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ROLE OF IMAGE ENHANCEMENT IN PADDY LEAF DISEASE DETECTION : A STUDY

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Abstract: The detection and classification of illnesses using plant leaf photographs is required in the sector of agriculture. Finding the illnesses of paddy leaf using an image processing system will lessen the dependency on farmers in order to safeguard agricultural products. Using image processing, the study article identifies and categorises illness in paddy leaf. 2- Dimensional computerised photos are electronic images that have been made using a computer. They are mostly created utilising two-dimensional forms such as 2-Dimensional geometric shape, word, and electronic graphics, as well as ways unique to them. It is possible to use the term to refer to a branch of computer science that involves specific methodologies, or it may refer to the forms themselves. These are the most common forms of digital photographs. Initially, they are based on traditional printing and drawing technologies, such as scientific drawing, advertising, typography, mapping, and so forth. A two-dimensional image/graphic is more than simply a mirror of a real-world item in such implementations; it is an independent creation with extra textual content. Two-dimensional models are selected because they have more stringent control over images/graphics than three-dimensional electronic images. In terms of aesthetic, the approach of three Dimensional digital images is extremely similar to camera work. In this post, we used BILINEAR Interpolation to scale photos and compress them with little image quality loss. This research introduced an advanced CNN-based technique to detecting and classifying rice leaf disease. In order to diagnose illness more quickly and accurately, advanced mechanisms have used a strategy that considers picture compression, edge detection, and CNN.

Keywords: Paddy leaf, image processing**,** 2D, 3D, digital image, rotation, scaling, CNN

[1]INTRODUCTION

Agriculture is found a significant source of income for people in many countries [1]. Farmers grew food plants depending on the land's natural conditions as well as the criteria. Farmers, on the other hand, confront a variety of difficulties, such a shortage of water, natural risks, plant pests, and so on [2]. Several issues have been resolved as a consequence of technological facilities put in place to restrict disease spread. There is no need to seek professional assistance since such a system has the potential to boost food output [3]. Plant disease diagnostics [4] is becoming an important field of research in agriculture. The most challenging job has been revealed to be recognising and categorising plant diseases. Plant disease identification [5] is crucial for preventing decreases in agricultural product quantity and yields. Diseases are seen as patterns on plants in plant disease identification studies [6]. Because plant illnesses are developed by hand, they are difficult to trace. Plant disease detection and image processing algorithms have been utilised since manual processing time demands a large amount of work and skill [7]. Recognizing illnesses with picture retrieval is part of data retrieval. Images are pre-processed and divided. Finally, the traits are removed so that they may be classified [8]. Such techniques might be employed to enhance the look of the exteriors of polluted factories [9]. It has been revealed that the leaves of several species are a significant source of illness. Common diseases in rice plants include sheath rot, brown blot, leaf blast, bacterial blight, and leaf smut [10]. Plant diseases have different symptoms depending on the plant. Plant diseases, according to observations, appear in a variety of colours, sizes, and forms. There are different diseases related with distinct plant leaf features. According to researchers [11], certain plant illnesses appear pink, while others are brown. Many malignancies have similar shapes but vary in colour. Others, on the other hand, are the same colour but distinct forms. A normal fraction of disease-related features may be obtained after segmentation [12]. Manual diagnosis of plant diseases has traditionally been done by scientists by evaluating them with their naked eyes, which takes more time and is more expensive in the case of farms that are larger in length and width [13]. This is not a simple procedure. Error occurs from time to time while identifying the type of an illness [14]. Rice output has declined in recent years owing to a lack of understanding about proper management for curing rice plant leaf diseases [15]. The four most common rice plant diseases are being researched. Brown spot, leaf explosion, bacterial illness, and covering decay are all examples of these diseases.

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[2] IMAGE PROCESSING

The earliest two-dimensional computer graphics, based on vector graphics devices, debuted in the 1950s. In the subsequent decades, they were gradually substituted with the assistance of raster-based equipment. Procedures using the PostScript language and the X Window System are game changers in this area. Material, style, and colour, position, height, orientation, arithmetic operators, and circumstance are all used to represent numerical forms in the form of vector images, electronic image/graphics in the form of raster pictures, and text to be typeset. It is now able to modify and manipulate components using 2D arithmetic modifications such as rotation, conversion, and scaling. A graphic is represented indirectly in object-oriented images by an object equipped with a self-rendering process, which is a mechanism that assigns colours to image/graphic pixels using an arbitrary algorithm. Complex models in object-oriented programming paradigms may be built by combining smaller objects.

