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Land Classification using Dataset and Building its Architecture using-CNN Algorithm

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ABSTRACT : Image matching is an important method to collect ground control points (GCPs) by finding correspondence between incoming images and chips of reference image maps. It is an essential process for automated precise geo-registration of satellite imagery. To get higher georeferencing accuracy, reference chips must be matched precisely on the images. The importance of higher matching success rate is increased with limited number of chips. In this study, we aim to match incoming satellite images against reference chips generated from aerial color ortho-images. Matching the two dataset is difficult since they have different spectral responses as well as different textures. We try to improve matching success rate by using pan-sharpened satellite images. The results showed higher matching success rate with pansharpened images due to similar spectral range and higher spatial resolution. Therefore, pansharpened image is helpful to improve image matching success rate in automated precise georeferencing of high-resolution satellite imagery.

KEYWORDS —Image matching, Ground control points, Georegistration, Ortho Images.

I.INTRODUCTION

The study presented by S. Illarionova et al. on satellite imagery classification using a deep CNN architecture. They showed that CNNs are capable of learning hierarchical fea- tures from raw data, which results in improved classification accuracy.

They also used dropout regularization to reduce overfitting in the fully connected layers of the CNN, which helped to improve the generalization of the model. Motivated by these works, this research paper proposes a land classification system using a CNN algorithm. The objective of the system is to classify land cover into different categories, such as crop fields, barren lands, forests, and water bodies, with high accuracy and efficiency.

The proposed system is expected to provide accurate infor- mation about land cover, which can help in various geospatial applications like agriculture, environmental, and urban management. The proposed system utilizes an agile CNN architecture called SatCNN, as described in which has shown superior performance in satellite imagery classification tasks. The system also utilizes data augmentation techniques, as described into increase the diversity of the training data and improve the robustness of the model.The efficiency of the proposed system is expected to be enhanced by the use of non-saturating neurons, as described in and GPU acceleration for faster training.

Also, data collected gets stale as it is not feasible to recollect information in short intervals of time. Satellite remote sensing images are a viable source of gathering effective land cover information due to their large view and repetitive coverage area. Raw images taken by satellites cannot be processed directly as they contain multiple bands with large data size. Because of the involvement of such huge data and higher variability in land cover classes, it is not easy to.

II. PREVIOUS SEARCH

Land cover classification using remote sensing data is the task of classifying pixels or objects whose spectral characteristics are similar and allocating them to the designated classification classes, such as forests, grasslands, wetlands, barren lands, cultivated lands, and built-up areas. Various techniques have been applied to land cover classification, including traditional statistical algorithms and recent machine learning approaches, such as random forest and support vector machines, e.t.c.

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III. LITERATURE REVIEW

The literature survey for research paper[1] focuses on the problem of identifying and classifying land use in remote sensing images using machine learning techniques. The authors discuss the limitations of traditional methods of land use classification, which are time-consuming and require a lot of manual effort. They propose the use of deep learning methods, specifically Convolutional Neural Networks (CNNs), for image classification. The paper describes the architecture of a CNN model designed for this task, and reports on its performance on a publicly available dataset. The authors demonstrate that their approach outperforms traditional methods and achieves high accuracy in land use classification. The paper is significant because it demonstrates the effectiveness of deep learning approaches for land use classification and provides a framework for further research in this field. In the research paper [2], the authors used Worldview multispectral satellite imagery to identify dominant species as an image segmentation task. The challenge in this task lies in distinguishing between similar forest compositions. To address this, the authors represented the multiclass forest classification problem as a hierarchical set of binary classification tasks. They also incorporated supplementary data such as tree height to improve species classification for wider tree age diversity. The authors tested six neural network architectures to find the best one for each task in the hierarchical decomposition. The proposed approach was evaluated on sample territories in Leningrad Oblast of Russia using field-based observations. The results showed that the proposed approach achieved significantly better results (average F1-score 0.84) than multiclass classification (average F1-score 0.7). Overall, the study demonstrates the effectiveness of using neural networks and remote sensing for forest inventory, particularly in identifying dominant species.

