

INTRODUCTION

Handwritten digit recognition is the process of receiving and correctly interpreting a legible hand-drawn digit from an input source (paper or photographs) by comparing it with previously trained data.

APPLICATIONS

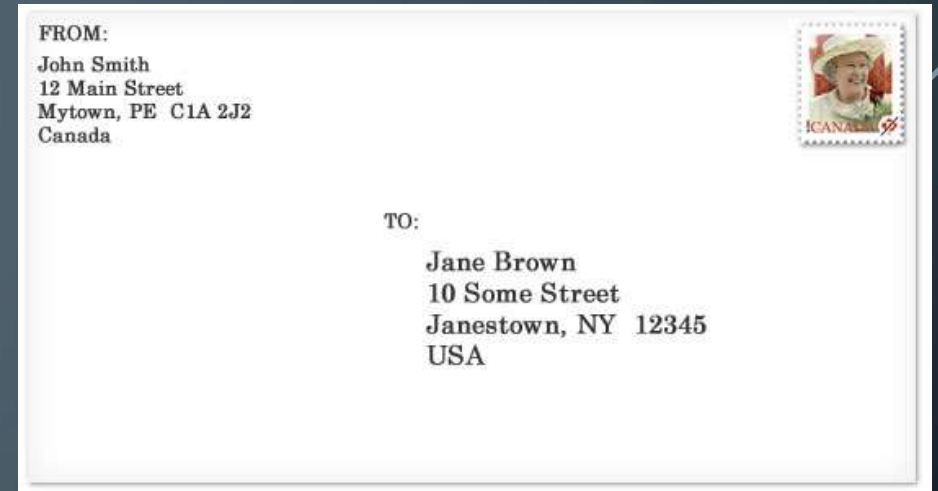
- Postal mail sorting
- Courtesy amounts on cheques
- Formation of data entry etc.



Number Plate
Recognition



Recognition of
legal amounts
on bank cheques



Postal mail
sorting



Currency
Recognition



House no.
Recognition

PROBLEM STATEMENT

Given a set of greyscale isolated numerical images taken from MNIST database.

The objectives are:–

- ✓ To recognize handwritten digits correctly.
- ✓ To improve the accuracy of detection.
- ✓ To develop a method which is independent of digit size and writer style/ink independent.

LITERATURE SURVEY

- Hand Written Character Recognition using Star-Layered Histogram Features

Stephen Karungaru, Kenji Terada and Minoru Fukumi


In this method, a character recognition method using features extracted from a star layered histogram is presented and trained using neural networks. After several image preprocessing steps, the character region is extracted. Its contour is then used to determine the center of gravity (COG). This CoG point is used as the origin to create a histogram using equally spaced lines extending from the CoG to the contour.

The first point the line touches the character represents the first layer of the histogram. If the line extension has not reached the region boundary, the next hit represents the second layer of the histogram. This process is repeated until the line touches the boundary of the character's region. After normalization, these features are used to train a neural network.

Result

This method achieves an accuracy of about 93% using the MNIST database of handwritten digits.

- A Novel Feature Selection and Extraction Technique for Classification



We present a versatile technique for the purpose of feature selection and extraction – Class Dependent Features (CDFs). CDFs identify the features innate to a class and extract them accordingly. The features thus extracted are relevant to the entire class and not just to the individual data item. This paper focuses on using CDFs to improve the accuracy of classification and at the same time control computational expense by tackling the curse of dimensionality.

Result–

This method achieves an accuracy of about 92%



EXISTING MODELS

Feature extraction methods

- Star layered histogram feature extraction algorithm
 - requires thinning operation
 - many inner details can not be captured using outer polygons
- Class Dependent feature selection and extraction
 - expensive in terms of computation

Classification Algorithms

- Linear Classifier

- error rate is 12.0%

- Neural Networks

- requires thousands of training examples and huge computation time

PROPOSED MODEL

- The proposed method uses k-nearest neighbour(k -NN) classification algorithm for classifying the MNIST digit images.
- Accuracy of about 96% can be achieved.
- Less number of computations required.
- No thinning operation required.