Image Scaling (2.1)

It occurs in the form of a technique for resizing graphical images in computer graphics. Resizing is a difficult procedure. It requires a balance of performance, smoothness, and sharpness. When employing bitmap images, the picture element that forms the image becomes increasingly visible when the picture size is increased and decreased. When an image element is averaged or jagged, it seems "soft." In the company of vector images, the trade-off may be in CPU resources to handle re-rendering images. It manifests itself as sluggish re-rendering in the presence of a static image, or as a slower frame rate and frame skipping inside computerised animation.

2.2 Image Compression: Loose & Lossless

Pictures may be compressed with or without loss. Encoding without loss becomes optimal in support of historical purposes. It is often used in medical photography, scientific illustration, clip art, and comic comics. When Lossy compression algorithms are applied at low bit rates, they introduce compression artefacts. Lossy approaches are effective in regular photography, such as portraiture, when minor reliability loss is accepted in exchange for a significant drop in bit rate. Without loss compression, there is lossy compression, which produces marginal deviations.

Techniques for lossless image compression are as follows:
Run-length encoding is the default in PCX and one of many choices in BMP, TGA, and TIFF.
Predictive Coding and DPCM
Encoding entropy
LZW dictionary techniques, which are utilised in GIF and TIFF, are examples of flexible dictionary methods.
PNG, MNG, and TIFF Chain codes use reduction.

Lossless compression

It exists in the form of a process in which compressed information is totally retrieved from original data. In contrast, lossy encoding exists in the form of a technique in which just a picture linked to the original information is retrieved, which often enhances the pace of compression. As a result, file sizes are lowered.

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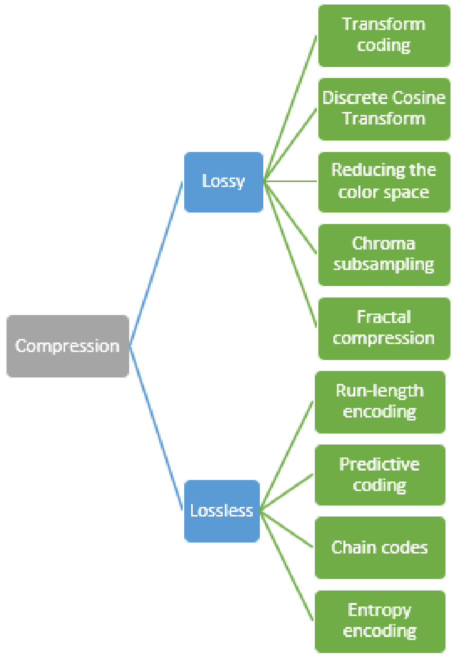

Fig 1 Lossy and lossless image compression

2.3 Edge detection

Edge detection is the technique of obtaining the edges or borders from a picture. Edge detection would be required to decrease picture content during feature selection. Edge detection removes unnecessary picture material, allowing for faster feature selection. To decrease time consumption, the edge detection approach was used before feature selection. Furthermore, using a compression process would lower the size of the picture. There are four types of edge detection.
Prewitt: Image processing has made use of the Prewitt operator. It is one of the methods for detecting edges. This is known as a discrete differentiation operator. It computes a gradient approximation of the picture intensity function. The output of the Prewitt operator may be the matching gradient vector at each location in the picture. Occasionally, the result may equal the vector's norm.
Robert and Roberts The cross operator performs simple, rapid 2-D spatial gradient measuring over graphical material. It emphasises the high spatial frequency areas that correlate to the edges. Input to operator is a grayscale in its most common usage.
Sobel: The Sobel operator is termed as Sobel–Feldman operator. It is also known as Sobel filter that has been utilized in graphical processing as well as computer vision. It is well known edge detection algorithms. It develops graphical content that are emphasizing the edges.
Canny : Canny edge detection is a method for extracting valuable structural information from various objects of vision and for significantly reducing the quantity of data to be processed. It has been used extensively in many computer vision systems. Canny has found that the edge detection requirements are relatively similar for various vision systems. In a variety of situations, an edge detection solution can therefore be used to address these requirements. The basic edge detection criteria include:

1. Detect the edge at a low error rate, which means that as many edges as possible in the image are accurately detected.
2. The edge point the operator detected should be located on the edge centre accurately.
3. Only once should a given edge in the picture be marked, and noise need not make false edges, where possible.