The paper [3] proposes a new approach to multimodality medical image registration using mutual information (MI) as a matching criterion. The method utilizes the statistical dependence between the image intensities of corresponding voxels in both images, which is assumed to be maximal if the images are geometrically aligned. This criterion is shown to be accurate for rigid body registration of CT, MR, and PET images by comparison with the stereotactic registration solution. The robustness of the MI criterion is also evaluated with respect to implementation issues and image content, including partial overlap and image degradation. The results demonstrate that subvoxel accuracy with respect to the stereotactic reference solution can be achieved automatically without any prior segmentation, feature extraction, or other preprocessing steps, making.

paper [4] presents a large, deep convolutional neural network (CNN) trained to classify 1.2 million high-resolution images in the ImageNet LSVRC- 2010 contest into 1000 different classes. The CNN architecture consists of five convolutional layers, some of which are followed by maxpooling layers, and three fully-connected layers with a final 1000-way softmax. To make training faster, non-saturating neurons and a very efficient GPU implementation of the convolution operation were used. To reduce overfitting in the fully-connected layers, a recently-developed regularization method called ”dropout” was employed. The authors achieved top-1 and top-5 error rates of 37.5data, respectively, which is considerably better than the previous state-of-the-art. This paper serves as a landmark contribution to the field of deep learning and computer vision, demonstrating the potential of deep neural networks to learn eatures from raw data and achieve stateof-the-art performance on challenging.

IV. SUMMARY OF LITERATURE REVIEW

In the literature surveys above, analyzed for the research paper explored studies related to land classification and deep learning techniques. Several studies, including research papers and studies, were analyzed to investigate the challenges and effectiveness of land classification using deep learning tech- niques. The studies showed that CNN-based architectures have been successful in improving the accuracy of land classification. The authors highlighted the need for further improvements in classification accuracy and robustness due to the complexity of land cover features. The literature review revealed that deep learning techniques, particularly CNN-based architec- tures, have shown promising results in land classification tasks. However, due to the complexity of land cover features, there is still room for improvement in classification accuracy and robustness. The authors of the research paper used this knowl- edge to build a CNN-based architecture for land classification and achieved promising results.

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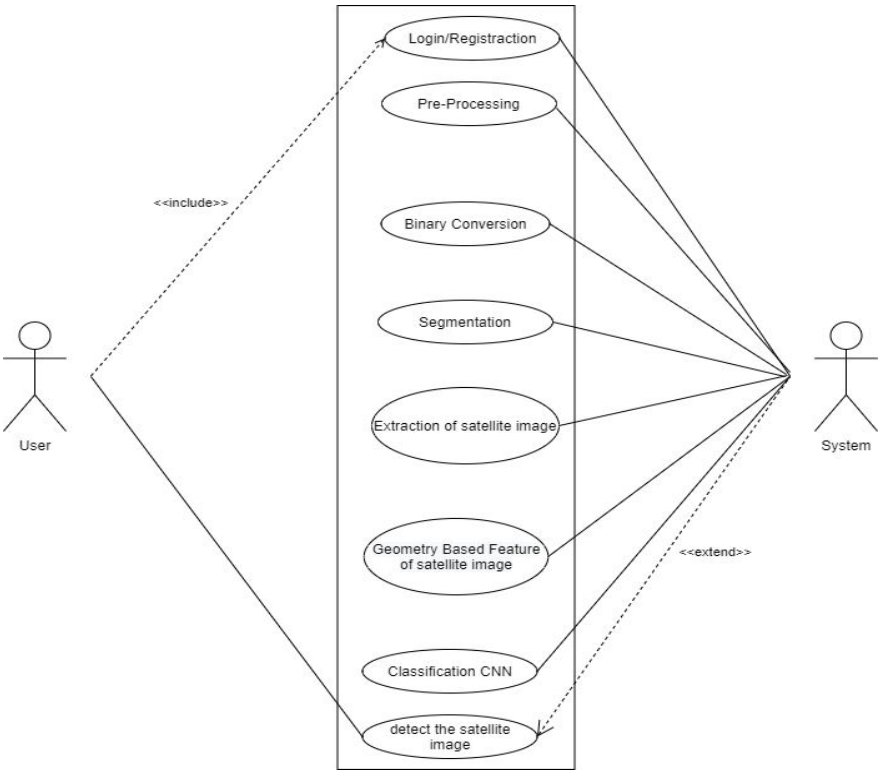
V. UML DIAGRAM

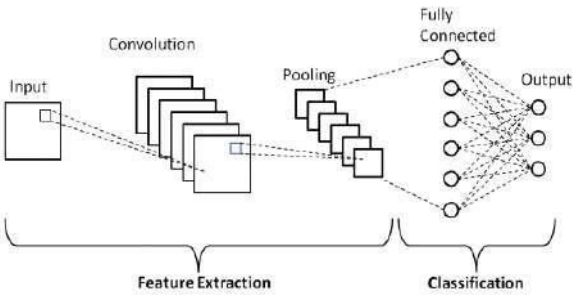


In the Unified Modeling Language (UML), a use case diagram can summarize the details of your system's users (also known as actors) and their interactions with the system. To build one, you'll use a set of specialized symbols and connectors.A use case diagram is used to represent the dynamic behavior of a system. It encapsulates the system's functionality by incorpo- rating use cases, actors, and their relationships. It models the tasks, services, and functions required by a system/subsystem of an application. It depicts the high-level functionality of a system and also tells how the user handles a system.

