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**Seminar Report**

**On**

Crop Scanning Application using Machine Learning

Submitted By

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**(Computer Science & Engineering)**

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**CERTIFICATE**

This is to certify that, the Seminar entitled “**Crop Scanning Applicati-on Using Machine Learning**” submitted by **Anup Bhade** is a bonafide work completed under my supervision and guidance in partial fulfillment for award of Bachelor of Technology (Computer Science and Engineering) Degree of Dr. Babasaheb Ambedkar Technological University, Lonere.

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**Abstract**

Machine learning is a trending technology nowadays and it can be used in modern agriculture industry. The uses of ML in agriculture helps to create more healthy seeds.

The principle that [**Arthur Samuel**](https://en.wikipedia.org/wiki/Arthur_Samuel) used earlier in machine learning experiments are used in today’s modern agriculture. Artificial machine learning in agriculture is one of the fastest growing areas. Artificial techniques are being used in the agricultural sector to increase the accuracy and to find solutions to the problems.

Agriculture plays a very pivotal role in the global economy of the country. Due to the increase in population, there is constant pressure on the agricultural system to improve the productivity of the crops and to grow more crops.

This is a machine learning application which includes image processing along with machine learning. This is a crop scanning app that will scan the crops and tell the type of crop also it will tell the present state of the crops and if there is any fault in crop it will also detect that and give the best solution available till date.

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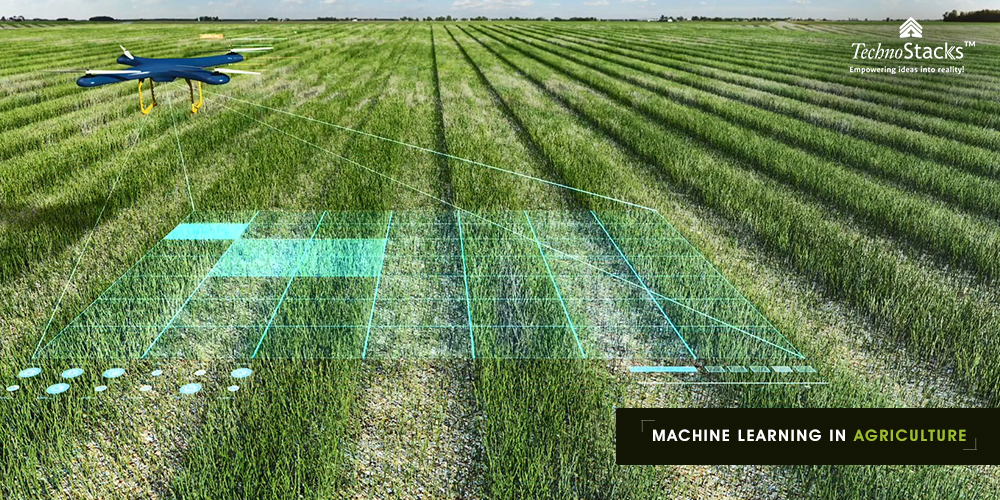
**INTRODUCTION**

Machine learning is a trending technology nowadays and it can be used in modern agriculture industry. The uses of ML in agriculture helps to create more healthy seeds.

The principle that [**Arthur Samuel**](https://en.wikipedia.org/wiki/Arthur_Samuel) used earlier in machine learning experiments are used in today’s modern agriculture. Artificial machine learning in agriculture is one of the fastest growing areas. Artificial techniques are being used in the agricultural sector to increase the accuracy and to find solutions to the problems.

Agriculture plays a very pivotal role in the global economy of the country. Due to the increase in population, there is constant pressure on the agricultural system to improve the productivity of the crops and to grow more crops.

Machine learning is the scientific study of algorithms and statistical models that computer systems use to effectively perform a specific task without using explicit instructions, relying on patterns and inference instead.



In machine learning agriculture, the methods are derived from the learning process. These methodologies need to learn through experiences to perform a particular task. The ML consists of data that are based on a set of examples. An individual example is defined as a set of attributes. These sets of characteristics are known as variables or features. A feature can be represented as binary or numeric or ordinal. The performance of the machine learning is being calculated from the performance metric.

The performance of the ML model improves as it gains experience over time. To determine the performance of ML models and the machine learning algorithms agricultures various mathematical and statistical models are used. Once the learning process is completed, then the model can then be used to make an assumption, to classify and to test data. This is achieved after gaining the experience of the training process. 

**Machine Learning Functions**

It can be divided into two categories, namely supervised and unsupervised learning.

