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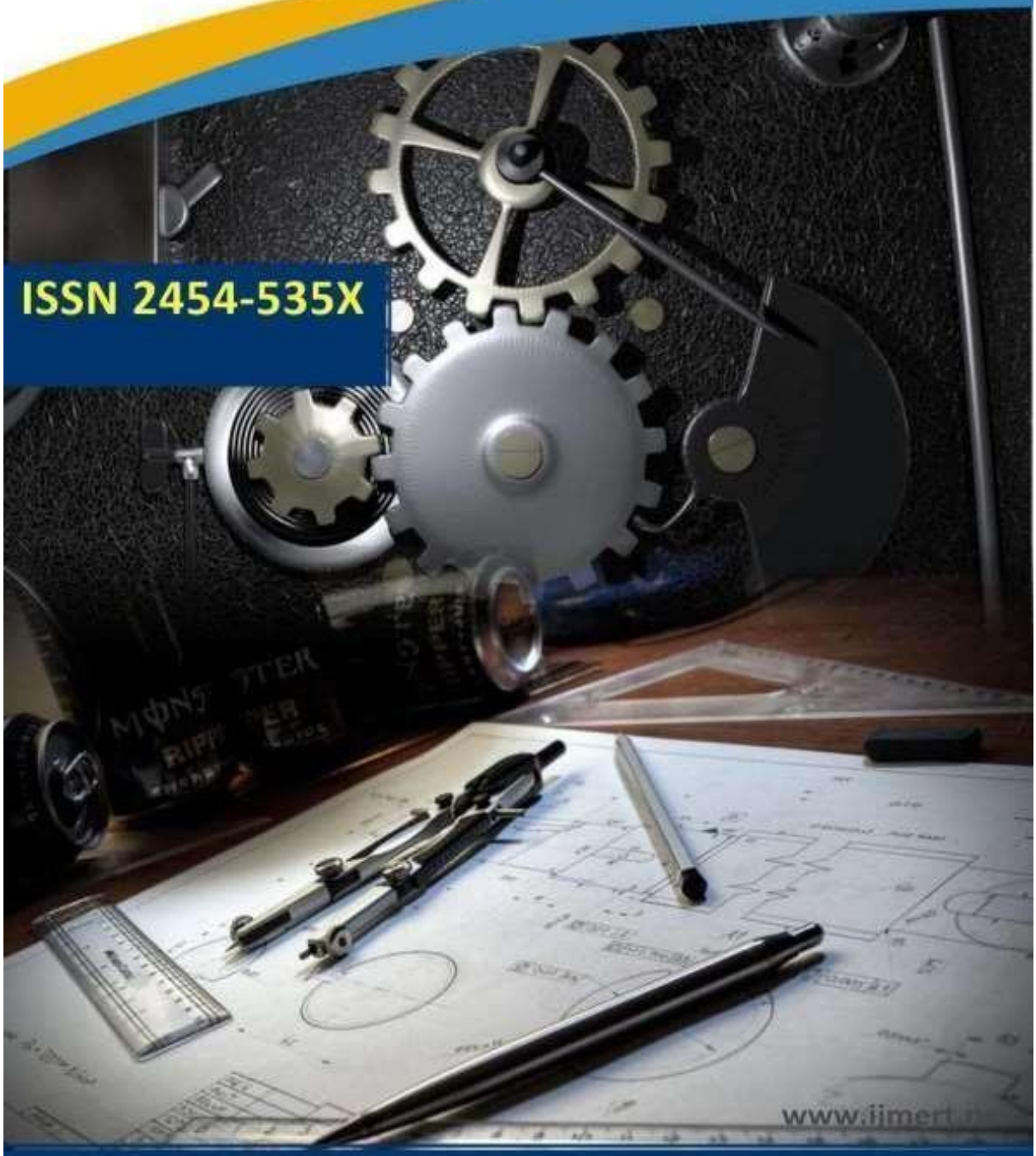

