



e-ISSN: 2319-8753 | p-ISSN: 2347-6710

IJRSET

International Journal of Innovative Research in
SCIENCE | ENGINEERING | TECHNOLOGY

INTERNATIONAL JOURNAL OF INNOVATIVE RESEARCH

IN SCIENCE | ENGINEERING | TECHNOLOGY

Volume 13, Issue 5, May 2024

ISSN INTERNATIONAL
STANDARD
SERIAL
NUMBER
INDIA

Impact Factor: 8.423

 9940 572 462

 6381 907 438

 ijirset@gmail.com

 www.ijirset.com

Land Classification of Satellite Image Processing

Prof. Hemant B. Jadhav, Prabhakar D. Jadhav, Rushikesh C. Kolte, Rushikesh P. Jagdale:

Head of Department, Department of Computer Engineering, Adsul's Technical Campus Chas, Ahmednagar, India

Department of Computer Engineering, Adsul's Technical Campus Chas, Ahmednagar, India

ABSTRACT: Classifying land cover using satellite photos is a crucial technique for researching terrestrial resources. Currently available are vast amounts of high resolution satellite-based data.photos from numerous satellites, including Sentinel, Landsat8, and others. Classifying land cover from these photos is a challenging undertaking due of the enormous amount of data and high variation kinds.In this context, deep neural networks can be extremely useful as they are capable of classifying these massive amounts of data. Related studies in this sector have employed lighter models and a significant number of handcrafted parameters, necessitating subject-matter expertise. It is discovered that the majority of models are too simplistic for an image this complex.

KEYWORD: Machine Learning, Convolutional Neural Networks, Image Classification.

I. INTRODUCTION

Satellite image processing is a field of remote sensing that involves the manipulation, analysis, and interpretation of images acquired from Earth-observing satellites. These images provide valuable information about the Earth's surface, atmosphere, and other features. Applications such as agriculture, scientific research, urban planning, environmental monitoring, and disaster management all heavily depend on satellite image processing. Environmental monitoring and conservation heavily rely on satellite image processing. Satellite imagery helps in precision agriculture by providing insights into crop health, and pest infestations.The ability to process satellite images quickly is essential in disaster management.Processing satellite images supports the management of natural resources, such as water bodies, forests, and minerals.

Understanding and representing land cover information through the classification of big satellite data is a difficult task. The actual land that has crops and trees on it is known as land cover.rivers, woods, arid regions, etc. Classifying, organizing, observing, and creating strategies for using Earth's resources possibly for the benefit of humanity as a whole requires information regarding land cover. Many geospatial applications, including urban, environmental, and agricultural management, depend on this classification. A lot of government and other agencies rely on accurate and current land cover data to assist them update their plans on a regular basis. Field surveys, which take a lot of time and physical labor, are the traditional technique of collecting data on land cover.

II. LITERATURE SURVEY

In Ibrahim's paper, Investigations were conducted into the impact of transfer learning on classification accuracy as well as the usefulness of the Convolutional Neural Network (CNN) models created by transfer learning to identify land use from satellite photos.In the context of this work, the transfer learning approach has been assessed utilizing various publicly available datasets comprising satellite photos for scholarly research. The accuracy of the CNN models for classifying satellite pictures was evaluated between those that were completely trained and those that were learned by transfer learning. For every dataset included in the study, it has been noted that CNNs trained by transfer learning produced results that were more accurate.[1]

Jicheng explain that One of the hottest topics in optical remote sensing image scene classification research right now is the transfer of CNN models that have already been pre-trained on a sizable visual dataset. It is challenging to manually determine the optimal hyper-parameter fine-tuning during the transfer of a pre-trained CNN model. This study proposes CNN automatic fine-tuning based on reinforcement learning to automatically search for the optimal fine-tuning hyper-parameters in order to address this issue. In particular, the CNN fine-tuning hyper-parameters are optimized layer by layer using the Double Q-learning approach, leading to the final production of a convergent fine-tuning hyper-parameters sample. In the experiment, two ORSISC datasets—UC-Merced and AID—are used to fine-tune the pre-

trained CNN model of AlexNet.[2]¹

Skakun paper informed Two machine learning techniques, random forest and multilayer perceptron, were utilized to classify all of the Sentinel-1 photos that were accessible and covered the study area. The findings indicate that SAR data can be applied to LULC mapping, including classes for water, sandbanks/outcrops, rainforests, and savannas. However, it is unable to accurately divide all groups, particularly those with geometrically similar structures like buritizais, perennial crops, and regeneration regions. The objective of this research is to map Land Use and Land Cover (LULC) using time-series Sentinel-1 Synthetic Aperture Radar (SAR) data in the Roraima, Brazil region.[3]

Apurva Saksena informed that An urban area is defined as a patchwork of densely populated areas. Within a city, land-use refers to the prudent and logical distribution of available land resources among various uses (e.g., managed woods, arable fields, pastures, and settlements). It is a method of making use of the land, covering resource allocation, planning, and management. A piece of land's physical characteristics and how it is used are related. Nevertheless, despite the abundance of geographical data, there is a dearth of study demonstrating this relationship.[4]