* Supervised Learning

In this machine learning agriculture method, the input data is represented with examples to the corresponding outputs. The primary goal of this function is to create a rule that will map the inputs to the corresponding outputs. In some cases, the inputs might not be available that may lead to missing output. The trained model is then used in supervised learning to predict the disappeared production and then the data is being tested.

* Unsupervised Learning

In this machine learning agriculture technique, there is no difference between the trained models and the test sets, while unlabeled data is being used. The goal of this method is to find the hidden patterns.



What the project is all about?

* This is a machine learning application which includes image processing along with machine learning. This is a crop scanning app that will scan the crops and tell the type of crop also it will tell the present state of the crops and if there is any fault in crop it will also detect that and give the best solution available till date.

What is the Propose of this project?

The purpose of this project is to use the power of science in the field of agriculture and make the agriculture more productive day by day by increasing farmers yield as well as help them to obtain the healthy crop.

About Application-

The application will work on both Android and ios platforms and will be available free of cost. It will be easy to use and will be able to work in many different languages to be farmer friendly. Addition to that farmers can also buy best natural pesticides for their crop at the minimal rate.

**LITERATURE SURVEY**

Image processing is prominent in the area of science and technology, agriculture, biological image processing, face/iris/image recognition and many other fields. The goal of image processing is to enhance or compress image information whereas in machine learning, it is used to optimize differentiable parameters so that a certain loss or cost function is minimized. So, combination of these two has led to a better conception about recognition and processing of images. There are many fields and uses where, frameworks that analyze images could have much benefit. From high-tech uses to areas like agriculture, image recognition etc., frame works benefit the community and improve quality of life. Extraction and machine learning algorithms provide a viable approach to creating such a system. For e.g. Google Cloud Vision API enables developers to understand the content of an image by encapsulating powerful machine learning models in an easy way. In this paper, we have discussing about various researches carried on image processing using machine learning framework.

Keywords: Image processing, Machine learning, Image.

