



Handwritten Math Problem Solver Using Convolutional Neural Network

Mohini Lokhande¹, Kirti Murudkar², Arbaaz Nadaf³, Niyati Shah⁴

Department of Computer Engineering Trinity College of Engineering and Research, Pune¹⁻⁴

Abstract: The main objective of this project to develop an Website which calculates the presents a Handwritten Equation Solver trained by handwritten digits and mathematical symbol using Convolutional Neural Network with some image processing techniques to achieve a decent accuracy of 98.46%.

Keywords: Machine learning, Python, Handwritten Equation, Simplification, Preprocessing, Segmentation, Implementation, Recognition, CNN, Polynomial expressions, Image processing.

1. INTRODUCTION

Polynomials are used to graph the curves of roller coasters and bridges, in economics to do cost analyses, to find the motion of a particle under the influence of gravity, to forecast sales trends, to develop profit margins. Complexities involved in Human Computer Interaction (HCI) are reducing at an extraordinary rate and computers are gradually catching up with the nuances, irregularities and imprecisions of the real world to enable an easier interaction. Tremendous amount of research has gone into identifying and classifying some irregularities of the real world including handwriting recognition, natural language processing, face detection and so on.

2. LITERATURE SURVEY

Many various papers can be found on handwritten character segmentation. Some scheme is also working on mathematical expressions recognition “MER”. Like “Using SVM and projection histogram identification of ME”. Some are for offline printed mathematical expressions and recognition mentioned by Zanibbi et. al. (2002), “Recognition of printed mathematical symbols”, “Using SVM Mathematical symbols identification”, “Recognition of online mathematical symbols using template matching distance”, “Offline Handwritten Mathematical symbols recognition using character geometry”. This all proposed method for recognition of symbols and segmentation using various actions. Recognition has been also done by CNN based models for mathematical symbols and character. Some discussion about concerned to the labyrinth of online mathematical expression recognition. Majority of those papers concentrated in the recognition scheme of the equations. In this approach, the main hub is on handwritten polynomial equation simplify. As there is not any proper work that can successfully handle the problem for handwritten images. The past work only focuses on the recognition level of the equation and not concentrated on multivariable identification in the equation to solve the problem. This work motivated to handle a multivariable segmentation and recognition efficiently and show the result is and every variable in the equation.

After preprocessing, segmentation, and recognition of the input image, generating a string equation from that image and simplify that expression is the main target.

3. EXISTING SYSTEM

SolveIt : An Application for Automated Recognition and Processing of Handwritten Mathematical Equations(2018).

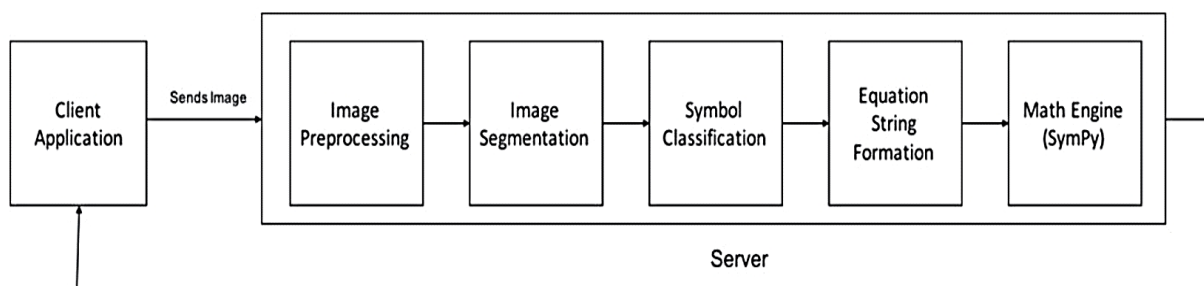
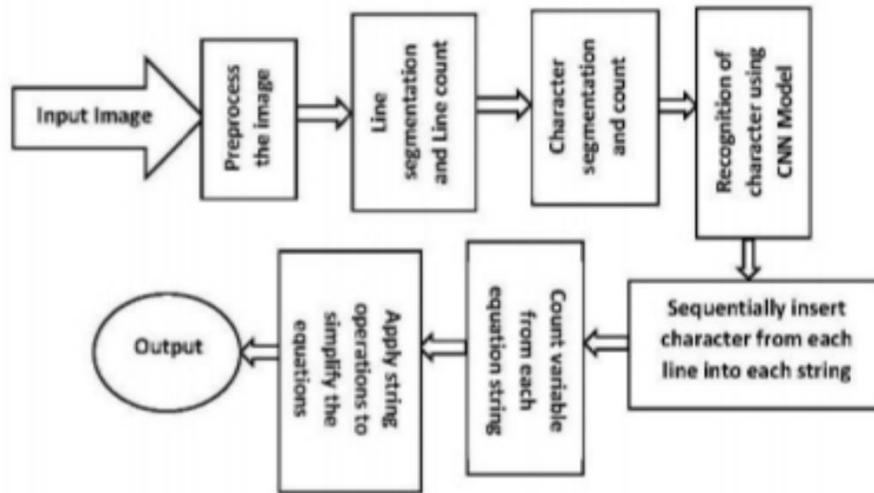


Fig 1: Pipeline style architecture of the application



4. PROPOSED SYSTEM

In this activity, for identifying handwritten polynomial expressions and simplifies the problem we illustrated many different steps from taking an input image to the final result, which is described below. In figure 1 shows the workflow diagram of our methodology.



5. CONCLUSION

To simplify the math, the main task done in the feature extraction from the image and recognition with the help of the CNN model. If the CNN model classifies correctly all of the segmented images then this will be generated the correct list of equations. Which will be better for the simplification part. This is a successful representation of the state of the art. Any person can easily use this as the process is easy and does not require any advance knowledge of the technology.

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