MNIST DIGI REPRESENTATION

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ABSTRACT- *This paper presents an implementation using Convolutional Neural Network to achieve the classification of the MNIST handwritten digit database. Here, we use plot of loss during training and classification accuracy to determine the performance of the neural network. The experimental results show that to a certain extent, the neural network can be used to solve classification problem. The thing of our work is going to be to make a model which will be ready to identify and determine the handwritten number from its image with better delicacy. We aim to finish this by using the generalities of Convolution Neural Network and MNIST dataset. However, the accuracy rate cannot be guaranteed and potential reasons are discussed. Then we try to modify the structure of the original neural network into a Convolutional Neural Network (CNN). The results indicate that CNN can be used to improve the performance during solving image recognition problem. At last, the results generated by our network system the most objective of this paper is to make sure effective and dependable approaches for recognition of handwritten integers.*

KEYWORDS: MNIST handwritten digit database, Convolutional Neural Network, Deep learning

1. INTRODUCTION

Intelligent image processing is an enticing study area in Artificial Intelligence it is also essential for a range of existing accessible research challenges. Hand-written digit identification is a well-researched sub-area of the field that discusses the detection of pre-segmented hand-written digits with learning models. It is along with several other disciplines in artificial intelligence, one of the most critical issues of machine learning, data retrieval, deep learning, and pattern recognition. The major application of machine learning approaches has been effective over the last decade in conforming to definitive systems that One of the main tasks in the area of the digital recognition system is the identification of digits from which the best discriminating characteristics can be extracted. In pattern recognition, various methods of area sampling strategies are used to identify certain areas. The difficulty in the identification of hand-written characters is primarily triggered by the wide variety in human writing styles. To enhance the efficiency of a hand-written character recognition device, robust feature extraction is therefore quite necessary. In the field of pattern recognition device sewing to its use in different areas, hand-written digit recognition has now achieved a lot of attention. In the next few days, by digitizing and manipulating existing paper records, the character recognition technology may serve as a foundation for initiating a paperless world. Hand-written digits datasets are vague, because sharp and perfectly straight lines may not always exist. Feature extraction is the key objective of digit recognition to eliminate the uncertainty from the data and achieve a more powerful embodiment of the term symbol from a series of numerical attributes. It deals with the retrieval from raw picture details of much of the

critical information. In comparison, the curves, like the written characters, are not always flat. In comparison, character datasets may be drawn in multiple sizes and orientations that are often meant to be written in an upright or downright point on a checklist. Consequently, by considering these limitations, an effective hand-written recognition system can be developed. It's very exhausting to remember handwriting characters often since it can be shown that most people cannot even identify their own printed texts. Therefore, there is a restriction for a writer to compose for hand-written text appreciation compete with human performance and perform substantially better than traditional artificial learning methods built manually. Moreover, not all the aspects of these individual models have previously been inspected. A significant effort has been made by researchers in data mining and machine learning to achieve successful approaches to the approximation of data recognition. Hand-written digits identification correspondence has its norm in the twenty-first century and is used much of the time in everyday life as a medium of discourse and capturing the details to be 16 communicated with others. The variety and distortion of the hand-written character collection are one of the difficulties in the overall recognition of hand-written characters since different cultures will use multiple handwriting types and control to extract the characters identical patterns from their known language. The system will be pre-loaded with thousands of input data to make the 'training' session more efficient and effective. Each percentage of 'train' sessions will be tested and validated for better accuracy.

2. PROPOSED SYSTEM

A process flow diagram symbolically shows how data flow throughout a system and how event-controlled decisions are made. The system flow chart diagram is a graphical representation of the relationship between the major parts or steps of the system. The flow chart shows the steps as boxes of various kinds and their order by connecting the boxes with arrows. The basic symbols of a flow diagram are shown below

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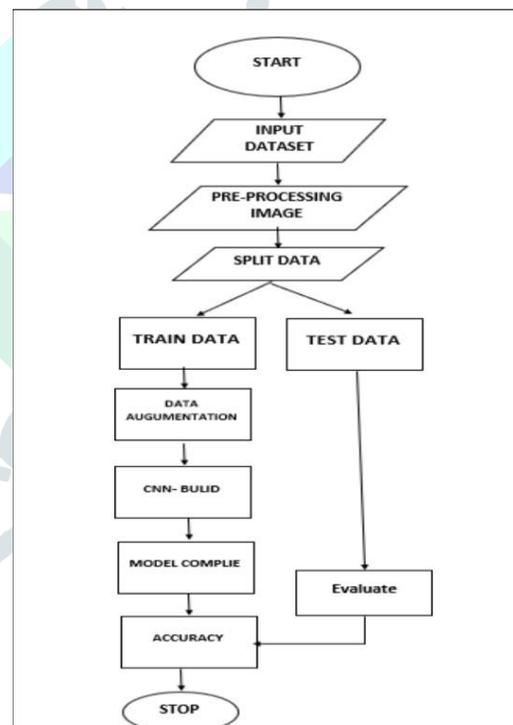
3. SOFTWARE CONFIGURATION