In today’s world, where information and technology dominates with the graphical advancement, images play an increasingly important role in many aspects. Likewise, image processing is also defined in the area of science and technology, agriculture, biological image processing, face/iris/image recognition etc. In contrast to past, it is very easy for everyone to generate complex graphical images, thanks to the great move in digital technologies. With such a bounty of pictures, conventional picture preparing strategies need to adapt more mind boggling issues and need to confront their flexibility as per human vision. Traditional image processing has faced with extreme pitfall. With the initiation of image datasets and benchmarks, machine learning and image processing have recently received a lot of attention. An ingenious combination of machine learning in image processing is persuasive to this field, which will lead to a better conception about images[1].The strategy utilizes an inductive learning calculation to create generation rules from preparing information. The quantity of image processing calculations that join some learning parts is required to increment, as adjustment is required. Notwithstanding, an expansion in adjustment is regularly connected to an expansion in multifaceted nature, and one needs to proficiently control any machine learning system to legitimately adjust it to image processing issues. In reality, preparing enormous measures of images means having the capacity to prepare enormous amounts of information regularly of high measurements, which is risky for most machine learning 1 Department of Software Technology Aloysius Institute of Management and Information technology, Mangalore, Karnataka, India. 2 Department of Software Technology Aloysius Institute of Management and Information technology, Mangalore, Karnataka, India. 3 Department of Software Technology Aloysius Institute of Management and Information technology, Mangalore, Karnataka, India. International Journal of Latest Trends in Engineering and Technology Special Issue SACAIM 2016, pp. 425-428 e-ISSN:2278-621X Machine Learning in Image Processing – A Survey 426 strategies. Accordingly, an association with the image information and with image priors is important to drive show determination systems. This paper surveys certain areas in Image processing where machine learning was applied and is discussed in the following section. II. LITERATURE SURVEY J.Stallkampet al.,in the year 2012 discussed about traffic signs that are portrayed by a wide fluctuation in their visual appearance in true situations. Changes of brightening, differing climate conditions and halfway impediments affect the impression of street signs. Practically speaking, an extensive number of various sign classes should be perceived with high precision. Use of neural networks has been explored here and also many image processing algorithms were implemented for humans to do tasks in ease[2].Regardless, none of the machine learning systems can deal with input images of variable size and point extent as present in the dataset. The standard approach is scaling of the images to a settled size. This can bring about issues when the outlook measure is distinctive between the first and the target sizes. Besides, it disposes of data in bigger pictures or presents antiquities assuming extremely little pictures firmly amplified. People are well prepared to do perceiving activity indications of various sizes, regardless of the possibility that is seen from sharp edges. Specifically, they are as of now taking a shot at a benchmark dataset for the discovery of activity signs in full camera pictures. FarshidArmanet al.,in the year 2002, introduced an encoded video sequences antecedent to that of decoding. The approach exploits the data contained in the DCT coefficients of MPEG or JPEG encoded video groupings. The framework has been tried in [3] effectively on different video groupings, counting gatherings, presentations, individual meetings, and others. Chich-Fong Tsai and Wei-Chao Lin, in the year 2011 has presented a paper on image retrieval using meta feature representation. Since the span of picture accumulations increments quickly, e.g. individual or potentially stock photographs, restorative pictures, and so on, successful administration of these picture accumulations has turned into a critical research issue in picture recovery. Specifically picture recovery strategies have been effectively created with a specific end goal to satisfy mechanical request, i.e. to work on substantial scale picture accumulations. What's more an effective picture recovery framework is skilled of successfully ordering picture databases to recover pictures with high or attractive exactness as well as review. At the end of the day given a question the point of picture recovery frameworks is to recover many comparative (or pertinent) pictures that is allowed [4]. M.MonicaSubashinietal.,in the year 2016proposed a strategy to build up a non-obtrusive technique for the recognizable proof utilizing attractive thunderous images. The procedure includes pre-processing, image segmentation, feature extraction, isolation, and constructor clarifiers are done on the premise of accuracy, efficiency and slipped by time. The results revealed by the system are robust and accurate in [5], consumed less time in degradation. Steve A. Chien and Helen B. Mortensen,in the year 1995,examined about multi-mission, VICAR organizer, an Artificial Intelligence framework which utilizes information about image handling steps and their necessities to build executable image preparing in scripts to bolster abnormal state science demands. This article portrays a general AI arranging way to deal with computerization and utilization of the way to deal with a particular region of picture preparing for planetary science applications including radiometric correction, colour triplet [6]. Hidetoshi Andoet al.,in the year 2016,discussed how images depends on the grouping for normal pictures and effectively takes a shot at the late accomplishments utilizing profound learning systems.On the other hand, they discusses how image order strategies of deformities Adithya.AK, KavyaRamesh and Hemalatha N 427 in modern items are for the most part kept secret, partly in light of the fact that inadequate pictures contain extremely delicate data about the items and the classified assembling advances. They likewise made utilize of GPU to quicken both image preparing to help recognition of deformities and machine learning. They proposed the blend of profound neural systems with irregular backwoods classifier for image characterization of film deformities, which performed better than utilizing both of the two systems alone [7].By utilizing irregular woodland as the classifier of the profound convolutional arrange, they accomplished general accuracy of 97.1% which is superior to utilizing neural systems for the classifier. This blend strategy can likewise be utilized for different sorts of deformity pictures. Because of picture attributes, some sort of deformity images were difficult to arrange decisively, and they will keep on enhancing the arrangement exactness utilizing some different thoughts which were not tried, including picture information expansion, alteration of neural system structure and layer parameters et cetera. It would be exceptionally intriguing to perceive how more current sorts of profound neural systems. Martin Kiechleet al., in the year 2015, proposed a model for showing the relationship between two image modality by providing the analysis model in a joint co-sparsity setup. The coupled analysis operators were introduced by minimizing the joint co-sparsity function, through a conjugate inclination strategy on a proper complex process. The identifying virtueof the introduced model was examined in two different applications [8]. First, it was used for regularized inverse problems in imaging, and second they considered the problem of bi-modal image registration. An algorithm was proposed that used an afore pair of bi-modal analysis operators to register the intensity, depth and NIR images. DominikMaximilian Ramiket al., in the year 2014, have proposed an intelligent machine learning system with the potentiality of independent learning of objects present in real environment.In its origination they were motivated by early phases of human visual framework. In this concept they have put forward an algorithm for salient detection of objects with the advantage of photometric invariants. The algorithm has low problems and can be processed in real-time on simultaneous processors[9]. This algorithm is the main key part of the present machine vision system. In their illustration, the detection of salient objects were efficiently used for preparing the second key part of the framework, which is the machine learning-based object detection and recognition unit. III. CONCLUSIONS This paper discusses various cases where images in the form of video sequences, traffic signals etc has been dealt with and machine learning framework being used in this fields. It was found that, machine learning presented a new model that helped in processing images in a better way.It was implemented in image processing to overcome all problems that was faced earlier. It provides a viable approach to create such a framework. The recognition of the content of images was not successful as in case of diagnosing phases, but successful enough to warrant more attention and research in this area.

