

Encephalon-An Implementation of a Handwritten Mathematical Expression Solver

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Abstract : Recognizing and solving handwritten mathematical expressions can be a challenging task, particularly when certain characters are segmented and classified. This project proposes a solution that uses Convolutional Neural Network (CNN) and image processing techniques to accurately solve various types of equations, including arithmetic, quadratic, and trigonometric equations, as well as logical operations like logical AND, OR, NOT, NAND, XOR, and NOR. The proposed solution also provides a graphical solution, allowing users to visualize equations and their solutions. In addition to equation solving, the platform, called CNNCalc, offers a comprehensive learning experience for students. It provides educational content, a quiz platform, and a coding platform for practicing programming skills in different languages like C, Python, and Java. This all-in-one solution makes the learning process engaging and enjoyable for students. The proposed methodology includes horizontal compact projection analysis and survey for segmentation and binarization, as well as connected component analysis and integrated connected component analysis for character classification. The compact projection algorithm compresses the horizontal projections to remove noise and obtain a clearer image, contributing to the accuracy of character segmentation. Experimental results demonstrate the effectiveness of the proposed solution in solving a wide range of mathematical equations. CNNCalc provides a powerful and user-friendly platform for solving equations, learning, and practicing programming skills. With its comprehensive features and accurate results, CNNCalc is poised to revolutionize the way students learn and solve mathematical equations. The platform utilizes a custom-designed Convolutional Neural Network (CNN) with image processing techniques to accurately recognize and classify symbols within handwritten equations. The compact projection algorithm effectively removes noise from horizontal projections, leading to clearer images and improved character segmentation. Experimental results demonstrate the accuracy and effectiveness of the proposed solution in solving a wide range of equations, including arithmetic, quadratic, trigonometric, and logical operations. CNNCalc features a user-friendly interface with a graphical representation of equations being solved, making it an interactive and engaging learning experience for users. The platform also includes tutorials, testing capabilities, and programming features in languages such as C, Python, and Java. Users can track their progress and work towards improving their skills. CNNCalc is poised to revolutionize the way students learn and solve mathematical equations with its comprehensive features and accurate results.

Keywords : AL, ML, hand written equation solver, maths, computer, CNNCalc, convolutional neural networks

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