Python?

Python has a simple syntax similar to the English language.
Python has syntax that allows developers to write programs with fewer lines than some other programming languages.
Python runs on an interpreter system, meaning that code can be executed as soon as it is written. This means that prototyping can be very quick.
Python can be treated in a procedural way, an object-orientated way or a functional way.
Stepping Stone to

Good to know

The version Python 2, although not being updated with anything other than security updates, is still quite popular. Python can be written in a text editor. It is possible to write Python in an Integrated Development Environment, such as Thonny, Pycharm, Net beans or Eclipse which are particularly useful when managing larger collections of Python files.

Python Syntax compared to other programming languages

Python was designed to for readability, and has some similarities to the English language with influence from mathematics.

Python uses new lines to complete a command, as opposed to other programming languages which often use semicolons or parentheses.

WHY IS LEARNING PYTHON PROGRAMMING LANGUAGE IMPORTANT?

Python Installation:

LINK: https://www.python.org/downloads

DEEP LEARNING ON ABNORMAL TISSUE SEGMENTATION USING MRI IMAGES

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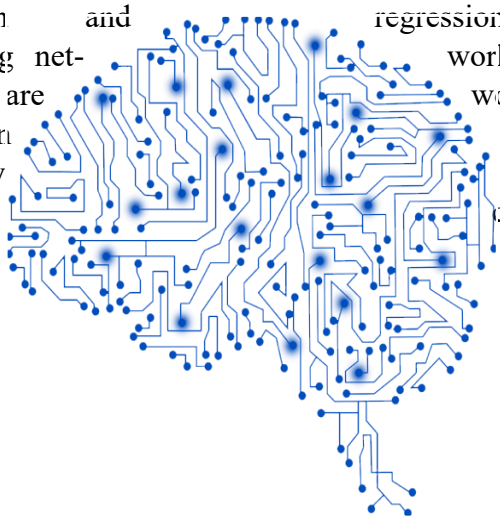
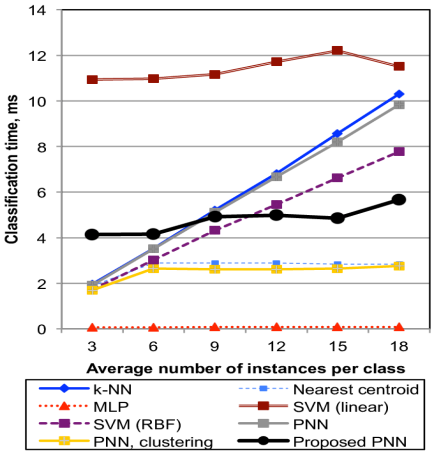
Deep Learning involves in using neural network concepts in order to characterize the feature from the given data for classification.

Convolutional Neural Networks (CNN) can be used in MATLAB for the purpose of Classification and regression. New networks can be created or the existing network can be used based on the application we are working for.The convolutional neural network can be trained either using a CPU,a GPU or by permorming multiple GPU in parallel.While computing in parallel it needs parallel computing toolbox.

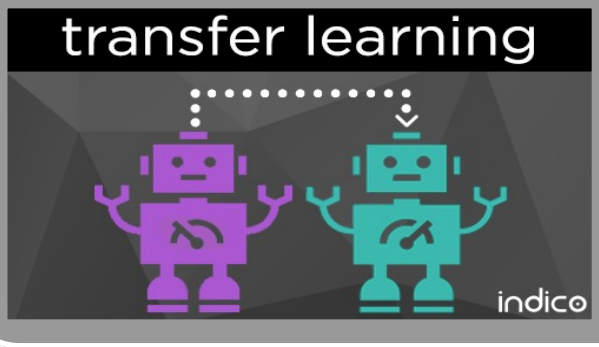


Classify Image using Google Net

The Google network has offers rich feature representation for huge variety of images. It has trained over million of images which can able to classify images into wide variety. It requires Neural Network Toolbox. In order to classify the images the image should have same size as that network.

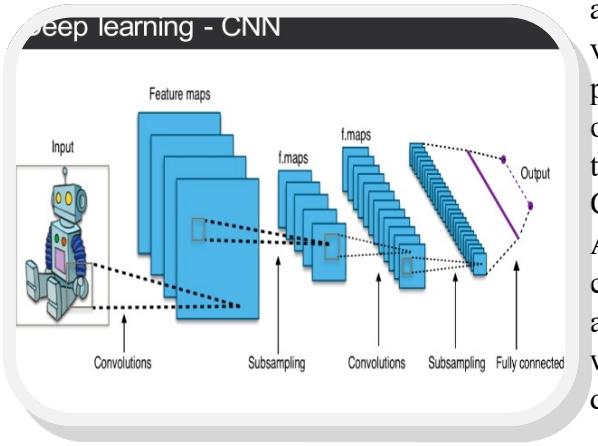


Transfer Learning



Transfer Learning is used in deep learning applications. To start a new network first take a pertained network and learn a new task. It is difficult to perform a randomly initialized tasks weight for a network. To solve this coarse tuning a network with transfer learning is faster than the older method.

