

Calculating Equation using Object Character Recognition

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Abstract— Object Character Recognition (OCR) is process of classification of object patterns contained in digital image. The character recognition is achieved successfully through segmentation, feature extraction and classification. In this paper it presents basic ideas of OCR needed for better understanding for Equation solving. It starts with brief background and history of OCR systems. In this various techniques of OCR systems are been used such as optical scanning and location segmentation also include pre-processing, segmentation, representation, extraction feature, training and recognition and post-processing. Than Equation solving is done by different Algorithm such as Cramer's rule, Gaussian elimination to provide best and reliable result of equation. Finally, future of Equation solving systems is presented.

Keywords: OCR, Neural Network, Gaussian Elimination

I. INTRODUCTION

Object Character Recognition(OCR) is process of identification of object patterns contained in digital image corresponding to alphanumeric or other characters. The character recognition is achieved through important steps of segmentation, feature extraction and classification. OCR is mostly used in both academic research as well as in industry. In this, we have collected together the basic ideas of OCR and equation solving knowledge for better understanding of book. It's been man's ancient dream to develop machines which reduce the effort of calculate basic linear Equation. One such replication of human functions is reading of documents encompassing different forms of text and Greece symbol. In this each character is identified and processed. Goal is to develop faster time and cost efficient software. It allows user to capture image containing of an equation and solving it. Library are being used to provide error- free calculation.

II. LITERATURE SURVEY

A. Schemes based on Image Scanning

[1] Mr. Pratik Madhukar Manwatkar, proposed a system which can automatically detect and read texts from image in 2015. Which is a Object Character Recognition system .It help's in indentifying Character, Symbol and Greek letter's. This system uses line detection and character detection algorithm. Than this capture dataset is than trained with existing dataset which help system to identify and detect symbol more efficiently. It also help's in providing output is amount of time .It also uses Feature Extraction to improve the Character recognition with more accurately and Reliability. Techniques used are named as Chain Code (CC), Independent Component Analysis(ICA).

[2] Kam-Fai Chan, proposed a system which Recognition Mathematical Expression in 2000. This system automatic recognized mathematical expression in a give image. It's uses Top-down and Bottom-up approach to parse the expression. In this system it also uses Error detection and

correction method which improve performance and reliability is result. It also overcome's some of the issues such as ambiguous of equation.

B. Text Recognition:

Text Recognition is newly concept which can be used in various field's. It is basically conversion of mechanical text in to digital or electronic text. This recognized text, character or symbol is mainly stored in ASCII or UTF-8 Format. OCR was basically used for Digitalization of Printed Document. So this techniques go hand in hand for recognition and calculating equation

III. EXISTING SYSTEM

As this field is newly introduced there are some existing system which perform similarly but with limited amount of Feature and reliability on result. Some of this Limitation include Few Mathematical Models, Amount of time required to solve the given equation is more, Also the implementation process is quite Complex to Implement and to understand. As this new technology it required Human intervention this become slow and less reliable

IV. PROPOSED SYSTEM

Equation solving using object recognition technique is newly introduced technique use in solving Mathematical Field. The proposed system uses multiple methods together which work hand in hand to give accurate result in minimum amount of time to processes. Initially Line and Character detection methods is implemented, which will help in detecting the Numbers, symbol and operator. As this method is tried and tested, it provide hassle-free result.

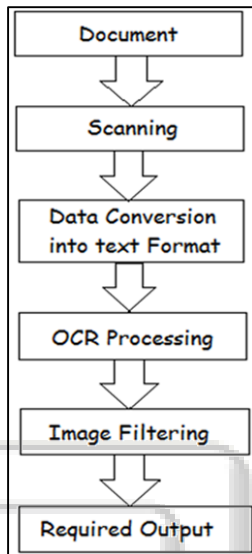
In this, integration of segmentation and contextual analysis in done. The proposed system also include new Mathematical Model so it can solve wide rang of Equation without any Limitation. Machine Learning and training Dataset is done to reduce the processing time. Such as storing most frequently used values in cache to reduce the swapping time between memory. As the system requirement are less, so it compatible with mostly used Hardware in world. Due to this it can be able to reach larger audience and can take benefits of this system.