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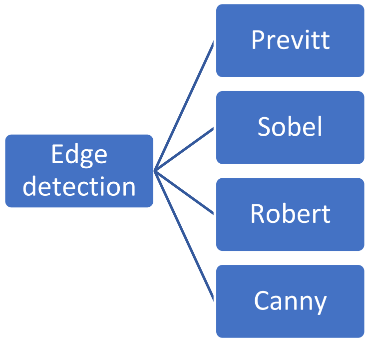

Fig 2 Edge detection

[2]LITERATURE REVIEW

In this article, we will use the image processing toolbox in MATLAB to compress images without sacrificing image quality. To do this, we must first investigate image processing science.

There have been studies to identify and diagnose paddy leaf diseases. Some studies make use of an integrated Deep Neural Network with the Jaya algorithm [1]. Existing research focuses on rice quality improvement [2]. With the help of picture quality analysis it becomes possible to conduct automatic plant diseases identification in vvarious varieties of crop [3]. Some researchers proposed integrated disease management for rice kernel smut [4]. Researchers have suggested many AI-based expert systems [5, 10] and nanotechnology-based systems [6]. Image analysis has been widely used to identify and analyse rice plant diseases [7, 9, 12]. Deep neural networks [13, 14] are now built into image processing-based mechanisms to identify and recognise plant diseases, providing a precise and efficient solution. The experimental findings were analysed and correlated with ANN, DAE, and DNN in that study. For blast impacted, these approaches obtained a high precision of 98.9 percent. In the case of bacterial plague, it was 95.78 percent, and in the case of sheath rot, it was 92 percent. Furthermore, in the case of brown spots, accuracy was found to be 94%. The average leaf picture accuracy was 90.57 percent. Some scholars, however, have used support vector machines [16].

Sangeet Saha, Chandrajit Pal, Rourab Paul, and others have a brief journey through hardware innovations for image processing[17] and their applications in cryptography.

The role of embedded applications in image and video processing, networking, and cryptography has grown in the current research period. Improved pictorial knowledge for improved human vision, such as deblurring and de-noising, is a revived research focus in many fields such as satellite imaging, medical imaging, and so on. We would like to focus on the importance of computer vision as one of the areas where hardware-implemented algorithms outperform software-implemented algorithms. Image Processing Techniques: A Comparative Study and Implementation[18] Sukhjinder Singh, R.k Bansal, and Savina Bansal use MATLAB.

Media improvement helps to improve image accuracy for improved rendering. This paper discusses three image improvement methods: GHE, LHE, and DSIHE, both of which increase the optical clarity of images. In this article, we apply and test the above-mentioned techniques on objective and subjective image quality parameters (such as PSNR, NAE, SC, AE, and MOS) to assess the quality of grayscale enhanced images. A comparative analysis is also being conducted. Histogram Equalization (HE) methods (such as GHE & LHE) aim to adjust the mean brightness of an image to the middle level of the gray-level spectrum when dealing with gray-level images, reducing their applicability for contrast enhancement in consumer electronics. DSIHE methods seem to address this downside because they aim to retain both brightness and contrast enhancement, though at the expense of the naturalness of the input image.

Dibyendu Ghoshal in the company of others conducted research on graphics edge detection with the help of gradients. It is a paper which presents a report on picture edge/border detection with the help of gradients. Edge/border detection becomes the fundamental operations in the treatment of pictures and its analysis. Edges/borders shape the outline of an object and thus serve in the form of boundary in the middle of object and surroundings. Accurate detection of edge/borders is critical for analysing simple image properties such as field, perimeter, and form. MATLAB 7.0 was required as a software tool.