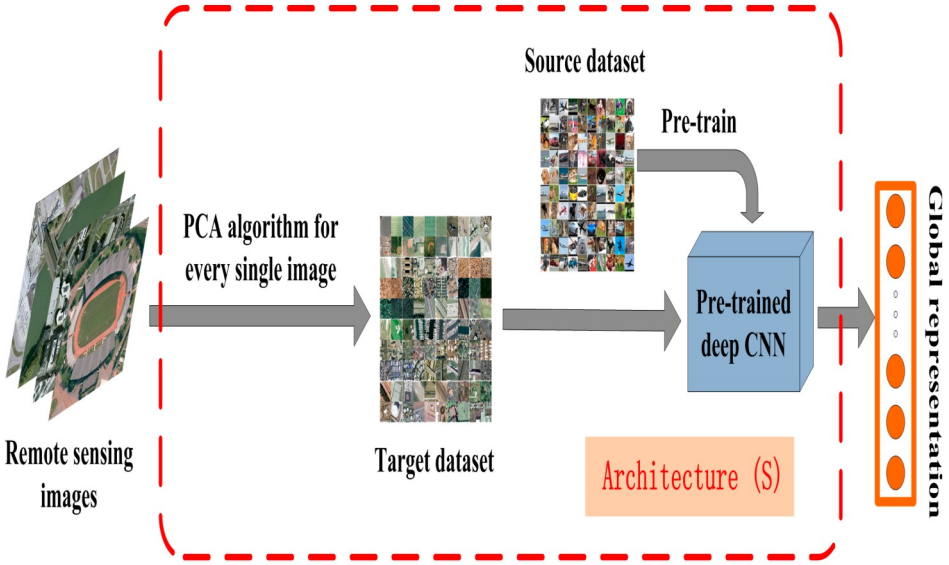
CNN is designed for images as inputs but they can also be used as text, signals and other responses. CNN is inspired from visual cortex which consists of simple and complex cells arranged based on the sub regions of the field. It is called as receptive fields. In these sub regions neurons might overlap, as CNN share spatially correlated outcomes. Also the number of parameters can be increased based on the size of input. CNN can able to reduce the number of parameters with less connectivity, sharing of weighs and down sampling.



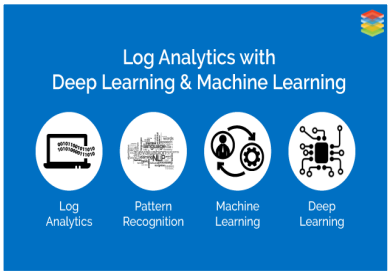
hat at the end of the century the use of words and general educated opinion will have alter "I believe that at the end of the century the use of words and general educated opinion will have altered so much that one will be able to speak of machines thinking without expecting to be contradicted." red so much that one will be able to speak of machines thinking without expecting to be contradicted."

Pretrained CNN

It is easy to select Pretrained networks for the applications. Feature extraction is an way to use the Pretrained networks in powerful way. and can use that features to train classifier i.e, support vector machine If SVM is tough for the application fine tuning can be done. In order to create a simple network for classification follow the below steps,



DEEP LEARNING ON ABNORMAL TISSUE SEGMENTATION USING MRI IMAGES



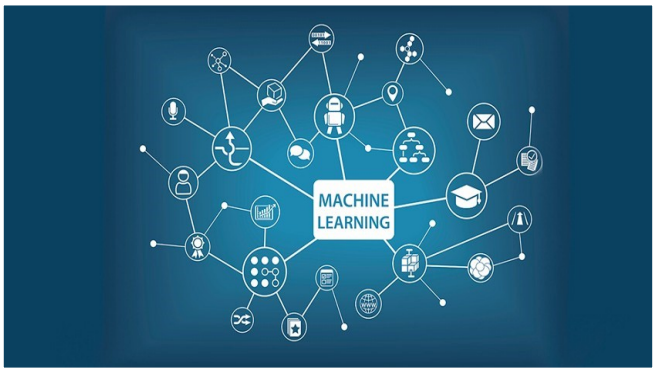
Author

BAMA JAYA-CHANDRAN, Assistant Professor CSE Department,

Artificial Intelligence and machine learning are often used ,especially in the domain of big data.

Artificial intelligence is a broader concept than machine learning, which addresses the use of computers to mimic the intellectual functions of humans. When machines carry out tasks based on algorithms in an "intelligent" manner, that is Artificial intelligence.

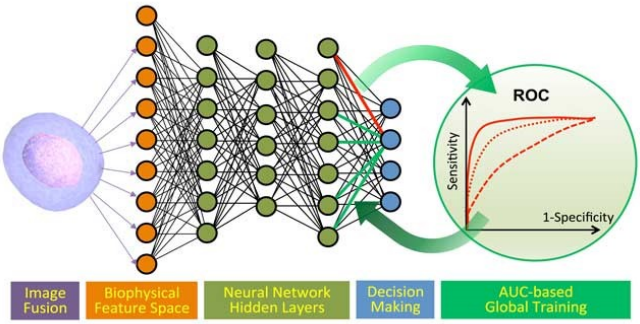
MACHINE LEARNING



Machine learning is a subset of Artificial Intelligence and focuses on the ability of machines to receive a set of data and learn for themselves, changing algorithms as they learn more about the information they are processing.

Training computers to think like humans is accomplished partly with the use of neural networks. Neural networks are a series of algorithms modeled after the human brain. Just as the brain can recognize patterns and help us ategorize and classify information, neural networks do the same for computers. The brain is constantly trying to make sense of the information it is processing, and to do this, it labels and assigns items to categories. When we encounter something new, we try to compare it to a known item to help us understand and make sense of it. Neural networks do the same for computer

DEEP LEARNING



Deep learning goes yet another level deeper and can be considered a subset of machine learning. The concept of deep learning is sometimes just referred to as "deep neural networks," referring to the many layers involved. A neural network may only have a single layer of data, while a deep neural network has two or more. The layers can be seen as a nested hierarchy of related concepts or decision trees. The answer to one question leads to a set of deeper related questions.

Deep learning networks need to see large quantities of items in order to be trained. Instead of being programmed with the edges that define items, the systems learn from exposure to millions of data points. An early example of this is the Google Brain learning to recognize cats after being shown over ten million images. Deep learning networks do not need to be programmed with the criteria that define items; they are able to identify edges through being exposed to large amounts of data.