**Brief on System-**

Humans have a great capability to distinguish objects by their vision. But, for machines object detection is an issue. Thus, Neural Networks have been introduced in the field of computer science. Neural Networks are also called as ‘Artificial Neural Networks’. Artificial Neural Networks are computational models of the brain which helps in object detection and recognition. This paper describes and demonstrates the different types of Neural Networks such as ANN, KNN, FASTER R-CNN, 3D-CNN, RNN etc. with their accuracies. From the study of various research papers, the accuracies of different Neural Networks are discussed and compared and it can be concluded that in the given test cases, the ANN gives the best accuracy for the object detection. Keywords- ANN, Neural Networks, Object Detection. 1. INTRODUCTION Artificial Neural Networks is a type of artificial intelligence that attempts to simulate the way a human brain works. Rather than using a digital model, in which all computations manipulate zeros and ones, a Neural Network works by creating connections between processing elements, the computer equivalent of neurons. An ANN is configured for a specific application, such as pattern recognition or data classification, through a learning process. Learning in biological systems involves adjustments to the synaptic connections that exist between the neurons. This is true for ANN’s as well Why Artificial Neural Networks? 1. Adaptive Learning: An ability to learn how to do tasks based on the data given for training or initial experience. 2. Self-Organisation: An ANN can create its own organisation or representation of the information it receives during learning time 3. Real time Operations: ANN computations may be carried out in parallel and special hardware devices are being designed and manufactured which take advantage of this capability. 4. Fault Tolerance via Redundant Information Coding: Partial destruction of a network leads to the corresponding degradation of performance. However, some network capabilities may be retained even with major network damage. 2. OBJECT DETECTION TECHNIQUES Images of objects from a particular class are highly variable. One source of variation is the actual imaging process. Changes in illumination, changes in camera position as well as digitization of artifacts, all produce significant variations in image appearance, even in a static scene. The second source of variation is due to the intrinsic appearance variability of objects within a class, even assuming no variation in the imaging process. Object detection involves detecting instances of objects from a particular class in an image. 2.1 Object detection in images using artificial neural networks and improved binary gravitational search algorithm in this paper, Artificial Neural Network (ANN) and Improved Primary Gravitational Search algorithm (IBGSA) have been used to detect object in images. Watershed algorithm is used to segment images and extract VIVA-Tech International Journal for Research and Innovation Volume 1, Issue 1 (2018) ISSN(Online): 2581-7280 Article No. 9 PP 1-9 2 www.viva-technology.org/New/IJRI the objects colour, feature and geometric elements are separated from each question. IBGSA is utilized as a best technique to locate subset of components for array arranging coveted items. The reason for utilizing IBGSA is to diminish intricacy by choosing remarkable components. Object recognition is an issue in clutter background, objects can be in various pose and lighting. Part base technology encode the structure by utilizing an arrangement of patches covering essential parts of an objects. In 3D ECDS, the edges of different objectives are segregated and the spatial relation of the same object is kept as well. A method of object detection that can combine the feature reduction and feature excerpt of PCA and Ada Boost. Method: In the current paper, Watershed, ANN and IBGSA are used for object detection. A lot of feature have been extracted from all these objects. Applying all these feature is time consuming and could grow calculation complexness of training ANN. Determining appropriate feature for knowledge can be used for this goal. For Example: there are some objects which automatically finds proper feature for object detection. In this methods selecting features from training objects are evaluated. KNN classifier has low accuracy but high speed and recurrence of utilizing classifier in determination process. It is used as a part of this progression. By the point of upgrading the assessment work that is exactness of KNN classifier. In way of choosing highlights, because of its high effectiveness, ANN is utilized as a classifier, chosen highlights are utilized as a classifier, and chosen highlights are utilized for preparing ANN. Advantages: IBGSA is very useful in reducing extracting feature, which helps classifier for faster result. Dis-advantages: It uses KNN which have low accuracy as a classifier, but a good speed. 2.2 Comparison of Faster R-CNN models for object detection [2] Object detection is a critical issue for machines. Faster R-CNN; one of the state-of-art object detection methods, approaches real time application. Moreover, computational impends on model and image crop size, yet accuracy is like-wise influenced; normally, time and accuracy have inverse relation. By altering input image size inspite downgrading performance, computation time meets criteria for one model. In this paper, they have changed over a few best in class models from the Convolution Neural Network (CNN). At that point, we contrast changed over models and few picture edit estimate as far as calculation time and location accuracy. Examination information will be used for choosing an appropriate identification demonstration on the off chance that a robot needs to play out a question local assignment. Method CNN based feature extraction, features from RPN and CNN are taken by CNN. The CNN architecture from classification is used by extracting the feature from the image. Now CNN and RCNN is initialized by weights of CNN trained from image classification. Region Proposal Network. CNN features pass small convolution network which perform a similar role to a hidden fully connected layer, and collectively thousands of anchors covering most region of image quality. Non-Maximum suppression is used to get regressed anchors before selecting ROI from anchors. Region based CNN: Each ROI is classified and its box is regressed using the fast R-CNN. The feature from CNN are cropped by each ROI and only cropped features are pooled. Then pooled, features pass some hidden fully connected layers. Finally, they gather bounding boxes with scores. Additionally bounding