A Review on Detection Optical Character Recognition

Miss. Velantina Kapale[1], Prof. Mangesh Ghonge [2]

Student, M.E.(Computer), SITRC, Nashik[1]
Assistant Professor, Computer Department, SITRC, Nashik[2]
Email: velantinak@gmail.com[1], mangesh.ghonge@sitrc.org[2]

Abstract- In many different fields, there may be a high demand for storing records to a laptop storage disk from the statistics to be had in revealed or handwritten files or images to later re-utilize this records through computers. One simple way to save data to a laptop device from those printed files will be first to scan the files and then shop them as image documents. However to re-utilize this data, it might very difficult to study or question text or different facts from those photo documents. Consequently a way to routinely retrieve and shop data, especially textual content, from photograph documents is wanted. Optical character recognition is an lively research place that attempts to expand a computer gadget with the ability to extract and procedure textual content from pix robotically. The goal of OCR is to obtain amendment or conversion of any form of text or text-containing files which includes handwritten textual content, published or scanned text images, into an editable digital format for deeper and similarly processing. Therefore, OCR enables a system to mechanically apprehend textual content in such documents. Some foremost challenges need to be identified and handled so one can reap a a hit automation. The font traits of the characters in paper documents and first-class of photographs are only a few of the latest challenges. Due to these demanding situations, characters occasionally might not be diagnosed efficiently by way of computer machine. In this paper we look into OCR in four exclusive ways. First we provide a detailed assessment of the demanding situations that might emerge in OCR tiers. Second, we review the overall phases of an OCR device together with pre-processing, segmentation, normalization, function extraction, classification and post-processing. Then, we highlight traits and main packages and uses of OCR and eventually, a short OCR records are discussed. Consequently, this dialogue offers a totally complete assessment of the cutting-edge of the field.

Index Terms- Neural Network, Feature extraction, Classification, OCR.

1. INTRODUCTION

Optical character recognition has been a subject of studies. Pattern reputation has 3 most important steps: Observation, pattern segmentation, and sample classification. Optical individual reputation (OCR) structures is remodeling big amount of documents, either printed alphabet or handwritten into system encoded text with none transformation, noise, resolution variations and other factors [1]. In general, handwriting recognition is classed into two sorts as off-line and online individual popularity. Off-line handwriting recognition entails automated conversion of text into an photograph into letter codes which can be usable within laptop and text-processing applications. Off-line handwriting reputation is more tough, as special human beings have specific handwriting styles. However, inside the on-line device, on-line man or woman popularity offers with a data movement which comes from a transducer while the user is writing [2]. The everyday hardware to accumulate statistics is a digitizing tablet which is electromagnetic or pressure sensitive [3]. While the person writes on the tablet, the successive movements of the pen are converted to a sequence of digital sign

that's memorized and analyzed by way of the computer. Optical character popularity (OCR) is a field of research in sample recognition, artificial intelligence and device imaginative and prescient, signal processing. Optical person popularity (OCR) is typically referred to as an off-line person recognition procedure to mean that the machine scans and recognizes static photos of the characters [5]. It refers to the mechanical or digital translation of pix of handwritten individual or printed text into gadget code without any version.
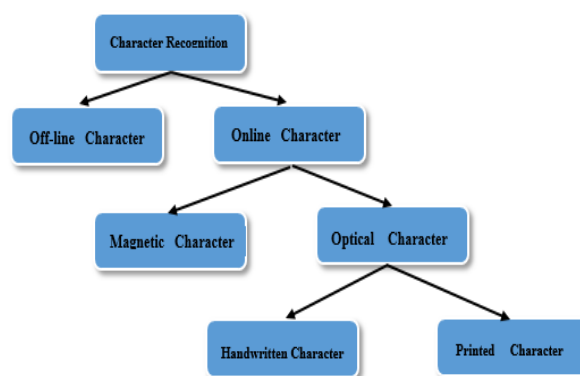