DEEP LEARNING ON ABNORMAL TISSUE SEGMENTATION USING MRI IMAGES

Author

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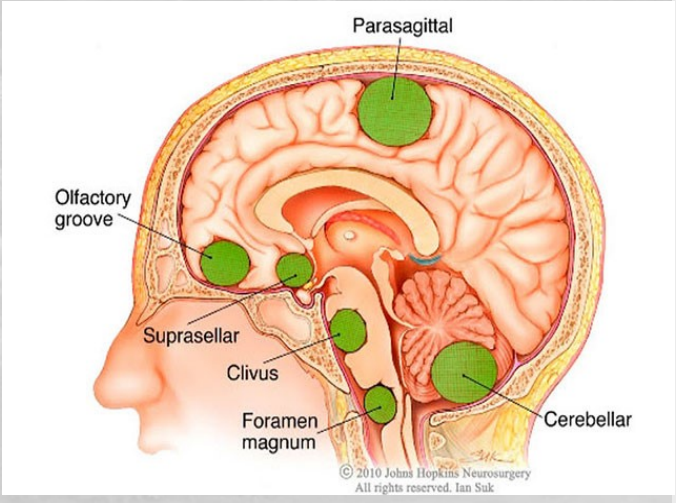
Inside this issue:

Brain Tumor

Brain Tumors are considered to be most fatal among all age groups which is basically abnormal growth of cells in human body. Two categories of Tumors are considered namely mild tumors and advanced stage tumors. Brain tumors segmentation is done using deep learning approach and classification of affected tissues in brain is done using MRI. Mild tumors are generally called primary tumors which do not spread to remaining parts of the human body. Advanced stage tumors spread to other body parts and it is always dreadf

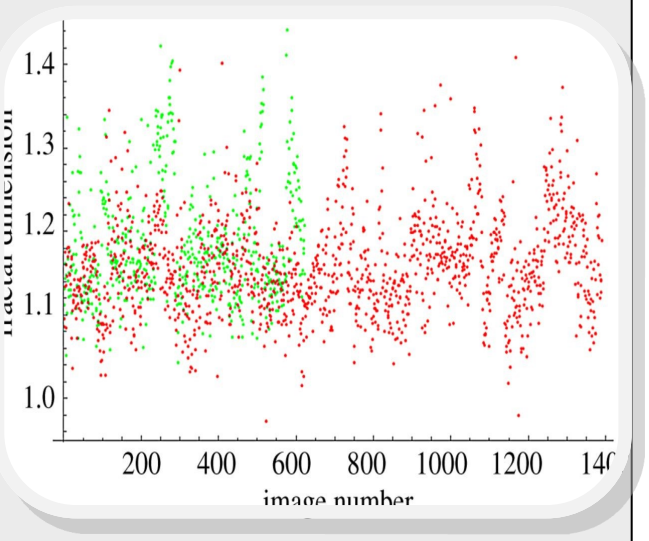


PTPSA Algorithm

PTPSA refers to Piecewise-Triangular Prism Surface Area which is an algorithm used for obtaining the fatal feature. In this the given image is divided into several equal sized rectangular images having length of side as r. Then each sub-image is taken into consideration and the intensity values of pixels in corner are measured and denoted as p1, p2, p3 and p4.Then the magnitude values of all corner pixels are measured which give the 3D plot of corresponding corner pixels.

Fractal Dimension

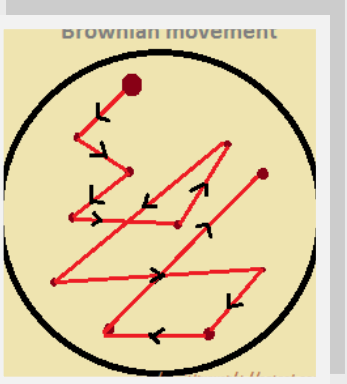
Fractal Dimension (FD) is a real number that describes the fractal property of the object taken into consideration. Using single modality MRI scanning tumor region in a tissue is identified using PTPSA method to compute FD. In PTPSA method the average intensity value of 4 corner pixels is taken as the height of central pixel. Thus four triangles can be formed from the above intensity values.



random movement of microscopic particles suspended in a fluid, caused by bombardment of the particles by molecules of the fluid. First observed in 1827, it provided strong evidence in support of the kinetic theory of molecules

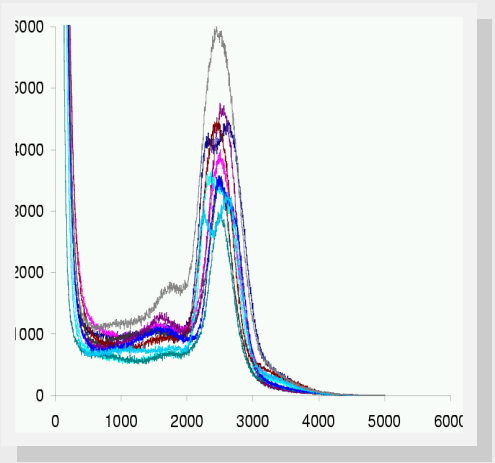
Brownian Movement

Brownian movement is the constant movement of a tiny particle in fluid or gas. The collisions cause random movement of microscopic particles with molecules of the surrounding medium. The motion of the fluid molecules causes the molecules to strike the suspended particles at random. This impact causes the particle to move in a random direction in a fluid.



Standardization of image intensity

Intensity bias in MRI can be calculated using an intensity normalization algorithm which is the foremost important preprocessing step. The tumor image is implemented using two step normalization method where the modification of existing histogram is done. Then modified histogram is matched with mean histogram using the training data approach. After normalization the values of intensity for the same tissue under consideration for various MR images have very narrow set of values.



