Algorithms Explanation in Details

Barcode Generator

To create barcodes for each image, all the images will be loaded in a list. The algorithm goes through a for loop for folders and a for loop for the images, which will go through the images. To create a barcode for each image, four projections are used: P1, P2, P3, P4 for the corresponding angles 0,45,90,135 degrees, respectively.
The corresponding threshold values are calculated for each threshold value by taking the average of its vector contents. Using a for loop for each projection, if the cell value is greater than the corresponding threshold value, 1 is assigned. Otherwise, zero is assigned. Once it goes through all the threshold values, they are combined into a binary string. It is then assigned a barcode in the EAN13 standard. Now, another list is created, storing the barcode, class ID and the binary string.

Search Algorithm

A search algorithm was created to search a query image in the MNIST dataset. With the given image, the algorithm searches through the database and compares barcodes by using the Hamming distance between two bit-strings of equal length. The Hamming distance compares the two binary strings. The algorithm goes through the characters in both strings and checks to see how many mismatches there are between the two strings. Less mismatches and having lower Hamming distance between the two strings are better because the barcodes are similar and thus result in an accurate search result.