boxes using Non Maximum suppression to avoid duplicated detection. Converting architecture Exchange last pooling layer of CNN with ROI pooling layer. Last Classification layer of image classification with classifier and regression layer of Faster-RCNN. Advantages: Computation time has been rapid due to use of faster RCNN along with VGG16 Dis-advantages: Enhancing time drastically diminishes performance. VIVA-Tech International Journal for Research and Innovation Volume 1, Issue 1 (2018) ISSN(Online): 2581-7280 Article No. 9 PP 1-9 3 www.viva-technology.org/New/IJRI Use of Faster-RCNN lead to lower in accuracy rate. 2.3 Detecting objects affordances with convolution neural networks [3] A novel and real time method is shown to distinguish object affordances from RGBD pictures. This technique trains the Deep Convolution Neural Network (CNN) to learn profound features from the input data in an end-to-end manner. The CNN has an encoder-decoder design so as to get smooth label prediction. The information are represented to as various modalities to give the system a chance to take in component all more successfully. Technique sets another benchmark on identifying order of object affordances enhancing the precision by 20% in correlation with cutting edge strategies that utilized hand-outlined geometric component. Besides this they apply direction strategies on a full size humanoid robot. Human have a great capability to distinguish object by our vision. This helps in daily process of handling the objects. For a robot, detecting an object is essential to allow to interact with environment safely. Normally everybody used RGB-D images or point cloud data. The benefit from this action leads to successful grasping action but fails in detecting other type of object affordances. Here unlike hand designed features are used, they treated this problem as pixel wise labelling task and use CNN to learn deep features from RGBD images. They show large CNN can be trained to detect object affordances from rich deep features. The affordances is studied quiet long time back in computer and robotics field. Data representation: Normally RGB-D images and cloud/depth images are used for training, but it is impossible to train a CNN by using limited dataset and having limited time. So a new methodology is being encrypted: Horizontal disparity, Height above ground and Angle between each pixels surface and normal (HHA) Advantages: It is a novel method that has improved result than that of state-of-art method for object detection. Dis-advantages: Grasping method based on object affordances is limited to surfaces that fit the region. 2.4 3D Shape nets: A deep representation for volumetric shapes [4] 3D pattern is crucial but is heavily underutilized in today’s computing system, mostly due to lack of good generic shape representation. With recent availability of inexpensive 2.5D depth sensors, it is becoming increasingly important to have a powerful 3D shape representation in loop. Apart from this recognition, recovering full 3D physical body from persuasion based. 2.5D depth mathematical function is also critical part of visual understanding. To this end, they propose to represent a geometric 3D shape as a chance distribution of binary variance of 3D Voxel Grid, using Convolution Deep Network. They have a 3D shape Nets, learns the distribution of complex 3D shapes across different objectives categories and arbitrary pores from raw CAD data and discovers hierarchical composition but representation automatically. It naturally support joint object recognition from 2.5D depth maps. Usage of 3D shape nets When provided with depth map of an object, it converts it into volumetric representation and identifies the observed surface and thus distinguishes it between free space and occupied space. 3D shape Nets can recognize object category complete all 3D shape and predict next best view if initial recognition is uncertain. 3D shape Nets to represent a geometric 3D shape as a probabilistic distribution of binary variables on a 3D vessel grid. To train this 3D deep learning model, they construct Model Net, a large scale object dataset of 3D computer graphics CAD models. Advantages: VIVA-Tech International Journal for Research and Innovation Volume 1, Issue 1 (2018) ISSN(Online): 2581-7280 Article No. 9 PP 1-9 4 www.viva-technology.org/New/IJRI 3D representation for object and a convolution deep belief network to represent a geometric 3D shape as a probability distribution of a binary grid on a 3D voxel grid. Disadvantages: It is unable to jointly recognize and reconstruct object from single view i.e. RGB-D sensor. A large dataset of 134M is used. 2.5 3D Object recognition from large scale point clouds with global descriptor and sliding window [5] A novel strategy for object recognition has been proposed in this paper that mater given 3D model in large scale scene point. 3D model in large scale scene point. Since large scale indoor point clouds are greatly damaged by noise such as cluster, collusion, hole and points in a scene point cloud, based on similarities between local descriptor computed at key points on both point clouds. To avoid such problem they have come with idea to use sliding window with specific end goal to co-ordinate and pieces of scene points cloud. They have used a bag-of-feature (BoF). A BoF representation if a window is efficiently calculated BoF vector. Though BoF is robust to partial noises it doesn’t preserves any spatial information. Then global descriptor of a window which is almost invariant to horizontal rotation of object inside is been proposed. The task of 3D object recognition from unorganized point clouds has been studied widely from a long time. It is generally divided into two part, first estimates 6 degree of freedom poses of given specific models in environment scenes. In first type, models are usually not contaminated by noises so that is easy to describe and exactly master their local shape around detected key points with local descriptor. In this, correspondence between models and scenes is calculated based on similarities of local descriptor. Then transition and rotation of input model are estimated from point to point matching by methods such as RANSAC methods of second type cut out individual object from at same point cloud at first and classify then with classifier obtained by supervised training using manually labelled data. In order to segment object from z background a clustering method like super voxels or plane removal by RANSAC is utilized. If the scene is simple like table top scene. It is easy to segment those pieces of point cloud that represents object from the scene. Advantages: Repetitive appearance of unhelpful primitive shapes and others is to detailed shape information due to noise is been tackled. Disadvantages: BoF is robust to partial noises, but it don’t preserves any spatial information. 