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ARTIFICIAL INTELLIGENCE

Authors

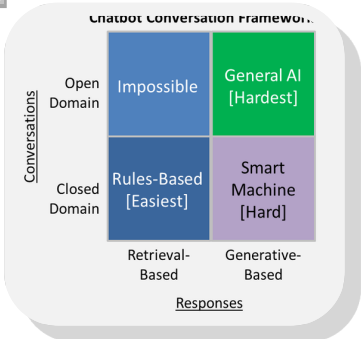
Dr.M.A. Maluk Mohamed , Professor & Director, CSE Department , Arthi ,Assistant Professor IT Department,

Artificial intelligence may be a futurist technology that's functioning on its set of tools nowadays. A slew of advances has been ascertained in previous couple of years: Self-driving cars that have achieved a milestone by work over 300,000 accident-free miles and changing into formally legal in 3 states; IBM Watson that beat 2 champions of Jeopardy!; and applied mathematics learning techniques are conducting pattern recognition on advanced knowledge sets from client interests to trillions of pictures. These developments actually raised the amount of scientists or giants taking interest in AI, that has created it essential for developers to know the bottom realities of building AI applications. the primary issue that strikes developers is,

Which coding domain works well for AI?

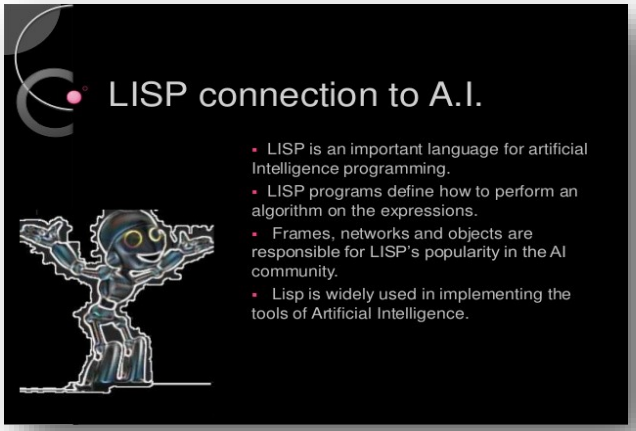
Every coding domain could be a AI language if you are adept in it!

AI programs are written in the majority the programming languages, the foremost common are: Lisp, Prolog, C/C++, recently Java, and even more recently, Python.



LISP

High-level languages like LISP are favored in AI as a result of once a few years of analysis in numerous universities quick prototyping was chosen over quick execution. Trash pickup, dynamic typewriting, functions as information, uniform syntax, interactive surroundings, and extensibility are a number of its feature that produces the language appropriate for AI programming.



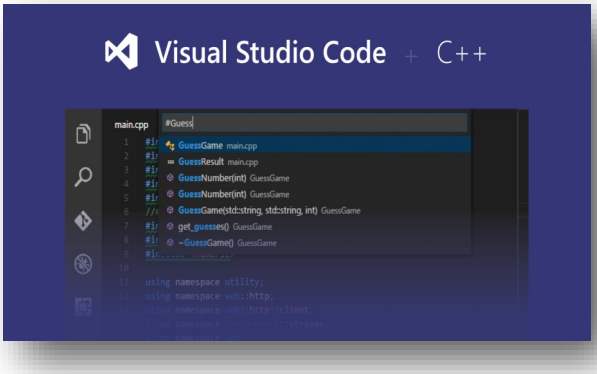
PROLOG

This language comes with an efficient combination of the high-level and ancient benefits of Lisp with a inbuilt unifier, that is especially helpful in AI. It's strength is 'logic based mostly problems'. logic programming provides smart solutions for issues during which logic is intimately concerned, or whose solutions have a compendious logical characterization. Its major downside (IMHO) is that it's arduous to find out.

Prolog is a general-purpose logic programming language associated with artificial intelligence and computati onal linguistics

C/C++

Cheetah of the bunch, C/C++ is generally used once the speed of execution is most significant. it's used principally once the program is straightforward, applied math AI techniques corresponding to neural networks are common samples of this. Back propagation is just one or two of pages of C/C++ code, and wishes each ounce of speed that the technologist will muster.



JAVA

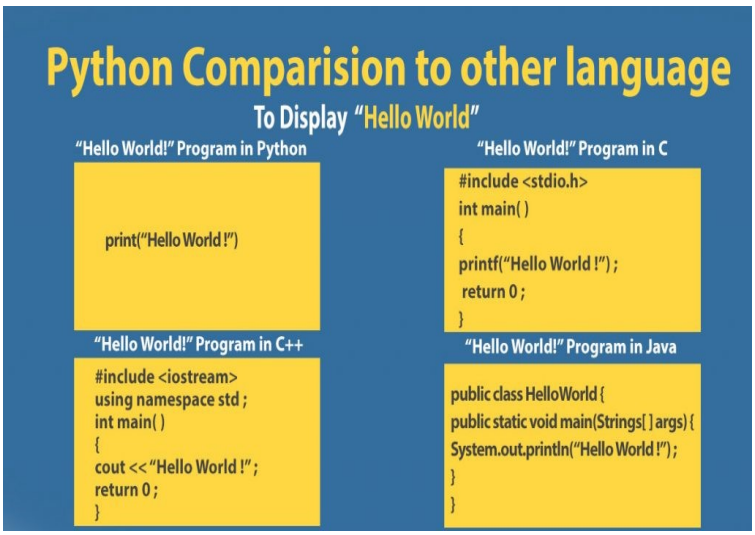
The newcomer, Java uses many ideas from Lisp, most notably trash collection. Its portability makes it fascinating for near to any application, and it's an honest set of inbuilt varieties. Java remains not as high-level as Lisp or logic programming, and not as quick as C, creating it best once portability is preponderant.

PYTHON

Python could be a language with the simplest compilation of Lisp and Java each. According to Norvig is his text scrutiny Lisp to Python, these 2 languages are terribly kind of like one another with some minor variations. There additionally exists JPython, giving access to the Java GUIs. this is often the explanation behind Peter Norvig selecting JPython to translate his programs from his AI book. As JPython allowed him to possess transportable user interface demos, and transportable http/ ftp/html libraries. Therefore, it's superb to use as AI language.

