

ABSTRACT

Grading is an essential part of education. Assessing each answer sheet manually, offering fair, unbiased and valid grades is difficult most of the time. The overall idea behind this project is to develop a computer vision algorithm along with a solution package for recognizing and digitizing steps of solving a mathematical equation written by freehand on a paper, validating the steps and final answer of the recognized handwritten lines by maintaining the context.

Although the printed text recognition is considered a clarified issue these days, handwritten text recognition remains a demanding task, mainly due to the huge variation in handwriting among certain people including the size, orientation, thickness, format, and dimension of each written letter or digit. The overall solution deduced to solve the problem can be divided into two parts, i.e 'Workspace Detection' module and the 'Analysis Module'. The Workspace detection module is responsible for detecting multiple workspaces in a given sheet of paper using predefined markers. The Analysis module is responsible for detecting and localizing characters in any given single workspace, and mathematically analyzing them, and drawing red, green lines depending upon their correctness. The applications of the proposed system can be found in various educational institutions such as schools, learning centres or university colleges.

The end result of the project is to evaluate each line and provide feedback in terms of a red/green bounding box drawn across it where green represents correct and red represents wrong answers. The technique aims to achieve a reasonable value of accuracy to offer reliable and dependable results.

Offline handwritten recognition systems based on machine learning algorithms have significant importance in the research field. However, it is a difficult recognition due to the presence of odd characters or similarity in shapes for multiple characters. The paper proposed a system that was implemented to recognize the handwritten characters and then display the final score of the student. The proposed CNN architecture can also be enhanced to achieve much higher performance and accuracy in displaying the score of the student.