2.6 Scalable object detection using deep neural networks [10] Deep convolutional neural networks recently demonstrated very impressive performance on a number of image recognition benchmarks. It has shown good performance on large scale visual recognition challenge. It was a winning model on localization subtask with the process by predicting single bounding box and identifying object category in the image. But the model cannot handle multiple instances of same object in the image. But the model cannot handle multiple instances of same object in the image. But now it can handle the same image having multiple instances and allows cross class generalization at highest level of network. In this paper the computational challenge is addressed. Also this challenge becomes even harder when an object occurs more than once in the image. How they tackle this by generating a no of bounding boxes. For each box the output is a confidence score i.e. the likelihood of an image existing in that box. Various training exercises are performed for this. The predicted results and the real results are then matched for the learning purpose. They are capitalizing on the excellent learning abilities of DNN (Deep Neural Network). This approach has shown generalizing capability over unseen classes and can be used for other detection problems. Now let us see the actual approach/methodology proposed in this paper. They use the Deep Neural Network which produces a fixed number of bounding boxes and then gives the output of each box as a confidence score. VIVA-Tech International Journal for Research and Innovation Volume 1, Issue 1 (2018) ISSN(Online): 2581-7280 Article No. 9 PP 1-9 5 www.viva-technology.org/New/IJRI Rounding box: The upper left and lower right coordinates are determined for the boxes. These boxes are adapted according to the dimensions of the image. Confidence: The confidence score of each box is given as a single node value Ci = 0 or 1. After that they can combine the bounding boxes as a single layer. Similarly also the collection of the confidence scores can be treated as one output. In the algorithms the number of bounding boxes taken are between 100 and 200. Training: The DNN predicts bounding boxes and confidence scores for each training image and then the highest scoring boxes are matched with actual values of the image. If M are actual number of images and K is the predicted amount. Then in reality the value of K is greater than M. Thus optimization is done of the predicted boxes which thee ground truth ones. Advantages: It is able to capture multiple instances of same object in the image. It is also able to generalize for categories was not trained on. Disadvantages: There are other methods showing better performance. 2.7 FPGA acceleration of Recurrent Neural Network based language model [11] Recurrent neural network (RNN) based language model (RNNLM) is a biologically inspired model for natural language processing. It records the historical information through additional recurrent connections and therefore is very effective in capturing semantics of sentences. At architectural level the parallelism of RNN training scheme is improved and also reduces the computing resource requirement. Experiments at different network sizes demonstrates a great scalability of proposed framework. RNN is a different type of neural network that can operate in time domain. RNN captures the long range dependencies using the additional recurrent connection. Then it stores them in hidden layer for later use. But the training costs in RNN was really high. So hardware up gradation was necessary to make it feasible. FPGA based accelerators have really caught the attention for tackling this problem. Modern language models are based on statistical analysis. The n-gram model is one of the most commonly used model. What it does is it takes the probability of a word to exist after the word before it from the previous history. But when the value of n becomes more i.e. n>5 then the computational costs really increase really increase. RNN comes to tackle this problem RNN uses its hidden layer to store historic information or previous information. Most of the computational resources in RNN is spend on matrix vector multiplication. To overcome this or tackle it to some extent multiple cores are used for operations. But then this leads to high access memory requirement. Thus a proper balance between computation unit and memory bandwidth should be obtained be obtained by proper scalability. Next comes the architectural optimization. It has various things to do in it. Like to increase parallelism between output layers and hidden layers. But it can only be done to a certain extent as there are limitations to it. Then there is the hardware implementations. The FPGA hardware design plays a huge role in supporting RNN. Advantages: Greater efficiency. Extensive hardware tuning and modification is required. 2.8 An image matching and object recognition system using webcam robot [7] Computer vision's vital steps is to find the relation among multiple images. Computer vision, is a science that makes machine capable to perceive the world around it in a similar way as human eyes and brain visually sense it. This can be done if correspondence over consecutive frames in an image is tracked and matching among them is identified VIVA-Tech International Journal for Research and Innovation Volume 1, Issue 1 (2018) ISSN(Online): 2581-7280 Article No. 9 PP 1-9 6 www.viva-technology.org/New/IJRI This paper is based on image matching approach and is also based on the approach of field of ROBOTICS. Object Recognition involves identification, detection, and tracking. But, there are some challenges exist such as scale, view point variation, deformation, illumination etc. So, for best image matching and Object Recognition one of the optimal method named Chamfer matching is used. For best object recognition relevant features should be known. In this method, they have some local features such as point, edges and black and white points. This paper can either be implemented through any hardware equipment to capture images or manually done by the user. Step1: All the nearest images of an object is stored manually in the database. Processing Algorithm is implemented after storing the images and are matched with current images taken by robot from different angles. Step2: Mobile Robot is fitted with CCD camera which controls through signalization. It is an eye of robot. Step3: Matching process within images using matching algorithm: Here, they are using Chamfer Distance Transformation because of its simplicity and reliability. But before implementing 3-4 DT, the image is converted to grey scale & binarisation is performed to count the black & white points in the image. Also, Canny Edge Detector is used to detect the edge points. Thus, this paper is based on the finding the matching percentage among two images that are exactly same, as well as slightly different and edited in some ways. Here, Chamfer Distance Transformation is used as it resulted efficient and high performance method for object detection due to its pixel based correlation approach. Advantages: The whole system is reliable & capable to match the two images in Digital Image Processing. It uses Chamfer Distance Transformation that results in better performance for object recognition due to its pixel based correlation approach Dis-advantages: Here, Chamfer Distance Transformation, this algorithm is slightly time consuming because of the number of grey levels involved. 