Fig 1. Character Recognition

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OCR includes many stages together with pre-processing, segmentation, characteristic extraction, classifications and reputation. The enter of one step is the output of subsequent step. The project of preprocessing relates to the elimination of noise and variation in handwritten [6]. Several region wherein OCR used including mail sorting, bank processing, file reading and postal address popularity require offline handwriting recognition systems, pattern popularity.
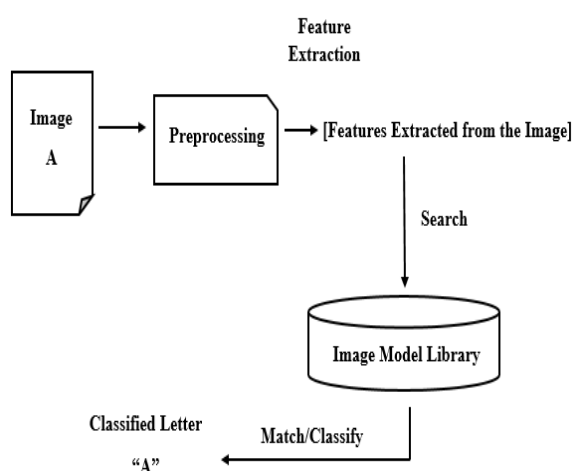

Fig 2. General Phases of Optical Character Recognition

Digitization:- Digitization is the system of changing a paper-based handwritten file into electronic layout. Here, each record consists of simplest one individual. The electronic conversion is done by using the use of a method whereby a record is scanned and an digital illustration of the original record as a photograph file layout is produced [8]. We used diverse scanner for digitization, and the digital photo changed into move for next step this is preprocessing phase.

Pre-processing: Inside the pre-processing phase, there may be a series of operations done on the scanned input picture. It enhances the photograph rendering it appropriate for segmentation the grey-level man or woman photo is normalized into a window sized. After noise reduction, we produced a bitmap image. Then, the bitmap picture changed into converted right into a thinned image [9].

Segmentation: The segmentation segment is the maximum important manner. Segmentation is finished via separation from the individual characters of an photograph. Segmentation of handwritten characters into exclusive zones (higher, middle and lower zone) and characters is greater difficult than that of revealed files which can be in wellknown form. This is mainly

due to variability in paragraph, words of line and characters of a phrase, skew, slant, length and curved. Sometimes additives of adjoining characters may be touched or overlapped and this situation create problems inside the segmentation venture. Touching or overlapping problem takes place often due to modified characters in upper-zone and decrease-sector. Segmentation is an vital stage [10]. Characteristic extraction in this section, capabilities of individual person are extracted. The performance of an each character reputation system that depends on the capabilities which might be extracted. The extracted functions from enter individual must allow classification of a individual in a unique way. we used diagonal functions, intersection and open cease points functions, transition features, zoning functions, directional capabilities, parabola curve becoming–based capabilities, and energy curve becoming–based functions a good way to find the feature set for a given person [11].

2. LITRATURE SURVEY

The evaluate system was followed with the aid of surveying the studies in last 10 years (2005-2013) for extraction of facts approximately some problems. The research articles have been reviewed to cowl the overview of man or woman reputation technique. Various issues: evaluation papers on one-of-a-kind method to understand the handwritten cursive characters. The evaluate and dialogue of troubles is ranging from year 2005-2013.

Majida Ali Abed Hamid Ali Abed Alasadi [2005][1] this manuscript considers a new technique to simplifying handwritten characters reputation based totally on simulation of the behaviour of schools of fish and flocks of birds, called the particle swarm optimization technique (PSOA). We present an overview of the proposed techniques to be optimized and tested on some of handwritten characters in the experiments. Our experimental results demonstrate the better diploma of overall performance of the proposed techniques. It's far mentioned that the PSOA in standard generates an optimized evaluation between the input samples and database samples which improves the final recognition charge. Experimental effects display that the PSOA is convergent and greater correct in answers that limit the error recognition rate.

Mohammed Z. Zhedher, Gheith A. Abandah, and Ahmed M. Al-Khawaldeh2005 [2] this paper describe that reputation of characters significantly relies upon upon the functions used. Several functions of the handwritten arabic characters are selected and mentioned. An off-line popularity system based on the selected capabilities turned into built. The device

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become educated and examined with sensible samples of handwritten arabic characters. assessment of the significance and accuracy of the selected capabilities is made. The recognition primarily based on the chosen functions provide common accuracies of 88% and 70% for the numbers and letters, respectively. Further enhancements are carried out by using function weights based on insights gained from the accuracies of individual features.