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IMAGE CLASSIFICATION USING CONVOLUTIONAL NEURAL NETWORKS

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ABSTRACT

In recent year, with the speedy development in the digital contents identification, automatic classification of the images became most challenging task in the fields of computer vision. Automatic understanding and analysing of images by system is difficult as compared to human visions. Several research have been done to overcome problem in existing classification system, but the output was narrowed only to low level image primitives. However, those approach lack with accurate classification of images. In this paper, our system uses deep learning algorithm to achieve the expected results in the area like computer visions. Our system present Convolutional Neural Network (CNN), a machine learning algorithm being used for automatic classification the images. Our system uses the Digit of MNIST data set as a bench mark for classification of grayscale images. The grayscale images in the data set used for training which require more computational power for classification of images. By training the images using CNN network we obtain the 98% accuracy result in the experimental part it shows that our model achieves the high accuracy in classification of images.

I.INTRODUCTION

In the realm of computer vision, the task of image classification stands as a fundamental challenge, with applications spanning from medical diagnostics to autonomous driving. As digital content identification continues to evolve at a rapid pace, the automatic classification of images has emerged as

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a cornerstone in the field, presenting formidable obstacles in replicating human-like understanding and analysis of visual data.

This project delves into the forefront of image classification by harnessing the power of Convolutional Neural Networks (CNNs), a cutting-edge deep learning architecture renowned for its unparalleled capabilities in image recognition tasks. With the goal of overcoming the limitations of traditional classification methods, this endeavor seeks to elevate the accuracy, efficiency, and robustness of image analysis.

Utilizing deep learning algorithms, particularly CNNs, our project endeavors to tackle the inherent challenges of automatic image classification. By training CNN models on vast datasets of labeled images, we aim to leverage the network's ability to extract intricate features and patterns from raw pixel data, enabling precise categorization of diverse image classes.

To evaluate the effectiveness of our approach, we employ the MNIST dataset—a widely recognized benchmark in the field of image classification. This dataset, comprising grayscale images of handwritten digits, serves as a rigorous testbed for assessing the performance of our CNN-based models. Despite the computational demands posed by training on grayscale images, our project aims to demonstrate the superior accuracy and efficiency of CNNs in classifying images across various categories.

Through this project, we endeavor to contribute to the advancement of computer vision technology, offering practical solutions for real-world image analysis tasks and paving the way for innovations in diverse domains such as healthcare, automotive, and surveillance. By leveraging state-of-the-art deep learning techniques, we aim to unlock new frontiers in image understanding and analysis, ultimately driving progress towards intelligent systems capable of comprehending and interpreting visual data with human-like precision.

II.EXISTING SYSTEM

the expedient improvement in the computerized substance distinguishing proof, programmed arrangement of the pictures turned out to be most testing

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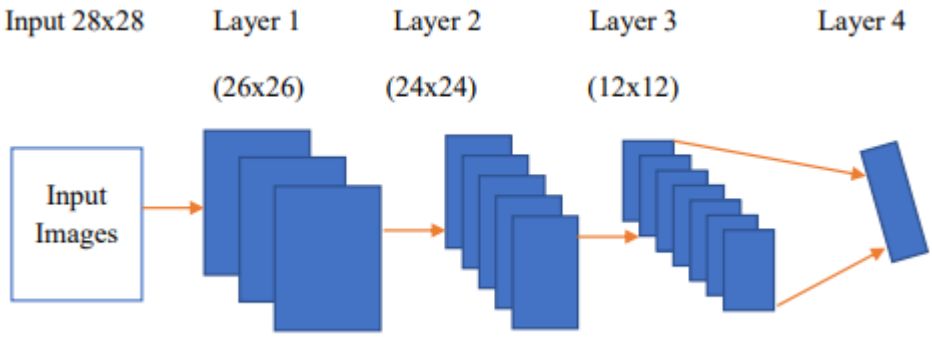
assignment in the fields of PC vision. Programmed comprehension and breaking down of pictures by framework is troublesome when contrasted with human dreams. A few research have been done to defeat issue in existing characterization framework, however the yield was limited uniquely to low level picture natives. Be that as it may, those methodology need with precise order of pictures. In this paper, our framework utilizes profound learning calculation to accomplish the normal outcomes in the region like PC dreams.