Python is an interpreted high-level programming language for general-purpose programming. Created by Guido van Rossum and first released in 1991, Python has a design philosophy that emphasizes code readability, notably using significant whitespace.

Benefits of victimization Python over the opposite Programming Languages for AI:



Smart quality documentation.
Platform agnostic, and gift in virtually every line distribution. Simple and quick to find out as compared to the other OOP language.

Python has several image intensive libraries like Python Imaging Library, VTK and Maya 3D visualization Toolkits, Numeric Python, Scientific Python and lots of different tools offered for numeric and scientific applications.

Python is incredibly neat, fast, robust, portable, and ascendable. These are obviously the foremost vital factors for AI applications.

Helpful for a very broad vary of programming tasks from very little shell scripts to enterprise internet applications to scientific uses.
Last however not the smallest amount, it's Open Source! Smart community support offered for constant.

Python Libraries for AI

AIMA Python implementation of algorithms from Russell and Norvig's 'Artificial Intelligence: a contemporary Approach'
Py Data log Logic Programming engine in Python
Simple AI Python implementation of the many of the factitious intelligence algorithms delineate on the book "Artificial Intelligence, a contemporary Approach". It focuses on providing a straightforward to use, well documented and tested library.
Easy AI straightforward Python engine for two-players games with AI (Negamax, transposition tables, game solving).

Conclusion:

Python plays a vital role in AI by providing it with smart frameworks like scikit-learn: machine learning in Python, that fulfills virtually each would like during this field and D3.js – Data-Driven Documents in JS, that is one amongst the foremost powerful and easy-to-use tools for visualization. However frameworks, it's quick prototyping makes it a very important language to not be unnoticed. AI wants loads of analysis and thence it's necessary to not need a five hundred kilobyte boilerplate code in Java to check a brand new hypothesis, which can never end the project. In Python nearly each plan is quickly valid through 20-30 lines of code (same for JS with libs). Therefore, it's a reasonably helpful language for the sake of AI.

DEEP LEARNING ON ABNORMAL TISSUE SEGMENTATION USING

Authors

- **Karpoorasundari, Assistant Professor ECE Department,**
- **Syed Moinud-din Bokhari, HOD, ECE department**

"By far, the greatest danger of Artificial Intelligence is that people conclude too early that they understand it." — Eliezer Yudkowsky

Artificial Intelligence

Artificial Intelligence provides the well defined autonomous process for performing the automation through a personal computer that can listen, react like a human in the form of machines. It started ruling the human life from the era of 1950's . "AI can be our friend "says Bill Gates cofounder & billionaire of Microsoft. For example, a spot mini robot has a new trick to open the doors for the house using Boston Dynamics. Artificial Intelligence changes the world in the areas by its self Intelligence in medicine, agriculture, cyber security and chat bots. It also helps to create the paperless offices

AI in Medicine

This field helps in improving the cancer diagnosis i.e. Intel aims to create a one day medicine for cancer patient that cures the cancer disease within 24 hours. AI also helps in keeping the kids safely in US during the year 2016. Nowadays AI plays its vital role along with machine learning using Neural Networks

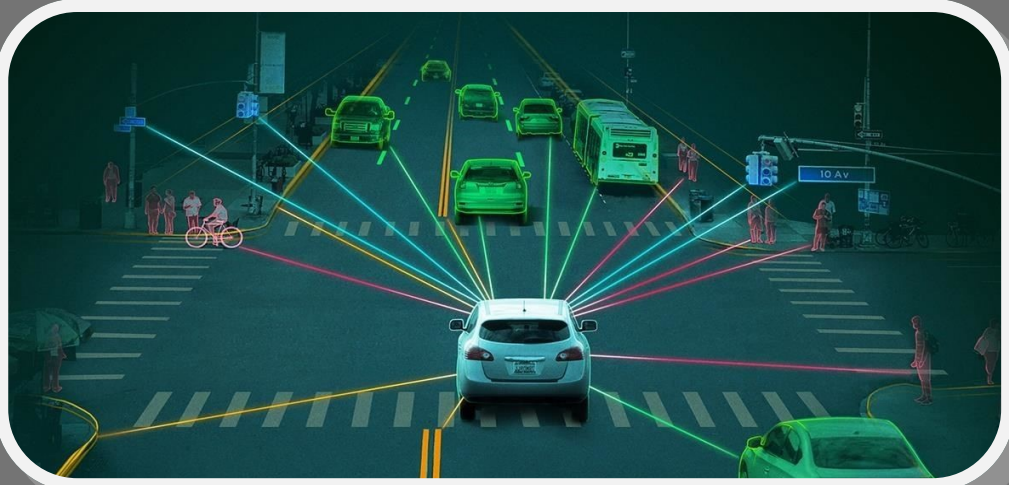
AI in Agriculture

Our honorable prime minister of India Mr. Narendra Modi Quotes that, "Artificial Intelligence drive the human race ".According to his quotes, the farming is also reframed through AI in many ways by means of identifying the best crop that provides the returns through testing the moisture content of the soil, Detecting the presence of insects in the field, Monitoring the growth of the plant through sensors, Picking the fruits & vegetables using robots etc. All the operations are done by predictive analysis, monitoring and robotics. This will enable a transformation of agriculture into digital agriculture.

" Artificial intelligence is growing up fast, as are robots whose facial expressions can elicit empathy and make your mirror neurons quiver." — Diane Ackerman

Self Intelligence Transportation

During the year 2012, Google tested the self driving cars through US department of transportation closer to the full of automation and it is also implemented in buses and trains. In china, one hundred of the self driving buses are produced with full of automation in AI with self intelligence for supporting the tourist from airport and bus stations. Initially it is designed in logic theorist that can able to reduce the problem solving skills in the human.