Ivan Dervisevic [2006][3] Fulfillment of optical character recognition depends on various of factors, of that are feature extraction and category algorithms. on this paper we look at the results of the software of a set of classifiers to datasets acquired through various fundamental function extraction strategies.

Diego J. Romero, Leticia M. Seijas, Ana M. Ruedin[2007][4] the recognition of handwritten numerals has many important applications, such as automatic lecture of zip codes in put up workplaces, and automated lecture of numbers in checknotes. In this paper we gift a preprocessing method for handwritten numerals popularity, primarily based on a directional dimensional non-stop wavelet remodel. The wavelet chosen is the mexican hat. It's miles given a major orientation by way of stretching one among its axes, and including a rotation angle. The ensuing transform has 4 parameters: scale, perspective (orientation), and role (x,y) inside the photograph. by means of solving some of its parameters we achieve wavelet descriptors that form a feature vector for each digit photo. We use those for the popularity of the handwritten numerals within the concordia university information base we enter the preprocessed samples into a multilayer feed ahead neural network, skilled with backpropagation. our results are promising.

Chirag I Patel, Ripal Patel, Palak Patel [2011] [5] objective is this paper is recognize the characters in a given scanned files and look at the effects of changing the fashions of ann. Today neural networks are in the main used for sample recognition task. The paper describes the behaviors of different models of neural network used in OCR. OCR is extensive use of neural community. We've taken into consideration parameters like number of hidden layer, size of hidden layer and epochs. We've got used multilayer feed forward network with again propagation. In preprocessing we've got implemented a few fundamental algorithms for segmentation of characters, normalizing of characters and de-skewing. We've used special models of neural network and applied the take a look at set on each to discover the accuracy of the respective neural community.

Sushree Sangita Patnaik and Anup Kumar Panda may additionally 2011[6] This paper proposes the implementation of particle swarm optimization (PSO) and bacterial foraging optimization (BFO) algorithms which can be meant for most desirable harmonic repayment via minimizing the unwanted losses happening inside the APF itself. The efficiency and effectiveness of the implementation of techniques are as compared for two exclusive conditions of supply. The total harmonic distortion (THD) in the supply modern-day which is a measure of APF performance is reduced considerably to nearly 1% by using employing BFO. The outcomes demonstrate that BFO outperforms the conventional and PSO-based totally strategies by way of ensuring remarkable capability of APF and quick be successful over harmonics in the source current even under unbalanced deliver.

Dileep Kumar Patel, Tanmoy Som1, Sushil Kumar Yadav Manoj Kumar Singh [2012][7] within the gift paper, the problem of handwritten individual recognition has been tackled with multiresolution method the usage of discrete wavelet rework (DWT) and euclidean distance metric (EDM). The method has been examined and observed to be greater accurate and quicker. Characters is assessed into 26 pattern instructions primarily based on appropriate homes. Features of the handwritten character images are extracted with the aid of DWT used with appropriate level of multiresolution technique, and then each sample class is characterised by a mean vector. Distances from input sample vector to all of the imply vectors are computed by EDM. Minimum distance determines the class club of input pattern vector. The seasoned- posed technique gives right reputation accuracy of ninety% for handwritten characters regardless of fewer samples.

Vijay Laxmi Sahu, Babita Kubde (january 2013) [8] This paper explains that classification techniques based on studying from examples were broadly implemented to individual recognition from the 1990s and feature delivered forth sizable enhancements of recognition accuracies. this class of techniques consists of statistical techniques, synthetic neural networks, assist vector machines, multiple classifier aggregate, etc. in this paper, the characteristics of the category strategies which have been successfully carried out to man or woman recognition, and display the final problems that may be doubtlessly solved with the aid of mastering techniques had been mentioned.

Gurpreet Singh Chandan Jyoti Kumar Rajneesh Rani dr. Renu Dhir (january 2013) [9] this paper offers precise evaluate in the area of off-line handwritten individual reputation.. The popularity of handwriting can, however, still is taken into consideration an open studies hassle due to its significant version in appearance. Despite the fact that, sufficient research have performed from history to this period, paper

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describes the techniques for converting text from a paper report into system readable shape. Offline handwritten individual popularity is a technique in which the computer understands routinely the picture of handwritten script. This cloth serves as a manual and update for readers operating inside the character recognition area. Choice of a relevant function extraction approach is probably the single maximum essential factor in reaching high recognition performance with lots better accuracy in individual reputation systems.