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Mie Sato et_al, (2000) tested a region growing method on the basis of magnitude of gradient in support of perfect separation [20].
"They express that undesirable partial-volume –effect which lies on boundary between a high intensity region & a low intensity region, makes unerring boundary determination a difficult task. A new approach to segmentation is required for removing adverse effect on boundary, which is unwanted especially from point of view of volume rendering. A gradient is useful for enhancing boundary because it emphasizes on difference among voxel values". Through the analysis of magnitude of gradient, it becomes possible to see sufficient dissimilarities. It becomes necessary to display this dissimilarities on the border area because these dissimilarities played an important role in improving the perfectness of the seperation process. Researches in relation to border zone seperation are being conducted.
Stoyan Donchev. (2000) used a flexible maximum gradient approach to segment areas and features in greyscale images[21].
"One of the most critical procedures of image processing is image segmentation, which is the isolation of an object from its surroundings". There are currently two basic types of segmentations realised in connection with strength and its gradient, as well as two basic types of segments areas and boundaries, respectively. "Field" is a word which typically refers to topologically joined regions of a picture with a relatively uniform allocation of strength, where as "border" is a word which typically describes those areas in which strength varies in a very dramatic way, or zones whose value of intensity gradient is high. It becomes possible to place borders in the middle of object and its context. It is also possible to place border in the middle of different areas of identical object. Out of these two separation methods one is used for the purpose of picture treatment in most cases. This is the reason due to which an innovative flexible threshold gradient approach has been submitted here. It is an approach which considers picture in the form of single indivisible entity in the company of areas and boundaries. The analysis of this structure yields the effects of a segmented image." The system is proposed for use in a variety of contexts, including analysis of 3-dimensional scenes with random illuminating source spot, coding of image homogenising regions, analysis of printed documents with inconsistent backgrounds and low content, decreasing the amount of strength levels and eliminating material redundancy, and so on.
Nikos Aspragathos and Phillip Azariadis (2001) Geometric[22] entity representation and transformation in computer graphics with the help of binary unit vectors and line amendment.
In order to define and transform 3D mathematical units in computerized pictures, a representational paradigm is presented in this article. The structure which has been presented here is built on the basis of binary unit vectors, and subsequent changes are performed with the help of binary rectangular matrices. Solidity emerges in the form of primary strong point of such type of representation, because other helpful mathematical properties of a demonstrated surface, like contiguous or usual vector, are embedded inside the real demonstrational paradigm itself.
Conversion, alterations, and view modifications are represented in natural manner with the help of screw displacement principle, where as resizing has been achieved when the moment vector of all the binary line is used. In addition to this, a transform operator assessment is proposed on the basis of binary unit quaternions for the determination of that optimal formula which can be used at the time of computational method implementation in support of computerized animation. In the end, empirical distinction in the middle of paradigm which has been submitted here and standard flexible paradigm is provided inside the computerized animation in order to demonstrate their process benefits.

[4] PROBLEM STATEMENT

In the case of paddy leaf, disease classification and prediction are difficult. The problem with paddy leaf disease identification is poor picture quality. Many of these approaches, especially LZW and its variants, be used in publicly available and copyrighted tools. Several methods are copyrighted in the US and other nations. Their use legally necessitates licencing from the copyright owner. Because of patents on specific types of LZW compression, and in particular licencing activities by patent holder Unisys that many developers consider violent, It is suggested by several publicly available advocates that people do not use GIF for squeezing immobile pictures files for PNG, because it incorporates those contract methods which is based on LZ77 in the company of range of domain specified forecasting filters. On the other hand, LZW license was expired in the June month of year two thousand and three.
The work of number of lossless compression methods which are utilized in favour of text is practically fine in support of indexed pictures. On the other hand, remaining methods fails to work in support of usual text, but still helpful in support of those bitmaps pictures which are mainly uncomplicated. It is also useful in support of those strategies which make use of picture specified qualities (like the ordinary occurrence of adjacent two dimensional domains of analogous tones, and the fact that coloured pictures generally hold a limited range of colours out of those representable in the colour space). It is already assumed in the past that contraction of sound without loss emerges as a much specialised

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field. It becomes possible for methods which contracts sound without loss to take help of the wave like structure of the data's repeated patterns, simply by means of "autoregressive models" for anticipating "next value ". It encode inconsistency in the middle of predicted and authentic data. The variation in the middle of predictable and authentic data is known in the form of error. In situations where these errors are small, dissimilarity values such as zero, plus one , one,. on sample values is very normal. It becomes possible to manipulate them once they are programmed in some external bits.
When only the gaps present in the middle of 2 copies of a file or, in video compression of consecutive pictures within a series is compacted it is considered valuable . It is known in the form of delta encoding. It came out of a Greek letter. It signifies a distinction in arithmetic. This concept is usually utilized where all variants become important except for compression and decompression. Although the error compressing technique in the above lossless audio squezzing system may be demonstrated in the form of delta encoding from the approximated to unusual sound wave, the approximated version of the sound wave is meaningless in any other sense.