VI. PROPOSED ALOGRITHM

CNN Algorithm:-

A Convolutional Neural Network (CNN) is a Deep Learning algorithm which can take in an input image, assign importance to various objects in the image and be able to differentiate one from the other.



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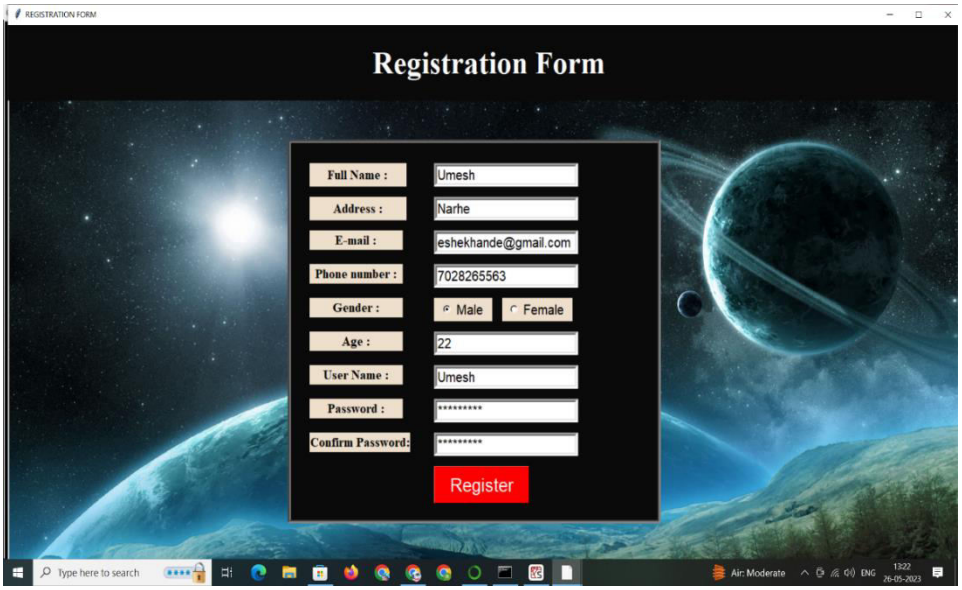
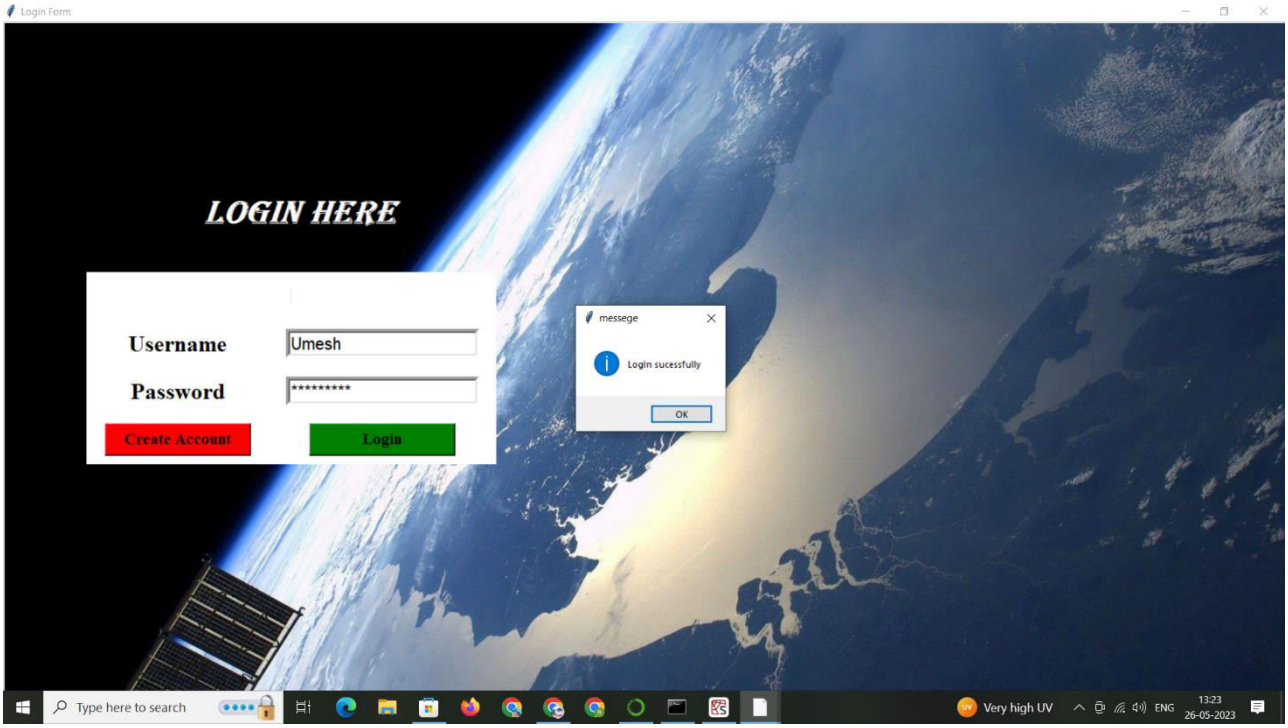
VII. RESULT