V. ALGORITHM

A. OCR Working:

For computers to scan a particular image, it needs to be presented it with an image of that page which is generated using an optical scanner or a digital camera. It is created in a graphic file which is usually in the form of a JPG file. In other words, the computer has a picture of the page rather than the text itself-it is not able to read the words provided on the page. OCR is a method of converting a picture of text into text itself. In other words, it generates something like a TXT or

DOC file from a scanned JPG of a printed or handwritten page depending on the requirements of the user. OCR i.e. Optical Character Recognition is the electronic transfer of images of either handwritten or printed text which is then converted into machine-coded text. It can be in the form of a scanned document or a photo of a document. Matrix matching, a type of OCR algorithm which involves comparing an image on a pixel-by-pixel basis; which is also known as pattern matching or pattern recognition. This technique usually works best with typewritten text and not when new fonts are encountered.

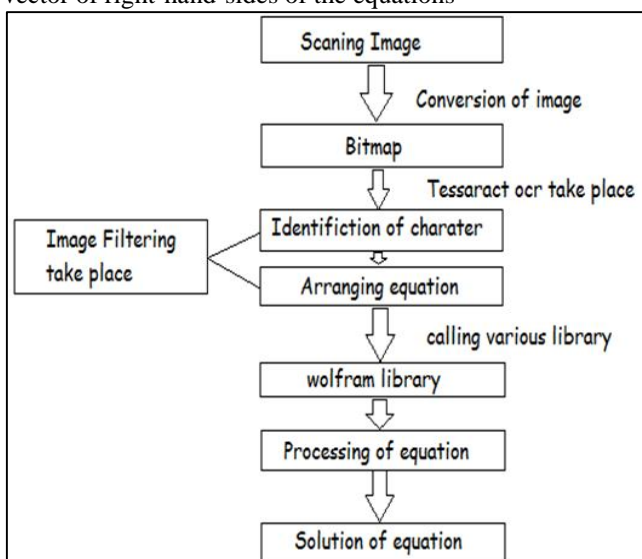


1) *Gaussian Elimination:*

An algorithm for solving linear equations. It is usually a sequence of operations performed on corresponded matrix of coefficients. Some of the process includes Swapping two rows than Multiplying a row by a nonzero number and Adding a multiples of one row to another row.

2) *Cramer's Rule:*

An explicit formula for the solution of linear equations with as many equations, unknowns valid whenever the system has a unique solution. It expresses the solution in terms of the determinants of the coefficient matrix and of matrices obtained from it by replacing one column by the column vector of right-hand-sides of the equations



VI. NEURAL NETWORK.

Third Party library's uses it personal Language's to Solve and Reduce functions, This library contain a broad range of methods for all kinds of algebra, even from basic linear to quadratic equations also multivariate nonlinear systems. It's optimizations to increase speed and reliability. Other operations rely on theorems and algorithms from number theory, abstract algebra and other advanced fields to compute results.

This Third party also has separate algorithms to show algebraic operations step by step using classic techniques that are easy for humans to recognize and follow.

The first layer detects edges. Then the following layers combine other edges found in the data, ultimately a specified layer attempts to detect a wheel pattern or a window pattern. Depending on the amount of layers, it will be or not be able to define what a car is on the picture, in this case.

The more layers in a neural network, the more is learned and the more accurate the pattern detection is. Neural Networks learn and attribute weights to the connections between the different neurons each time the network processes data.

This means the next time it comes across such a picture, it will have learned that this particular section of the picture is probably associated with for example a tire or a door.

VII. CONCLUSION

There are so many up-coming projects where the manual work is decreased and people want an easier lifestyle. We propose a similar system where there is no need for manual work and the system developed will be easy and time-efficient. The system will be able to perform mathematical equations and generate the output. The text will be recognized using various algorithms and the characters will be used and perform the functions required. We conclude that this software will be useful in future to overcome issues of existing problem. Users will have good efficient use of software decreasing the manual work.

REFERENCES

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