The issue with exiting researches is that they did not work on the quality of image while classifying the paddy leaf. Moreover there is need to improve the performance during classification and prediction. Research is supposed to implement scaling using BILINEAR Interpolation in order to compress images with minimal loss in image quality. Moreover in order to improve the performance there is need to introduce the edge detection mechanism that would eliminate the use less portion from paddy leaf image. Only useful portion would be considered. This would reduce the image processing time and lead to high performance during classification and prediction process.

Table 1 Comparison chart for previous researches

Author / Year	**Objective**	**Methodology**	**Limitation**
Ramesh, S., & Vydeki, D. (2020) [1]	In order to recognize and classify the disease of paddy leaf	Best DNN in the company of Jaya method	Process of traning is time consuming
X.E. Pantazi, D. Mo shou, A.A. Tamouri dou (2019) [3]	For automatic identification of those leaf disease which are present in the various variety of crops	Examination of picture quality and multi-grade classification devices.	There is need to increase the accuracy
Astonkar, R. Shwet a, V.K. Shandilya (2018). [7]	recognition and examination of those Diseases which destroy crops	Picture treatment	The process of detection need to more efficient and reliable.
Singh, B. Kumar, S. S. Ganapathysubra manian, A. Singh (2018). [8]	Deep learning in support of plant stress phenotyping: trends in addition to upcoming perception	Image processing	Need to improve performance and reliability

[4] ADVANCED PADDY LEAF CLASSIFICATION

Advanced research are focusing on study of existing pattern detection and techniques. During research work review the loopholes of traditional techniques used in pattern detection has been made. Research proposes a methodology for mask detection using edge based CNN (convolution neural network) algorithm. Proposed work is supposed to implement the proposed methodology using MATLAB. Comparison of proposed methodology and algorithm with the traditional algorithm has been made. The proposed work is supposed to be more efficient as compared to traditional techniques.

Process Flow of Proposed Methodology

1) The image base of data set captured by camera would be created. The graphical content captured from camera is pre-processed using image resize function.
2) Apply tradition CNN classifier in order to check the space and time consumption after getting the image dataset. The time and space variable is stored in order to compare it with upcoming time and space variable in case of edge detection mechanism.

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3) Apply the edge detection mechanism on the image set. The edge detector would eliminate the useless portion of image. The edge detection deduces the file size as well as the feature extraction time.
4) Apply the proposed CNN classifier in order to check the space and time consumption. The CNN classified is supposed to have rich features. The trained CNN classifier is enough to train the image set. The decisions are made according to trained image set.
5) Compare the performance and space consumption of traditional and proposed work.

Table 2: Comparison Chart for Traditional and Advanced Research

Feature	**Traditional Research**	**Advanced Research**
Detection time	Comparatively high	Comparatively low
Space	More storage space is required	Comparatively less space required
Accuracy	Relatively less accuracy	Relatively high accuracy
Edge Detection mechanism	Not applied	Canny edge detection is applied
Neural Network	Not applied	Convolution Neural Network
Flexibility	Lack of flexibility	High flexibility as it could be applied in another application
Scalability	Limited scalability	Work could be implemented at huge scale
Performance	Relatively low	Relatively high
Mechanism	DNN	CNN

[5] EXPERIMENTAL RESULTS

A. Acquisition of images

Acquisition of images is procedure of getting image that is used in research. Rice plant leaves images are captured by using high resolution digital camera from farm field. In order to perform recognition of diseases, all captured images are required to be shifted to computer. This is the location where action process of implementation takes place. Dataset is prepared with 650 images that are consisting 95 normal images and 125 bacterial blight images. Data set is having 170 blast images along with 110 sheath rot images. Moreover dataset has 150 brown spot images.

Fig 3 Sample images of normal and diseased leaves

B. Pre-processing

In order to reduce need of memory and computation of power, the size of images in dataset is changed. The cropping operation is performed on image to set dimension of 300×450 pixels during pre-processing phase. During preprocessing significant operation is to remove image background by applying hue values based fusion with edge

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detection mechanism. Image in RGB model is converted into HSV at initial stage. From the HSV model S value is considered for process as it overs the whiteness. Considering threshold value to 90, image is modified to binary image. Then this binary image is fused with original RGB image in order to create a mask. Threshold value is chosen considering many trials. Fusion process is helps in removing background by assigning pixel values to 0. Pixel value 0 is showing black color in the RGB model. Following figure is showing preprocessing steps.

