Project Design Phase-I - Solution Fit

Project Title: A Novel Method For Handwritten Digit Recognition System
Team ID: PNT2022TMID42195

Define CS, fit into CC

1. CUSTOMER SEGMENT(S) CS

Use of automatic processing system used in banks to process bank cheques
Recognition of handwritten digits and make banking operations easier and error free.
This system is developed for zip code or postal code recognition that can be employed in mail sorting. This can help humans to sort mails with postal codes that are difficult to identify.

6. CUSTOMER CONSTRAINTS CC

There is no possibility of obtaining information about the type of the input. First, the text has to be separated into characters or words. With Hidden Markov Models or Neural Networks these words are matched to a sequence of data .The development of novel methods to solve classification problems enjoys ongoing popularity in data mining and related disciplines, so that a large number of alternative methods are available. Not surprisingly, algorithmic advancements are usually not adopted immediately in corporate practice, where classical techniques like logistic regression or decision tree approaches prevail (Cui and Curry 2005, p. 595; Friedman 2006, p. 180).

5. AVAILABLE SOLUTIONS AS

Images in the real world can be exposed to some of the natural influences such as dust,Air pollution, and a number of other abnormalities. In order to simulate the performance of our proposed algorithm for these natural influences, we add an additive white Gaussian noise with σ=0.5 to the MNIST dataset.In this subsection, we evaluate the classification performance of our proposed algorithm on a noisy MNIST dataset to verify its classification ability in a case dealing with high levels of noise.MNIST is a dataset which is widely used for handwritten digit recognition. The dataset consist of 60,000 training images and 10,000 test images.

Explore AS, differentiate

Focus on J&P, tap into BE, understand RC

2. JOBS-TO-BE-DONE / PROBLEMS J&P

The illegible handwriting of the users makes it difficult for the system to identify the digits

If the digital system is of poor quality, it becomes unrecognizable for the system

Poor internet leads to delay in the output. Internet connectivity issues is of major concern.

Arabic digits are more challenging than English patterns. Hence, it makes it difficult for the system. In Handwritten number recognition, we face numerous challenges because of different styles of jotting of different peoples as it.

It is not an Optical character recognition.

9. PROBLEM ROOT CAUSE RC

The handwritten digit recognition is the capability of computer applications to recognize the human handwritten digits.

It is a hard task for the machine because handwritten digits are not perfect and can be made with many different shapes and sizes.

Handwritten Digit Recognition is the capability of a computer to fete the mortal handwritten integers from different sources like images, papers, touch defenses, etc, and classify them into 10 predefined classes (0-9).

This has been a Content of bottomless-exploration in the field of deep literacy.

Number recognition has numerous operations like number plate recognition, postal correspondence sorting, bank check processing, etc .

7. BEHAVIOUR BE

1.The applications where these handwritten digit recognition can be used are Banking sector where it can be used to maintain the security pin numbers, it can be also used for blind peoples by using sound output.

2.In business, System Analysis and Design refers to the process of examining a business situation with the intent of improving it through better procedures and methods.

3.Handwriting recognition software allows user to translate all those signature and notes into electronic words in a text document format.

4.This data only requires far less physical space than the storage of the physical copies.

Focus on J&P, tap into BE, understand RC

3. TRIGGERS

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Human effort can be reduced.

Bank can employ less employees who are as efficient as the computerized processing system

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4. EMOTIONS: BEFORE / AFTER

EM

Handwriting recognition software allows users to translate all those signatures and notes into electronic words in a text document format.

This data only requires far less physical space than the storage of the physical copies.

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It helps humans ease their jobs and solve more complex problems.

10. YOUR SOLUTION

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The handwritten digit recognition system is a way to tackle this problem which uses the image of a digit and recognizes the digit present in the image.

Convolutional Neural Network model created using PyTorch library over the MNIST dataset to recognize handwritten digits.

This exploration provides a comprehensive comparison between different machine literacy and deep literacy algorithms for the purpose of handwritten number recognition.

For this, we've used Support Vector Machine, Multilayer Perceptron, and Convolutional Neural Network.

The comparison between these algorithms is carried out on the base of their delicacy, crimes, and testing- training time corroborated by plots and maps that have been constructed using matplotlib for visualization

8.CHANNELS of BEHAVIOR

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8.1 ONLINE

Isolated-characters and word recognizers are the most basic type of classifiers currently used in handwriting recognition.

The development of classifiers is attempted using a variety of techniques ranging from struc-tural and rule-based methods to statistical modeling.

The performance of rule-based methods is limited by the capabilities of the designer to reliably devise the set of rules.

On the other hand, statistical approaches generally require a large amount of data for training.

Such classi-fiers require a fixed number of features in multidimensional feature space.

The problem now is to define a separation boundary between classes in this feature space.

This often leads to complex solution representations and intolerance to noise and consequently large generalization errors.

As a result heavy emphasis is placed on the preprocessing stage prior to classification in order to effectively reduce these problems.

8.2 OFFLINE

In the domain of off-line handwritten character recognition there are two key strategies in current use.

They can be broadly grouped as ‘active’ and ‘passive’ character recognition.

At the heart of our approach is the feature extraction routine that divides the image into a quad tree.

Features are then extracted based on the contour representation in the sub-image.

Hierarchy is maintained by dividing each sub-image into deeper quad trees in order to increase the level of detail.

For most datasets a depth of 4 is sufficient. The features from all these levels are then placed in a feature vector.

This feature vector is then presented to the GP classifier.

The same technique can be adopted using quin tree representation.