2.9 3D Convolutional object recognition using volumetric representation of depth data [8] Convolutional Neural Network allow to extract features directly and automatically and produces better results in object Recognition. Here, RGB and Depth data are used in convolutional networks, volumetric information hidden in depth data are not fully utilized .So their system is proposed to utilize the volumetric information by 3D CNN. 3D CNN based approach is to exploit 3D geometrical structure of objects using depth data. Here depth data is used instead of RGB as RGB has rich colour, texture information while depth data has better ability representing 3D objects. Here, object can be recognized using only single depth images without having complete 3D model of object. There are 2 types of volumetric representation used. Volumetric representation is used as it is providing simplicity to CNN and also good representation of 3D geometrical shape. Volumetric Binary Grid Volumetric Intensity Grid In this method, input depth image is converted to a point cloud. The volumetric representation is found after de noising the point cloud to a 3D matrix space in which each cell represents a voxels. Volumetric Binary Grid represents the existence of surface point in voxel. 1 means present and 0 means absent & Volumetric Intensity Grid is to keep how many points a voxel represents. So, the voxel value is incremented by 1 for each projected point cloud value. Now, this CNN architecture is composed of convolutional layers followed by leaky ReLU. This Convolutional layer have 32 filter with 5\*5\*5 and 3\*3\*3 sizes. The third layer is a pooling layer which down samples the input volume. The last two layers are fully connected layer. When they tested, they founded that, the proposed method handles the background problems without using masks and provides superior performance in the presence of background. This system has achieved higher accuracy than many state-of-arts approaches on the commonly used Washington RGB-D object Dataset .It is the first volumetric approach on this dataset. So, 3D CNN on volumetric representation make it possible to learn rich 3D structural information of objects. Advantages: Higher accuracy. First Volumetric approach in the Washington RGB-D object dataset Volumetric Representation provides simplicity to CNN and good representation of 3D geometrical cues. VIVA-Tech International Journal for Research and Innovation Volume 1, Issue 1 (2018) ISSN(Online): 2581-7280 Article No. 9 PP 1-9 7 www.viva-technology.org/New/IJRI Dis-advantages: Depth maps do not give enough information to build complete 3D model of objects. 2.10 A Shape Preserving Approach for Salient Object Detection Using Convolution Neural Network [12] In computer vision what saliency does is, it identifies the most informative part of a visual scene. It also helps to reduce the computational complexity. This paper proposes a novel saliency object detection method which combines a shape preserving saliency prediction driven by a convolution neural network with low and middlelevel region preserving image information. This model learns a saliency shape dictionary which is then used to train CNN. CNN then predicts the salient class of a target region and then estimates the full but coarse saliency map of the target image. Then the map is refined using image specific low-to-mid level data. The saliency map predicted by the CNN is further refined using the hierarchical segmentation maps by exploiting the global information such as spatial consistency and object boundaries. The proposed system outperforms the existing methods on popular benchmarks datasets. 2.11 Application of Deep Learning in Object Detection [6] This paper mainly deals with the field of computer vision. The comparison between R-CNN, Fast RCNN, and Faster R-CNN is the main focus of this paper. The above mentioned neural networks are similar to each other as the name suggests. Fast R-CNN and Faster R-CNN are the later versions of R-CNN. In this paper RCNN, Fast R-CNN and Faster R-CNN are run across three different datasets i.e. Imagenet, PASCAL VOC and COCO. After the comparison the Faster R-CNN is the one that came out on top with most accuracy/precision. After determining that Faster R-CNN is the best amongst the three we tested it on the example of football field. Then its precision for various objects on the field is also mentioned. 2.12 Object Recognition and Detection by Shape and Color Pattern Recognition Utilizing Artificial Neural Networks [9] A robust and accurate object recognition tool is presented in this paper. The paper introduced the use of Artificial Neural Networks in evaluating a frame shot of the target image. The system utilizes three major steps in object recognition, namely image processing, ANN processing and interpretation. In image processing stage a frame shot or an image go through a process of extracting numerical values of object’s shape and object’s color. These values are then fed to the Artificial Neural Network stage, wherein the recognition of the object is done. Since the output of the ANN stage is in numerical form the third process is indispensable for human understanding. This stage simply converts a given value to its equivalent linguistic term. All three components are integrated in an interface for ease of use. Upon the conclusion of the system’s development, experimentation and testing procedures are initiated. The paper presents the following generalizations. The system’s performance varies with the lighting condition with a recommended 1089 lumens with 97.93216% accuracy. Lastly the system contains a very high tolerance in the variations in the objects position or orientation, with the optimum accuracy at up.