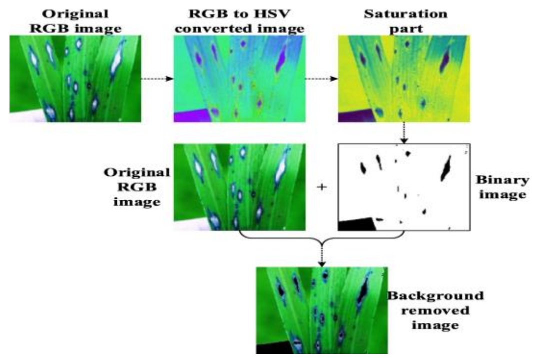

Fig 4. Pre-processing steps for background elimination

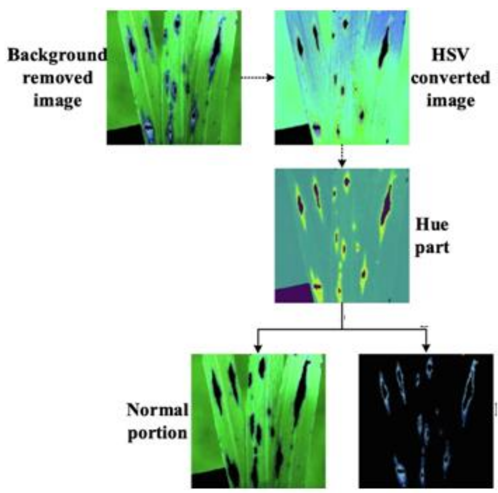

Fig 5 Edge detection from the hue part

C. **Extracting features**

In this work texture and color features are extracted. The color features includes extraction of mean and standard deviation values whereas the texture features include the GLCM features. Finally edge detection mechanism is applied to improve the accuracy during detection.

1) Color features

1. Initial R, G and B components have been fetched for diseased portion. Mean value and standard deviation have been evaluated.
2. In case of HSV model, H, S and V components are considered. Then mean value has been calculated.
3. In case of LAB color model, L, A and B components are taken in account. Then mean value is calculated.

The mean and standard deviation are calculated by using the formulas given below.

$M_y = \frac{1}{n}\sum_{x=1}^{n} P_{yx}$ ……………………………………………(1)

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$S_y = \sqrt{\frac{1}{n}\sum_{x=1}^{n}(P_{yx} - M_y)^2}$……………………………….(2)

Here n is showing total number of pixels. P_{yx} is meant for pixel values.

2) Texture Features

Considering spatial relationship among pairs of gray value intensity pixels, the GLCM is getting texture of image. From GLCM the specified displacements homogeneity, correlation, energy and contrast can be found. Formulas for such characteristics have been shown as.

$H_y = \sum_{x-0}^{n} \frac{P_{yx}}{1+(y-x)^2}$…………………………………….(3)

$Ct_y = \sum_{x=0}^{n} P_{yx}(y-x)^2$………………………………………….(4)

$Cn_y = \sum_{x-0}^{n} P_{yx}\frac{(y-M)(x-M)}{S_y}$……………………………….(5)

$E_y = \sum_{x=0}^{n}(P_{yx})^2$………………………………………….(6)

where, H_y shows homogeneity, Ct_y is meant for contrast, Cn_y indicates correlation, E_y shows energy, n is considered for total number of pixels, P_{yx} is presenting pixel values, M_y is showing mean and S_y is showing standard deviation.

