**Bangla Handwritten Digit Recognition**

**Abstract:** Handwritten digit recognition is a technique for automatically recognizing and detecting handwritten digital data via Machine Learning models. To meet the demand for paperless offices and to greatly improve work efficiency, a proper Bangla handwritten digit recognition system needs to be researched and implemented. It is not easy to recognize Bengali handwritten digits due to differences in shape, size and writing style. In this paper, we will use Machine Learning algorithms to recognize the Bangla handwritten digit. Plentiful works have already been done in English, Arabic, Chinese, Japanese handwritten script. Some work on Bangla also has been done but there is space for development.

**Keywords–** Bangla handwritten recognition , Deep learning , Computer vision , Machine learning

**1. Introduction:** Handwritten digital recognition development research is rapidly evolving and redesigning automation fields such as automatic check reading, automatic number plate reading, digital postal service, optical image recognition (OCR), etc. Due to the different aspects of its use, computer vision researchers really feel the need to work on and improve on it - actually quality and performance. But handwriting identification is more challenging than typed letters. Because different people write differently and that creates a high level of diversity in the writing style. Also, there are some similarities between the shapes of the different characters. Overwriting situations make it even more challenging to properly classify handwritten numbers. There are many more applications that can use this Bangla Digit Recognition System. Such as Bangla Handwritten Letters Base OCR (Optical Character Recognition), Picture to Text to Speech, Bangla ID Card Reading, Number Plate Reading, Vehicle Tracking, Post Office Automation etc.

Our contributions -

* Collecting Data
* Pre-processing the data
* Applying Machine learning algorithms
* Creating and testing the model with real life data

Listed your contributions as points.

**2. Research Aims:** The goal of this investigation is to build up a superior Bangla Handwritten Digital Recognition System. Our aim is to achieve the accuracy as best as possible in recognizing Bangla Handwritten Digit.

**3. Research Objectives:**

* Using the database from BHaND. Which is similar to MNIST's English handwritten digit database. So, the work will be easier.
* Pre-processing
* Achieving best accuracy in recognizing Bangla handwritten digits.

Write as a point.

**4. Literature Review**

Existing research summary, their methodology, result, limitations [1]

In this section, some of the most interesting, traditional liveness detection techniques and deep learning on liveness detection are presented. There are many approaches that have been proposed to detect Face Liveliness for identification systems. Gahyun Kim et al. and Jukka et al. proposed a model based on Frequency and Texture based analysis for detecting liveliness [2][3]. This model can detect live and fake faces frequency and texture analyses. The author proposed the Local Binary Pattern(LBP) applied on the given facial images to analyze the textures. In their proposed model there are some limitations. For detecting liveliness, this research didn't deal with the attacks using portrait photographs, video and fake faces, masks or 3D models of the face. Sooyeon et al. [4] proposed the effect of defocus for face liveness detection. The author used a feature-level fusion approach to detect spoofing images. This paper didn't consider more robust countermeasures and can not detect spoofing attacks against 3D attacks and videos by analyzing textural and temporal characteristics.

**5. Research Questions:**

1. How to design secure social media systems by employing …..

**6. Proposed Methodology**

Figure 1: Working Prototype of Proposed System

**7. Conclusion**

**References**

[1] Kim, J.; Kang, U.; Lee, Y. Statistics and deep belief network-based cardiovascular risk prediction. Healthc. Inform. Res. 2017, 23, 169–175.