Working of the application.

* The farmer has to click the photo of the desired type of crop for which he wish to get the solution for
* The application will scan the image of the crop and then will do the image processing.
* By the images in the backend and by the use of machine learning model the app will Detect if the plant or crop is having any disease or not.
* The app will also give the solution the problem related to the crop.

Features of Application-

* The application will be free to use only some premium features will require subscription
* The app will be user friendly and therefore it is easy to use.
* The app will be available in all languages so the farmer has to not deal with the language which he doesn't know
* The app will show the progress report of the farm and also the possibility of the rain using google weather.
* Farmer can also test the soil quality by help of the app.
* The app will make him aware about the weather conditions in his surrounding.
* The app will provide the information of the best fertilizer and pesticides available with the cheapest rate in the Indian market
* This app is the complete solution to the farming and agriculture
* The app is available in multiple languages to overcome the language barrier.

How we are using it in Business?

* The app will be available in Android, IOS and various other platforms.
* The price of the application will be Rs.50.
* We kept the app in the paid section because it is for our business.
* And also we will require a lot of efforts to prepare such application
* The app is kept at a very affordable price by keeping in mind the financial condition of the farmers.

What we need to do in the backend?

* We need to use machine learning by training or Algorithms over and over.
* For this we require the datasets of many recent years.
* We will need thousands of images of crops and soil
* We will need a huge budget to develop such app

Technologies used-

* Machine learning
* Artificial Intelligence
* Android

**CONCLUSIONS-**

We are here to guide farmers to take the right decision at right time. This will help them to make more profit.

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**Signature of Student**

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