Handwritten Digit Recognition Using Logistic Regression

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Abstract: *With applications in optical character recognition (OCR), digitizing historical documents, and automating data entry procedures, handwritten digit recognition is crucial to pattern recognition and machine learning. This work develops a handwritten digit recognition system using logistic regression. The main objective is to use the MNIST dataset to develop a precise and effective model for classifying handwritten numbers from 0to 9. Data collection, preprocessing, model installation, training, assessment, and analysis are all included in the methodology. Normalizing pixel values and flattening 2D picture matrices into 1D vectors are steps in the preprocessing process. Using gradient descent optimization, the logistic regression model set up for multi- class classification minimizes the cost function. A testing set will be used to assess performance, and metrics including F1 score, recall, accuracy, and precision will be used. A very precise logistic regression model for handwritten digit identification is the anticipated result. The model's advantages and disadvantages will be emphasized through thorough analysis and visualization, which will include learning weights, biases, and incorrectly categorized images. This work offers useful solutions for automation, postal services, and digital archiving, furthering the field of pattern recognition and highlighting the significance of logistic regression in machine learning.*

Keywords: Logistic Regression, Pattern Recognition, Optical Character Recognition (OCR), MNIST Dataset, Machine Learning, Multi-class Classification

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