D. CNN based classification

The framework of CNN contains three layers i.e. input layer, output layer and hidden layers. The proposed architecture of CNN is shown in following figure

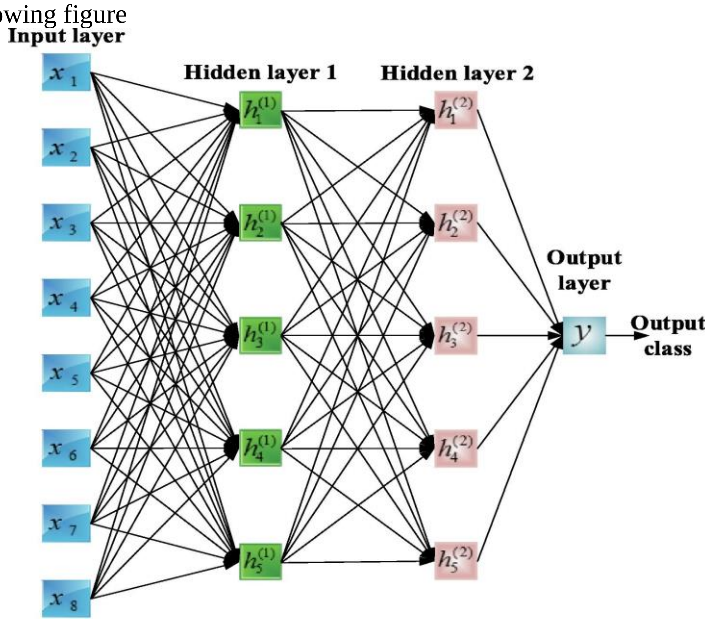

Fig 6 Architecture of conventional Neural Network with hidden layers

The simulation part is providing the comparative analysis of accuracy in case of previous and proposed work. Considering overall accuracy in case of previous and proposed model following table has been produced. It has been observed that the overall accuracy is more in case proposed model where CNN has been used with canny edge detection mechanism as compare previous model. In proposed model overall accuracy is 97.692% but in case of previous research it was 93.077%

Table 3 Comparison of overall accuracy

	Previous research	Proposed research
Overall accuracy	93.077%	97.692%

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Considering precision accuracy in case of previous and proposed model following table has been produced. It has been observed that the precision accuracy is more in case proposed model where CNN has been used with canny edge detection mechanism as compare previous model.

Table 4 Comparison of Precision accuracy

Class	Previous research	Advanced research
Blast	96.67%	100%
Bacterial blight	92.58%	100%
Brown spot	92.59%	96.296%
Sheath Rot	88%	95.833%
Normal	95%	95.238%

[6] SCOPE OF RESEARCH

Research work has focused on CNN based advance approach to detect and classify paddy leaf disease from images. Advance mechanism has make use of approach that is considering image compression, edge detection and CNN in order to perform detection of disease rapidly with more accuracy.

Most efficient methods for automatically structuring, indexing, and retrieving image information have been investigated in research. This work would investigate various image compression approaches, including loosy image compression methods and lossless image compression methods. Image transmitting during networking is ideally suited for the application of an algorithm based on Huffman Coding to compress the image with the least amount of loss of image quality. Implementing the algorithm in MATLAB to compress an image during preserving image consistency has reduced the probability of file retransmission. Calculations of the Peak Signal to Noise Ratio and Mean Square Root Error confirm the algorithm's accuracy. Use of CNN model made in advance research provides overall accuracy and precision value.

REFERENCES

1. Ramesh, S., & Vydeki, D. (2020). Recognition and classification of paddy leaf diseases using Optimized Deep Neural network with Jaya algorithm. Information processing in agriculture, 7(2), 249-260.
2. Vo-Tong Xuan (2018). Rice production, agricultural research, and the environment. Routledge, In Vietnam's rural transformation (2018), pp. 185-200
3. X.E. Pantazi, D. Moshou, A.A. Tamouridou (2019). Automated leaf disease detection in different crop species through image features analysis and one class classifiers. Comput Electron Agric, 156 (2019), pp. 96-104
4. M.K. El-kazzaz, E.A. Salem, K.E. Ghoneim, M.M. Elsharkawy, G.A. El-Kot, Z.A. Kalboush (2015). Integrated control of rice kernel smut disease using plant extracts and salicylic acid. Arch Phytopathol Plant Protect, 48 (8) (2015), pp. 664-675
5. M. Yusof, N.F. Mohd, M. Rosli, R. Othman, M.H.A A. Mohamed (2018). M-DCocoa: M-agriculture expert system for diagnosing cocoa plant diseases. Proc. International Conference on Soft Computing and Data Mining. 2018 (2018), pp. 363-371
6. Kim, Dae Young, A. Kadam, S. Shinde, R.G. Saratale, J. Patra, G. Ghodake (2018). Recent developments in nanotechnology transforming the agricultural sector: a transition replete with opportunities. J Sci Food Agric, 98 (3) (2018), pp. 849-864
7. Astonkar, R. Shweta, V.K. Shandilya (2018). Detection and Analysis of Plant Diseases Using Image Processing. Int Res J Eng Technol, 5 (4) (2018), pp. 3191-3193