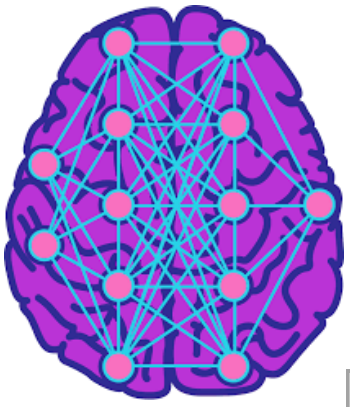
AI in Robotics

According to the BBC, the robots are not robots. It can do the machines function with the integration of AI. At present, it prevents the human workers from the fumes and harms produced during welding through Robot Worx. During the year 2016, a friendly robot named "Pepper" was introduced in U.S and sold around 1000 Units. It can read the human emotions easily and develop its own emotions for making its friend happy. Many more AI based robots are also developed for helping the human. Apart from the positive impact on society, one more drawback is there' "whenever the task is not completed fully, it makes the human expectations into low. Yes, Some flaws are there where the human can satisfies.

https://www.reasoning.world/artificial-intelligence-is-not-a-threat-to-society/
https://www.weforum.org/agenda/2018/07/chinese-internet-giant-baidu-has-just-rolled-out-self-driving-buses
www8.cao.go.jp/cstp/tyousakai/ai/summary/aisociety_en.pdf

AI in Cyber Security

Intelligence is the key word that denotes what AI stands for? Without Intelligence , AI will not exist. If a security is needed, there also intelligence is also a mandatory word. AI plays the vital role in terms of child theft, frauds that happen in insurance, Banking Services etc. the first Yoky Matsuka of Nest believes that AI will become useful for people with amputated limbs, as the brain will be able to communicate with a robotic limb to give the patient more control. This kind of cyber technology would significantly reduce the limitations that amputees deal with on a daily basis.



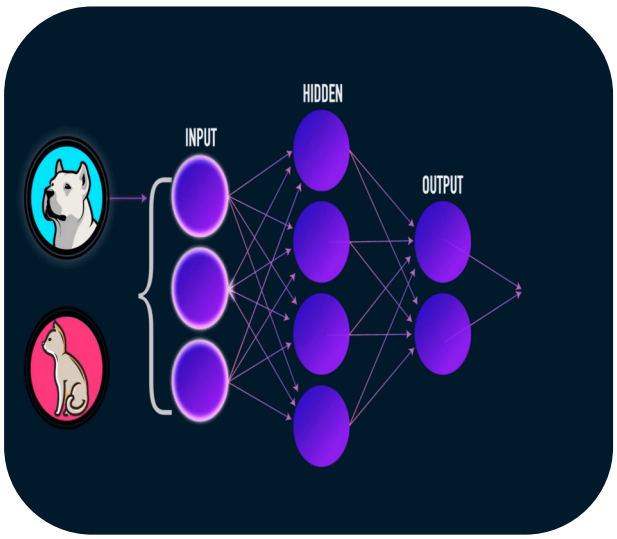
DEEP LEARNING ON ABNORMAL TISSUE SEGMENTATION USING MRI IMAGES

Authors

V. Praveenkumar[1], Assistant Professor ,, B.Syed Moinuddin Bokhari" Head ECE Department

Introduction:

In today automation world, neural network plays a major role in designing intelligence systems. Decision making in the intelligence systems primarily depends on the layers in the systems. As we already know that neural networks have the aggregation of layers. Each layer has its own transformation on their inputs in order to get the optimized results in decision making. A neural network has a minimum of three layers. The first layer is input layer and output layer is the last layer. Hidden layer is present in between the two layers. The number of hidden layers is based on the designed intelligence system. Artificial neural networks contain a set of synapses are characterized by weight and strength of its own.

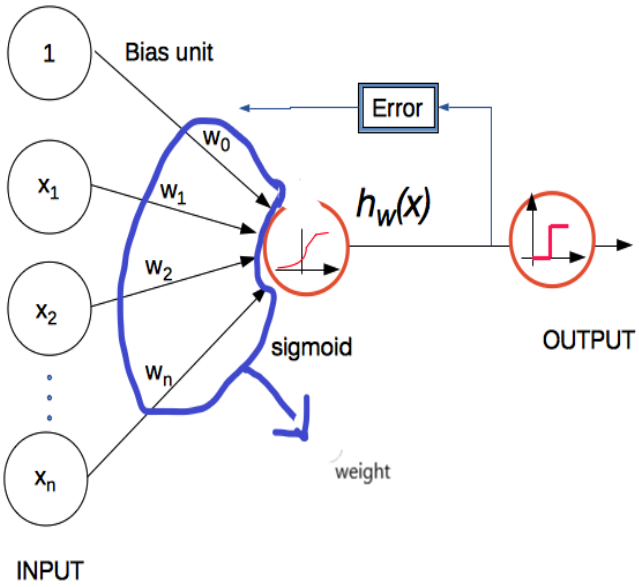


- **Reve-nue** growth.
- **Self**-service rate.
- Satisfaction rate.
- **Activa-tion** rate
- Confusion triggers

Metrics:

The following metrics are influencing the optimization of decision making.

Weight Factor:

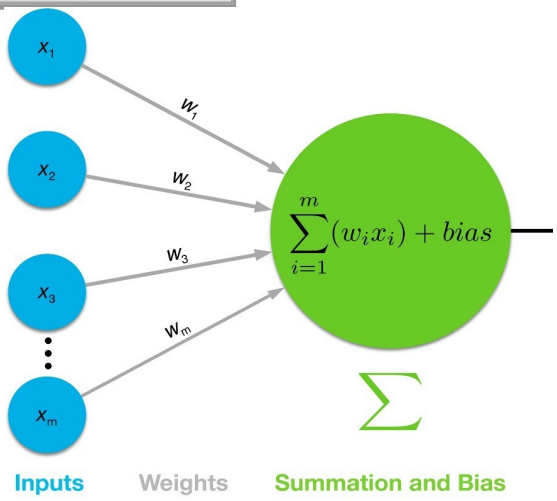


Neurons in the input layer have weights (adaptive coefficients) which are added to the input signals and are given to the summation functions. Weights are the measurement of input strength. During the training set weights are adjusted to get the optimized results.