Majida Ali Abed, Hamid Ali Abed Alasadi, (august 2013) [10] This manuscript considers a brand new method to simplifying handwritten characters recognition based totally on simulation of the behavior of schools of fish and flocks of birds, referred to as the particle swarm optimization technique (PSOA). We gift an overview of the proposed methods to be optimized and examined on some of handwritten characters in the experiments. Our experimental consequences demonstrate the higher diploma of overall performance of the proposed tactics. It is mentioned that the PSOA in trendy generates an optimized contrast between the enter samples and database samples which improves the very last popularity charge. Experimental effects display that the PSOA is convergent and more correct in answers that decrease the mistake recognition rate.

Argha Roy, Diptam Dutta Kaustav, Choudhury (march 2013)eleven] this paper, the version of network weights the use of particle swarm optimization (PSO) turned into proposed as a mechanism to improve the performance of artificial neural network (ANN) in type of iris dataset. Category is a machine studying approach used to are expecting group club for information instances. To simplify the trouble of class neural networks are being brought. This paper specializes in iris plant type the use of neural network. The problem worries the identification of iris plant species on the idea of plant attribute measurements. Class of iris information set would be discovering patterns from examining petal and sepal size of the iris plant and the way the prediction was crafted from reading the sample to shape the class of iris plant. With the aid of the usage of this sample and type, in destiny upcoming years the unknown statistics may be predicted greater precisely. Artificial neural networks were correctly applied to troubles in sample class, feature approximations, optimization, and associative reminiscences. On this paintings, multilayer feed-ahead networks are trained the usage of back propagation studying set of rules.

Amir Bahador Bayat[2013] [12] Automatic reputation of handwritten characters has lengthy been a purpose of many research efforts in the sample recognition

discipline. This paper investigates the design of a excessive green device for recognition of handwritten digits. First it proposes an green gadget that consists of two important modules: the feature extraction module and the classifier module. Inside the characteristic extraction module, seven units of discriminative features are extracted and used inside the reputation device. Within the classifier module, because the first time on this area, the adaptive neuro-fuzzy inference machine (ANFIS) is investigated. Experimental results display that the proposed machine has true recognition accuracy (RA). But, the outcomes show that in ANFIS training, the vector of radius has very critical position for its recognition accuracy. At the second fold, it proposes an intelligence gadget in which a singular optimization module, i.e., progressed BEES algorithm (IBA) is proposed for locating the satisfactory parameters of the classifier. In check level, 3-fold pass validation approach was implemented to the MINST handwritten numeral database to assess the proposed machine performances. Simulation consequences display that the proposed machine has excessive recognition accuracy.

Swagatam Das, Arijit Biswas, Sambarta Dasgupta, and Ajith Abraham[13] this paper proposed bacterial foraging optimization set of rules (BFOA) has been extensively regular as a international optimization algorithm of present day interest for dispensed optimization and control. BFOA is stimulated through the social foraging behaviour of escherichia coli. It starts offevolved with a lucid outline of the classical BFOA. It then analyses the dynamics of the simulated chemo taxis step in BFOA with the help of a simple mathematical version. It affords a brand new adaptive version of BFOA, where the chemo tactic step length is adjusted at the run in keeping with the contemporary health of a virtual bacterium. And, analysis of the dynamics of reproduction in BFOA is likewise mentioned and additionally gives an account of most of the sizable programs of BFOA till date.

3. OCR CHALLENGES

All for exact first-rate and excessive accuracy character popularity, OCR strategies count on excessive first-rate or excessive decision snap shots with a few primary structural homes which include excessive differentiating text and heritage. The manner pics are generated is an crucial and determining issue in the accuracy and success of OCR, for the reason that this regularly affects the nice of photographs dramatically. Typically OCR with pictures produced with the aid of scanners offers high accuracy and true performance. In comparison, snap shots produced by way of cameras usually aren't as accurate of an enter as scanned images to be used for OCR because of the environmental or digicam related

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elements. Numerous errors may emerge, which can be clarified as observe.