ISSN : 2348 - 5612 | Volume : 09 , Issue : 04 | October - December 2022
https://doi.org/10.36676/urr.2022-v9i4-48

8. Singh, B. Kumar, S.S. Ganapathysubramanian, A. Singh (2018). Deep learning for plant stress phenotyping: trends and future perspectives. Trends Plant Sci, 23 (10) (2018), pp. 883-898
9. M. Kamal, A.N.I. Mahanijah, F.A.R. Masazhar (2018). Classification of leaf disease from image processing technique. Indonesian J Elect Eng Comput Science, 10 (1) (2018), pp. 191-200
10. D. Patrício, R.R. Inácio (2018). Computer vision and artificial intelligence in precision agriculture for grain crops: a systematic review. Comput Electron Agric, 153 (2018), pp. 69-81
11. B.H. Prajapati, J.P. Shah, V.K. Dabhi (2017). Detection and classification of rice plant diseases. Intell Decis Technol, 11 (3) (2017), pp. 357-373
12. J.G. Barbedo, L.V. Arnal, T.T.S. Koenigkan (2016). Identifying multiple plant diseases using digital image processing. Biosyst Eng, 147 (2016), pp. 104-116
13. S. Sladojevic, M. Arsenovic, A. Anderla, D. Culibrk, D. Stefanovic (2016). Deep neural networks based recognition of plant diseases by leaf image classification. Comput Intell Neurosci (2016), pp. 1-11
14. P. Mohanty, D.P. Sharada, M.S. Hughes (2016). Using deep learning for image-based plant disease detection. Front Plant Sci, 7 (1419) (2016), pp. 1-10
15. A.-K. Mahlein (2016). Plant disease detection by imaging sensors–parallels and specific demands for precision agriculture and plant phenotyping. Plant Dis, 100 (2) (2016), pp. 241-251
16. F. Pinki, N. Tazmim, S.M.M Islam Khatun (2017). Content based paddy leaf disease recognition and remedy prediction using support vector machine. In: Proc. In Computer and Information Technology (ICCIT), 20th International Conference (2017), pp. 1-5
17. Dudgeon, D.E. & R.M. Mersereau, Multidimensional Digital Signal Processing. 1984, Englewood Cliffs, New Jersey: Prentice-Hall.
18. Castleman, K.R., Digital Image/graphic Processing. Second ed. 1996, Englewood Cliffs, New Jersey:
19. Oppenheim, A.V., A.S. Willsky, & I.T. Young, Systems & Signals. 1983, Englewood
20. Papoulis, A., Systems & Transforms with Applications in Optics. 1968, New York:
21. Russ, J.C., Image/graphic Processing Handbook. Second ed. 1995, Boca Raton, Florida: CRC
22. Giardina, C.R. & E.R. Dougherty, Morphological Methods in Image/graphic & Signal Processing. 1988, Englewood Cliffs, New Jersey: Prentice-Hall. 321.
23. Gonzalez, R.C. & R.E. Woods, Digital Image/graphic Processing. 1992, Reading, Massachusetts:
24. Goodman, J.W., Introduction to Fourier Optics. McGraw-Hill Physical & Quantum
25. Electronics Series. 1968, New York: McGraw-Hill. 287.
26. Heijmans, H.J.A.M., Morphological Image/graphic Operators. Advances in Electronics & Electron Physics. 1994, Boston: Academic Press.
27. Hunt, R.W.G., Reproduction of Colour in Photography, Printing & Television,. Fourth ed. 1987, Tolworth, England: Fountain Press.
28. Freeman, H., Boundary encoding & processing, in Picture Processing & Psychopictorics, B.S. Lipkin & A. Rosenfeld, Editors. 1970, Academic Press: New York. p. 241-266.
29. Stockham, T.G., Image/graphic Processing in Context of a Visual Model. Proc. IEEE, 1972. 60:
30. Murch, G.M., Visual & Auditory Perception. 1973, New York: Bobbs-Merrill Company,
31. Frisby, J.P., Seeing: Illusion, Brain & Mind. 1980, Oxford, England: Oxford University