III.PROPOSED SYSTEM

Our proposed system uses CNN for implementation purpose. Convolutional Neural Networks are very similar to ordinary Neural Networks, that are made up of neurons that have learnable weights and biases. Every neuron performs dot product by receiving some input and using bias it follows non-linearity. The whole convent still expresses a distinct score function, from the raw pixels on one end to class scores at the other end.

They have a loss function like SoftMax on the last layer which is fully connected layer. As the inputs are images to convent, it allows to encode certain properties in architecture. These properties make the forward function more efficient to implement and vastly reduce the number of parameters in the network. The mail goal of the image classification able to extract the feature from raw images



IV.REQUIREMENT ANALYSIS

The project involved analyzing the design of few applications so as to make

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the application more users friendly. To do so, it was really important to keep the navigation's from one screen to the other well ordered and at the same time reducing the amount of typing the user needs to do. In order to make the application more accessible, the browser version had to be chosen so that it is compatible with most of the Browsers.

V.REQUIREMENT SPECIFICATION

Functional Requirements

- Graphical User interface with the User.

Software Requirements

For developing the application the following are the Software Requirements:

1. Python
2. Django
3. Mysql
4. Wamp server

Operating Systems supported

1. Windows 7
2. Windows XP
3. Windows 8

Technologies and Languages used to Develop

1. Python

Debugger and Emulator

- Any Browser (Particularly Chrome)

Hardware Requirements

For developing the application the following are the Hardware Requirements:

- Processor: Pentium IV or higher
- RAM: 256 MB
- Space on Hard Disk: minimum 512MB

VI.MODULES

1. **Data Collection Module:** The data collection module is responsible for gathering a diverse dataset of images representing different categories or classes. It may involve sourcing images from online repositories, datasets, or capturing images using sensors or cameras.

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2. **Data Preprocessing Module:** The data preprocessing module handles the preprocessing of the collected images to make them suitable for training the CNN model. Tasks include resizing images to a uniform size, normalization, augmentation (e.g., rotation, flipping), and labeling images with their corresponding classes.

3. **Model Architecture Design Module:** The model architecture design module involves designing the architecture of the Convolutional Neural Network (CNN) model. It determines the number of layers, types of layers (convolutional, pooling, fully connected), activation functions, and other architectural choices.

4. **Model Training Module:** The model training module trains the CNN model using the preprocessed image dataset. It involves optimizing the model parameters (weights and biases) using optimization algorithms such as gradient descent. Techniques like transfer learning may also be employed, where a pre-trained CNN model is fine-tuned on the specific dataset.

5. **Model Evaluation Module:** The model evaluation module assesses the trained CNN model's performance on a separate validation or test dataset. Metrics such as accuracy, precision, recall, and F1-score are commonly used to evaluate the model's classification performance.

6. **Hyperparameter Tuning Module:** The hyperparameter tuning module conducts hyperparameter optimization to fine-tune the performance of the CNN model. It involves adjusting parameters such as learning rate, batch size, dropout rate, and kernel size to optimize the model's performance.

7. **Deployment Module:** The deployment module deploys the trained CNN model into a production environment for real-world use. This may involve

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integrating the model into a web application, mobile app, or embedded system for inference on new images.

VII.CONCLUSION

In this paper, we used Convolutional Neural Networks (CNN) for image classification using images form hand written MNIST data sets. This data sets used both and training and testing purpose using CNN. It provides the accuracy rate 98%. Images used in the training purpose are small and Grayscale images. The computational time for processing these images is very high as compare to other normal JPEG images. Stacking the model with more layers and training the network with more image data using clusters of GPUs will provide more accurate results of classification of images. The future enhancement will focus on classifying the colored images of large size and its very useful for image segmentation process.

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