Required Measurements and Analysis

1)Retrieval Accuracy in terms of Hit Ratio

The retrieval accuracy was calculated in terms of hit ratio. A hit was recorded as a success, when an image with a digit returned an image of the same digit(same class). A miss was recorded as an unsuccessful search. The hit ratio received was 91%. To make improvements, more projections could have been added. Another thing that could have been done.

2)Big-O Complexity Analysis:

Big-o complexity for Barcode Generation

In this code, there are a number of operations performed .Most of the lines of the code , have a number of operations as 1 and n. Also, this is a quadratic code that means that it contains two loops. The first loop is for the outer folders that are named from 0 to 9, it is an outer loop .Second loop is the inner loop for the images named from 0 to 9 inside each folder . For the outer loop that is the first loop, the number of operations is n+1. For the inner loop , the number of operations performed are (1+2+….n) which is equal to n*(n+1)/2. Therefore, the number of operations performed in the inner loop is (n^2+n)/2. Adding all the number of operations performed in the Barcode Generation algorithm we will get (1*x)+(n*x)+(n^2), where x can be any integer value. Therefore, the big-oh complexity of the Barcode Generation algorithm is O(n^2).,

Big-o complexity for Search Algorithm

In the search algorithm , we have used the hamming distance for comparison. In the hamming distance , the number of operations is n in total as in it we have only a linear equation . That means that we are comparing with just i values. This step is performing n+1 number of operations So overall the number of operations for hamming distance is (1*x)+(n*x) , where x is any integer value.

Since in the searching algorithm we are again converting the images to barcode and then matching the hamming distance between them , we must again use two loops , inner and outer loop as mentioned in the above paragraph. Since the two loops are being used the number of operations for the outer loop will be (1+2+….n) and number of operations for the inner loop will be (n^2+n)/2. Therefore, the total number of operations in searching algorithm will be (1*x)+(n*x)+(1*y)+(n*y)+(n^2), where x and y are integers. After adding them we get (1*z)+(n*z)+(n^2), where z is an integer value.

Since we ignore the constant and the fastest growing function determines the big-o , hence the big-oh complexity for search algorithm is O(n^2).