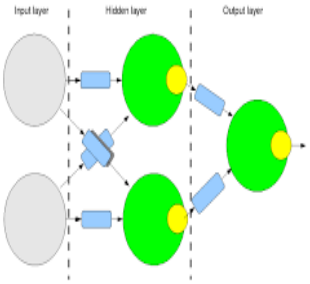
Summation Function:

The weighted input signals are added in the first processing element called summation function. Consider the inputs (i_1, i_2, ... , i_n) and corresponding weight vectors (w_1, w_2, ..., w_n) for the given neural network. By multiplying input and weight vectors and adding these products collectively called summation function which is a single number. The weights are changed each and every time to get optimization.

Summation function = $i_1 w_1 + i_2 w_2 + \ldots\ldots + i_n w_n$



Activation Function:



The output value in the previous section is given to the activation function before passed to transfer function.

The main purpose of activation function is to allow the summation function output changes over time. There are several types of activation function which are chosen based on the type of task oriented networks. The common ones are: the Linear, the Step, the Ramp, the Sigmoid and the Gaussian functions.

Transfer Function:

The weighted sums of summation function are transformed to a working output through an algorithmic process known as the transfer function. In the transfer function the summed total is compared with some threshold to determine the neural output. If the sum is greater than the threshold value, the processing element generates a signal. If the sum of the input and weight products is less than the threshold, no signal (or some inhibitory signal) is generated. Both types of response are significant.

Generally the threshold value is non-linear. The non-linear fashion of threshold values makes it possible for optimized results. In addition to that the noise is added with the transfer function to get optimized results in the real time environments.

Abstract

High-dimensional data can be converted to low-dimensional codes by training a multilayer neural network with a small central layer to reconstruct high-dimensional input vectors. Gradient descent can be used for fine-tuning the weights in such “auto encoder” networks, but this works well only if the initial weights are close to a good solution.

Scaling and Limiting:

The transfer function results pass through the scale and limit processes. Scale function adds the offset value to the transfer function and the limit function ensures the transfer function within the bound. This limiting is in addition to the hard limits that the original transfer function may have performed.

Output Function (Competition):

Each neuron produces one output signal, which it may give to hundreds of other neurons. Generally, the transfer function's result is the output of the processing element. Some network topologies change the transfer result to compete with neighboring elements inhibiting processing elements unless they have great strength. Competition can occur at one or both levels. First, competition determines which artificial neuron will be active or provides an output. Second, competitive inputs help determine which processing element will participate in the learning or adaptation process.

Error Function and Back-Learning Function:

Error is calculated based on the differences between the expected outputs with obtained output in most of the learning neural networks. By using error function the error value is squared or cubed to fit their specific purposes. This error value is back-propagated to the previous layers to adjust the weights to get

Its purpose is to modify the weights on the inputs of each processing element in the neural network according to some neural based algorithm.

Conclusion:

For the effective predictions of neural networks in the intelligence systems, it is necessary for improving the learning process of the system by adjusting the metrics. In this article we discussed the metrics in neural networks in a brief man-

References:

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Application of Artificial Intelligence in Agriculture

The world's population has recently touched 7.6 billion and is continuously growing. Accordingly, the test for the following decades would be to supply the requirements of the growing total populace by building up a very beneficial farming administration, while safeguarding the nature of the earth. However, a vast majority of the developing nations including India are confronting agrarian work deficiency issues. In India, over 58 percent of the households depend on agriculture as their principal means of livelihood.
A noteworthy part of young people from the towns has moved to the cities for a better quality of life. Subsequently, farming tasks get deferred amid its peak seasons because of lack of workforce.

In order to cope with the growing problems of climate change and rapid industrialisation, the agricultural sector is in dire need of automation and advanced technology. For our lives to become better the most advanced technology should reach the hands of the people who are the creators of the food we thrive on every day. In order to realize this the Indian government has encouraged the development of several start-ups which aid in creating the appropriate technology to satisfy the everyday needs of the farmer.

In this article, the major contributions of several start-ups based on artificial intelligence have been discussed. The challenges that may occur in the application of AI to agriculture have also been highlighted.

GROWTH OF ARTIFICIAL INTELLIGENCE BASED APPLICATIONS IN THE AGRICULTURAL SECTOR

A year spent in artificial intelligence is enough to make one believe in God." —Alan Perlis

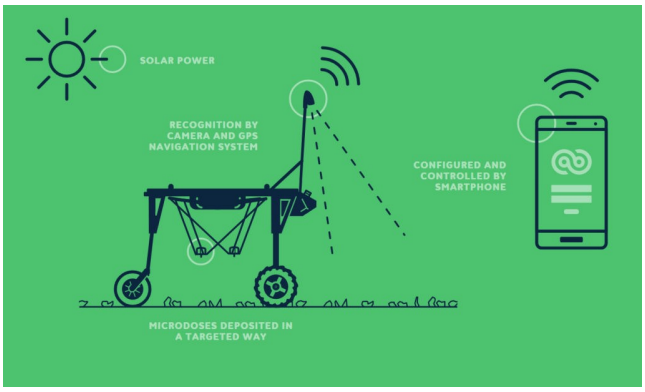
The major contributions of artificial intelligence to the agricultural sector fall under the following

Development of agricultural robots.

Predictive analysis.

Monitoring of crop and soil conditions.