1.Scene complexity:
In a normal surroundings, we will see massive numbers of man-made objects which can be protected in digital camera taken photographs consisting of artwork, homes, and logos. Those gadgets have comparative structures and appearances to textual content which makes textual content recognition very hard inside the processed photograph. Textual content itself is often laid out to encourage decipherability. The undertaking with scene intricacy is that the encircling scene makes it difficult to segregate textual content from non-textual content [1]

2.Conditions of Uneven Lighting:
Frequently, taking pictures in herbal environments results in choppy lighting and shadows. This poses a project for OCR as it degrades the favored characteristics of the photograph and therefore causes much less correct detection, segmentation and reputation outcomes [2].
This circumstance with choppy lights is what distinguishes a scanned picture shape one that is produced with a digital camera. The shortage of such disparities in lighting fixtures and shadows makes scanned photographs desired over digital camera photographs for their higher traits and best. Although using an on-digital camera flash may also take away such issues with uneven lighting, it introduces new demanding situations.

3.Skewness (rotation):
for optical individual reputation systems, the point of view for the enter photo that taken from camera of hand-held tool or other gadgets that used for taken photo is not fixed like a scanner enter, which skewing of textual content lines from their precise orientation is probably discovered. Excellent degree poor effects will be found whilst the sort of skewed image is fed to the OCR classifier. Many strategies available for the cause of deskew the photo documents, which include projection profile, rast set of rules, hough remodel, methods of fourier transformation, and so on.

4.Blurring and Degradation:
Given that operating over an expansion of distances are supposed to several digital cameras, an important thing is the virtual digital camera's focusing. For the excellent accuracy of character reputation and man or woman segmentation, person sharpness is needed. At big apertures and quick distances, uneven focus may be found while a small point of view adjustments. For the maximum part linked with images, there are two sorts of difficult to understand that is: out of consciousness difficult to understand and motion difficult to understand [3]. On the factor for catching a

transferring object, whilst the color price of the digital camera isn't sufficiently high, the sensor receives presented to a usually converting scene. Thus, blurring will found in elements in movement.

5.Aspect Ratios :
Text has one-of-a-kind factor ratios. Textual content can be short which includes visitors signs and symptoms, at the same time as other text can be tons longer, which include video captions. Area, scale and period of text need to be taken into consideration with seek procedure to come across text, which introduces high computational complexity.

6.Tilting (Perspective Distortion):
Report images acquired via scanners is continuously parallel to the aircraft of sensor, but this cannot be located all times for recorded photo received by means of a portable camera, that might not generally be parallel to the shape aircraft. As a result, lines of text that remote from the camera seem littler than people who nearer to the digital camera which seems extra. This situation causes tilted photos. Commentary of a angle distortion is clear if the recognizer isn't always angle illiberal, which causes decrease recognition rate and accuracy [4]. Mobile phones have a bonus with orientation sensors. They could recognize whether or not the tool is tilted and while twisting happens they are able to forbid customers to take photographs. Permitting the user to align aircraft of the shape with that of the digicam is likewise furnished by means of this feature. Orientation sensors therefore may additionally assure that produced pix fulfill a certain degree of evenness.

7.Fonts :
Italic style and script fonts of characters would possibly overlap each different, making it tough to carry out a number of the primary OCR approaches which includes segmentation. Characters of diverse fonts have massive inside-magnificence variations and form many pattern sub-spaces, making it difficult to perform accurate recognition when the man or woman class variety is big.

8. Multilingual Environments:
Albeit a big part of the languages of Latin have many characters, languages as an example, Jap, Chinese and Korean, have a huge number of individual lessons. Linked characters are exist in Arabic languages, that in line with context, it changes writing shape. In Hindi syllables constitute with the aid of combining alphabetic letters into hundreds of shapes. In multilingual conditions, OCR in scanned files stays as a primary research difficulty [5], on the grounds that OCR in complicated symbolism is greater troublesome.

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9. Warping:
Content or textual content on items of various geometries can be every other challenge for ocr to be diagnosed when pictures of such state of affairs captured by way of hand-held cameras. Some circumstances can also emerge with flatbed scanners, wherein the twisted textual content located whilst the content material procured on photo, for example the content material toward the binding of an exceptionally thick e-book. For convention paper files, a method for image dewarping [6]. By awaiting the manner that content lines are similarly separated and parallel to every different, they dewarp pics.