9.1 Registration Page



9.2 Login Page

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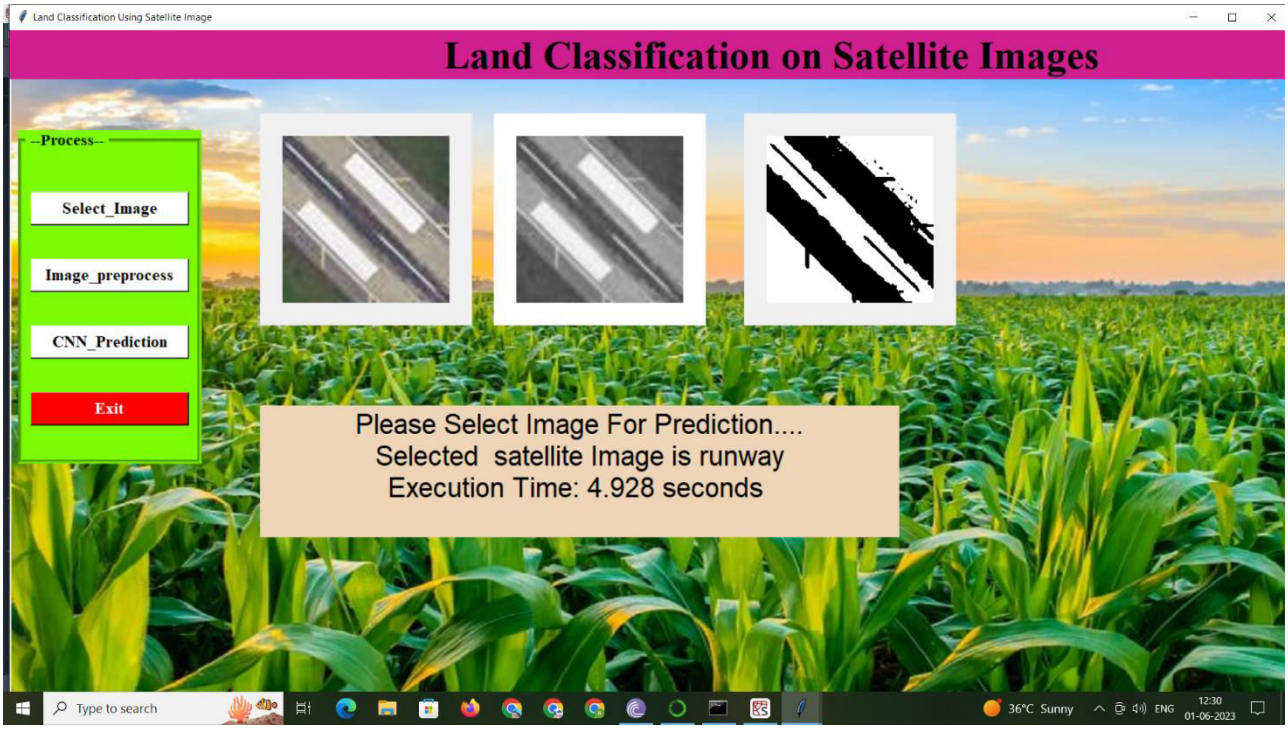
9.3 Processing



9.4 Final Output

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VIII.CONCLUSION

This project a CNN architecture for extracting scene in- formation from Satellite images. Most other models proposed in the literature use a light CNN model and augment it with features specific to satellite images. Such domain knowledge is not generally available with the AI community. The model is designed on lines of VGG but has fewer number of parameters. Also, the techniques of Batch Normalization and Dropout has helped our model to outperform all the other architectures with an accuracy of 99.84The amount of time required for training and testing is just 30 epochs which is very less as compared to others. Another advantage is that the images need not be pre-processed and hence, it can be useful to batch-process large number of images. It is planned to use this model to process the data of entire state and ascertain its land resources.

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