AGRICULTURAL ROBOTS



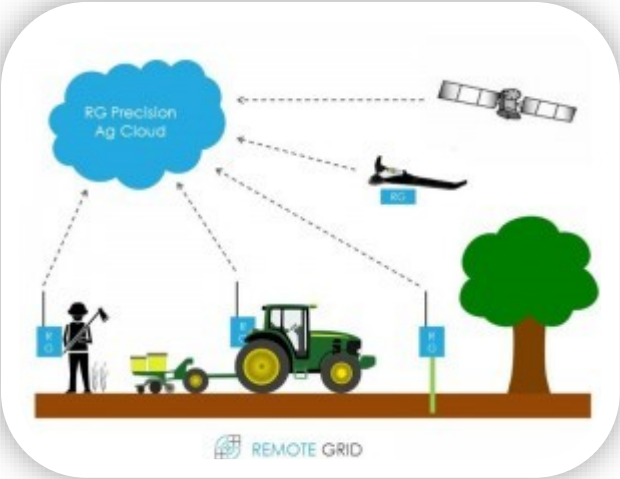
Customary cultivating techniques battle to stay aware of the efficiencies required by the market. Ranchers in developing nations are experiencing an absence of workforce. The ascent of robotized cultivating is an endeavour to tackle these issues. Creating self-sufficient robots is assuming a huge part in rural generation and administration. Till date, the rural robots have been used chiefly to harvest, compound splashing and picking fruits. The robots have the potential for multitasking, tangible sharpness, operational consistency and are also suitable for odd working conditions.

The development of these type of bots has occurred on a large scale around the globe .In the past few years several kinds of robots for varied applications have been developed by the European countries like the MF-Scamp Robots Designed by Blackmore, Autonomous Plant Inspection (API) Research Platform designed by Danish Institute of Agricultural Science (DIAS), ISAAC-2, Bonirobo developed by Germany, Lettucebot developed in California and Hortibot in New Zealand In India, one of the recent developments was the development of a farming robot named Agribot developed by the students of BIT, Hyderabad.

The main aim was to build the efficiency, speed, application exactness of the work and limiting the work of the ranchers. Its real zone of capacity was harvesting, spraying, seeding and evacuating the weeds. This robot was intended to execute the fundamental capacities required to be done in farms. A dream based line direction technique is utilized to control the robot stage driven along the harvests planted. The framework incorporates a camera prepared to give a live vision of the field. The primary deterrent to this sort of robot is that agricultural lands are a piece of nature and nature is not uniform which makes the development of the physical structure suitable for the agrarian conditions difficult.

PREDICTIVE ANALYSIS

Predictive analysis is one of the most useful techniques that can be used to aid the farmers, predict the soil and weather conditions before preparing the bed for sowing or application of fertilizers. While developing an application for this purpose the following steps must be considered.



Around the globe, several applications have been developed by start-ups which have utilized Big Data Analytics and Internet of things to solve various agricultural issues like the presence of excessive nitrogen and other parameters in the soil. In India, two major applications were developed which used the predictive analysis technique. Microsoft in collaboration with ICRISAT (International Crops Research Institute for the Semi-Arid Tropics), developed an app that used machine learning and business intelligence. The farmers who were interested in using the application were sent messages which provided them with information about the best sowing time. The major advantage of this development was that the installation of sensors in the fields was eliminated. The effectiveness of the app was tested by introducing it in Andhra Pradesh. A database was created by collecting the data related to the climatic conditions of the past 30 years.

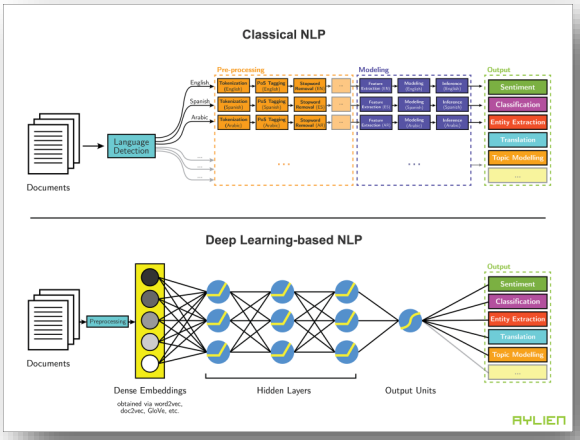
The optimal sowing period was determined by calculating the soil moisture index so that the crops receive adequate water during the sowing period. The above app developed was highly beneficial and it clearly indicated the increase in productivity of farms. This development became an instant hit among the farmers as it did not require

MONITORING CROP AND SOIL CONDITIONS

Artificial intelligence can be applied for continuously monitoring the soil and crop conditions. A large number of Indian start-ups have developed varied applications for this purpose.

Using Deep Learning for Image Analysis

The use of deep learning technology helps in creating a large database which can hold information in the form of images about the various aspects of the crops cultivated. This helps in determining the nature of the seeds before they are sowed and also in determining the type of infections that may attack the crops. The utilization of this innovation gives propelled picture acknowledgment that can perceive objects, faces, fauna and label them in any picture. The main advantages are receiving alerts on crop Infestation and proper grading of seeds.



CONCLUSION

Agriculture is an inevitable part of human life regardless of the people practicing it. The changing culture and climatic conditions have made the traditional practice of agriculture counter-productive. AI- based technologies help in improving the efficiency of the agricultural practices and thus the quality of the produce.

In this article, various AI techniques and their application through various start-ups were highlighted. However, the use of these advanced technologies are just emerging and the improvement in the agricultural production is the evidence for the success of these technologies. It is estimated that in the next five years agricultural robots would be adopted all around the world. The database used in predictive analysis techniques should be enhanced using deep learning to suit the varying environmental conditions. Thus in order to meet the ever-growing demand of the ever-increasing population, it is high time that all developing countries adopt these techniques.

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