4. OCR APPLICATIONS

Optical character recognition has been achieved in a severa of programs. We mentioned a number of these application regions in this phase.

1. Handwriting Recognition:
Handwriting reputation is the capacity of a computer to get and translate intelligible handwritten facts from assets, for example, paper records, photographs, touch-screens and specific devices. The photograph of the written content is probably detected "off line" from a bit of paper with the aid of optical scanning (optical character popularity) or smart word popularity. On the other hand, the developments of the pen tip can be detected "on-line", as an example by using a pen-based totally pc screen floor.

2. Receipt Imaging:
 Receipt imaging is widely applied as a part of several businesses programs to display monetary statistics and keep accumulation of bills from heaping up. In government places of work and self sufficient agencies, ocr simplifies information amassing and evaluation, among extraordinary processes.

3. Legal Industry:
Felony industry [7] is also one of the recipients of the OCR innovation. OCR is applied to digitize documents, and to in particular enter into pc database. Valid specialists can in addition search files required from first-rate databases through essentially writing a few key phrases.

4. Banking:
Some other imperative use of OCR is in banking, wherein it's miles utilized to technique cheques without human intervention. A cheque may be embedded with a system where the framework filters the sum to be issued and the right measure of coins is exchanged. This innovation has been idealized for revealed cheque, and is genuinely specific for handwritten tests diminishing the preserve-up time in banks.

5. Healthcare:
To system printed fabric, medicinal services [7] have likewise visible a variety in the usage of OCR innovation. Medicinal service specialists continuously want to manipulate considerable volumes of files for each patient, including safety frames and further standard fitness forms. To stay aware about every one of this records, it's miles precious to input relevant facts into an digital database. With OCR processing tools, we are able to extract statistics from structures and positioned it into databases, so that every affected person's records is fast recorded and retrieved when wished in destiny.

6. Captcha:
A captcha [8] is a system that could create and grade tests that human can pass yet cutting-edge software program era can not. malicious programmer can make software to misuse non-public statistics on web sites. Dictionary assault is attack towards mystery word showed frameworks wherein a programmer composes a device to time and again try unique passwords like from dictionary of maximum normal passwords. In captcha, a photo comprising an association of letters and numbers is produced with variety of size and textual styles, distracting backgrounds, arbitrary quantities, highlights and noise in order that textual content can't be read via OCR. Current OCR frameworks can be applied to evacuate the noise and element the image to make the picture tractable by means of such malicious customers.

7. Automatic Number Plate Recognition:
Automatic number plate popularity [9] is utilized as a mass commentary approach making usage of optical character reputation on pictures to understand vehicle registration plates. ANPR has moreover been made to save the photographs stuck by way of the cameras which includes the numbers caught from registration code. ANPR innovation own to plate range from vicinity to place as it is an area unique innovation. They may be used by one of a kind police forces and as a way for digital toll accumulation on payper-use streets.

8. ATMA: android travel mate application:
 ATMA : android journey mate application [10] that it empowers vacationers and travellers to effortlessly capture the local signboards, nation dialect books pages, motel menus, banners and so on. unicode textual content layout changed into received from content material embedded inside the stuck photo by means of an implicit OCR. With the aim that travellers can translate the local dialect unicode content into their very own kingdom dialect, it likewise offers translation feature.

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5. CONCLUTION

The Optical Character recognition has been a subject of research and encompass diverse principles concerned, and boost in addition advances within the place. The accurate reputation is without delay depending on the nature of the material to be study and through its satisfactory. Contemporary studies isn't at once situation to cursive handwriting and to apprehend the kid handwriting which require high supervised gadget. From numerous research we've got seen that choice of relevant function extraction and classification approach plays an essential role in overall performance of person popularity rate. This evaluation establishes a entire device that converts scanned pix of handwritten characters to text files. On this paper, we have studied various papers with extraordinary set of rules. Each method have personal porn's and con's. However, nonetheless there are many untimely issues, while more than one optima exist. The overall performance is degrading. So, in future there is a lot of work to get rid of drawbacks." BFO with BPN" must supply us suitable accuracy and boom performance. It is able to exist a couple of optima. It is use for worldwide optimization this cloth serves as a guide and update for readers running within the person popularity area.

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