Google Collab Collab is a free Jupiter notebook environment that runs entirely in the cloud. Most importantly, it does not require a setup and the notebooks that we create can be simultaneous. Collab supports many machine learning libraries which can be easily loaded. With Collab,we can import an image dataset, train an image classifier on it, and evaluate the model, all in just a few lines of code. Collab notebooks execute code on Google's cloud servers, we can leverage the power of Google hardware, including GPUs and TPUs, regardless of the power of our machine.

Google Collab Features

- Google Collab provides tons of exciting features that any modern IDE offers, and much more.
- Some of the most exciting features are listed below:
  - Interactive tutorials to learn machine learning and neural networks.
  - Write and execute Python 3 code without having a local setup.
  - Execute terminal commands from the Notebook.
  - Import datasets from external sources such as Kaggle.
  - Save the Notebooks to Google Drive.
  - Import Notebooks from Google Drive.
  - Free cloud service, GPUs and TPUs.
  - Integrate with PyTorch, Tensor Flow, Open CV.
  - Import or publish directly from/to GitHub

PYTHON DEEP LEARNING USING KERAS

Keras is a minimalist Python library for deep learning that can run on top of Theano or TensorFlow. It was developed to make implementing deep learning models as fast and easy as possible for research and development.

GUIDING PRINCIPLE OF KERAS

Modularity- A model can be understood as a sequence or a graph alone. All the concerns of a deep learning model are discrete components that can be combined in arbitrary ways.

Minimalism- The library provides just enough to achieve an outcome, no-frills, and maximizing readability.

Extensibility- New components are intentionally easy to add and use within the framework, intended for researchers to trial and explore new ideas.

Python- No separate model files with custom file formats. Everything is native Python

4. RESULT & DISCUSSION

Computer output is the most important and direct source of information to the user. Efficient intelligible output design should improve the system's relationship with the user and admin in decision-making. Output design generally refers to the results generated by the system. For many end users on the basis of the output to evaluate the usefulness of the application. Efficient software must be able to produce and efficient effective reports.
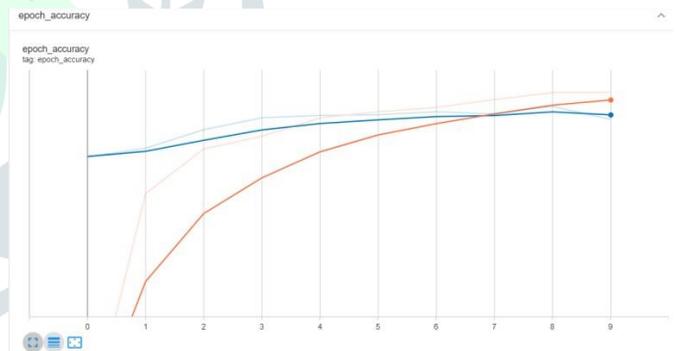
5. CONCLUSION

The key goal of this paper is to find a representation that makes for successful identification of isolated hand-written digits. For the identification of hand-written numerals, numerous machine learning algorithms were used in this paper. The important challenge in every

identification method is to re solve the extraction of features and valid classification approaches. In terms of precision and time complexity, the suggested algorithm aims to answer all the variables and well. Among all Machine learning models we got the SVM (Support Vector Machine) recognition method, the total highest accuracy of 95.88 percent is reached. This study is carried out as an initial effort, and the purpose of the paper is to make it simpler to identify hand-written digits without using any common methods for classification. Future research should allow the usage of a convolution Neural Network architecture which is the topic of deep learning, which provided the best result in the MNIST database and implemented the proposed recognition method by hand. Such more machines may be configured to recognize handwritten characters, identify objects, segment items, recognize handwriting, acknowledge text language, and for potential research, but could also allow hardware deployment for more effective and reliable live results on an online software recognition framework for live test case scenarios.

6. REFERENCES

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