Ruikun informed Enhancing the ability to extract information about land cover can be done effectively through the fusion of data from remote sensing. This work investigated the potential in land classification using optical remote sensing images of GF-1 and SAR images of GF-3. The study location was chosen to provide a variety of land cover types. The object-oriented method for classifying land cover included the spectral, texture, and vegetation indices that were retrieved from panchromatic, multispectral, and SAR pictures. When compared to the outcome obtained with simply optical images, the classification accuracy decreased due to the noises produced by the SAR information on roads, buildings, and bare ground.[5]

Center for Biosphere Studies In this article, a research site in southwest France, close to Toulouse, is monitored for land cover and use using satellite pictures for a period of 11 years. Spot and Landsat are used to collect time series of optical data, providing high spatial resolution multispectral images. Each year, a variety of land cover and usage types are identified. It is based on a random forest algorithm and national reference geographic data.[6]

Patrick Helber Several uses for earth observation are made possible by the resulting classification system. We show how this classification scheme can be applied to enhance geographical maps and to identify changes in land use and land cover. This research presents a patch-based approach to classify land cover and land use using Sentinel-2 satellite pictures.[7]

III. PROPOSED SYSTEM

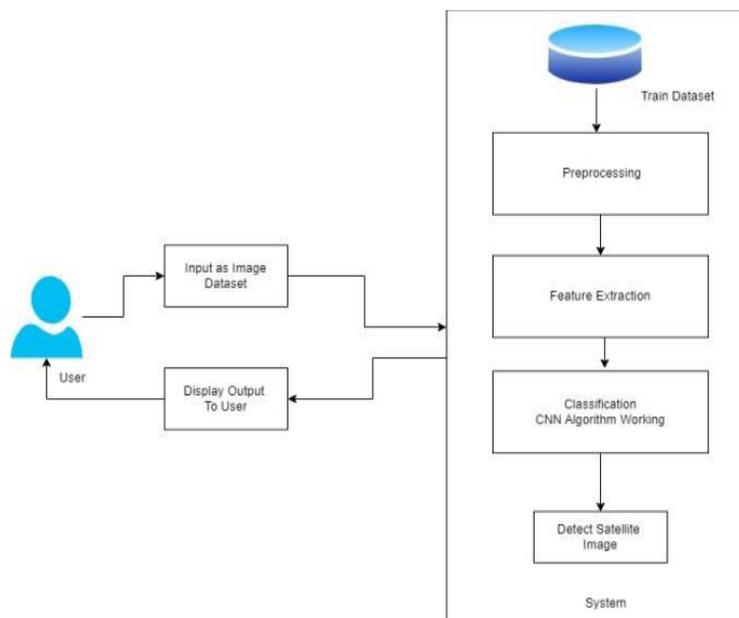


Fig.1.System Architecture

IV. METHODOLOGY

Methodology of four Land Cover Classification of Satellite Image Dataset As

1. Input Satellite Image Dataset:

- Satellite image datasets containing multi-spectral or multi-temporal imagery captured by remote sensing satellites.
- Each image in the dataset represents a specific geographical area and contains spectral bands such as red, green, blue, near-infrared, etc.

2. Training Dataset:

- Labeled dataset consisting of satellite images paired with ground truth labels indicating land cover types such as forest breach .
- Each image in the training dataset is annotated with pixel-level or object-level labels representing different land cover classes (e.g., forest, beach, urban, agriculture).
- Annotations may be generated manually through expert annotation or obtained from existing land cover databases or field surveys.

3. Preprocessed Image Data:

- Preprocessed versions of input satellite images generated during data preparation.
- Preprocessing steps may include resizing, normalization, color balancing, grey to binary conversation and geometric correction to enhance image quality and facilitate model training.

4. Augmented Training Data:

- Augmented versions of the training dataset created by applying data augmentation techniques.
- Augmentation techniques such as rotation, scaling, flipping, and random cropping are used to increase the diversity and robustness of the training data.

5. Feature Representation:

- Feature representations extracted from satellite images to feed into the classification model.
- Features may include raw pixel values, spectral indices (e.g., NDVI, NDWI), texture features, or deep learning embeddings extracted from pre-trained CNN models.

6. Model Parameters:

- Parameters defining the architecture and configuration of the CNN model used for land cover classification.
- Model parameters include the number of layers, filter sizes, activation functions, dropout rates, learning rates, and optimization algorithms.

7. Trained Model:

- Trained CNN model weights and architecture learned from the training dataset.
- The trained model is capable of predicting land cover classes from input satellite images based on learned features and patterns.

8. Validate Dataset:

- Separate dataset reserved for model validation and evaluation purposes.
- Validation dataset contains satellite images and corresponding ground truth labels not used during model training to assess the generalization performance of the trained model.

10. Classification Results:

- Predicted land cover class labels and confidence scores generated by the trained model for each pixel or region of interest in the input images.
- Classification results are used for generating land cover maps, assessing land cover changes, and deriving actionable insights from satellite imagery.

By incorporating these data design elements, the land cover classification system can effectively process satellite image datasets, train CNN models, and produce accurate land cover Classify .

V. RESULT

1. Main page: Here, on this page two buttons are located Login and registration for user.

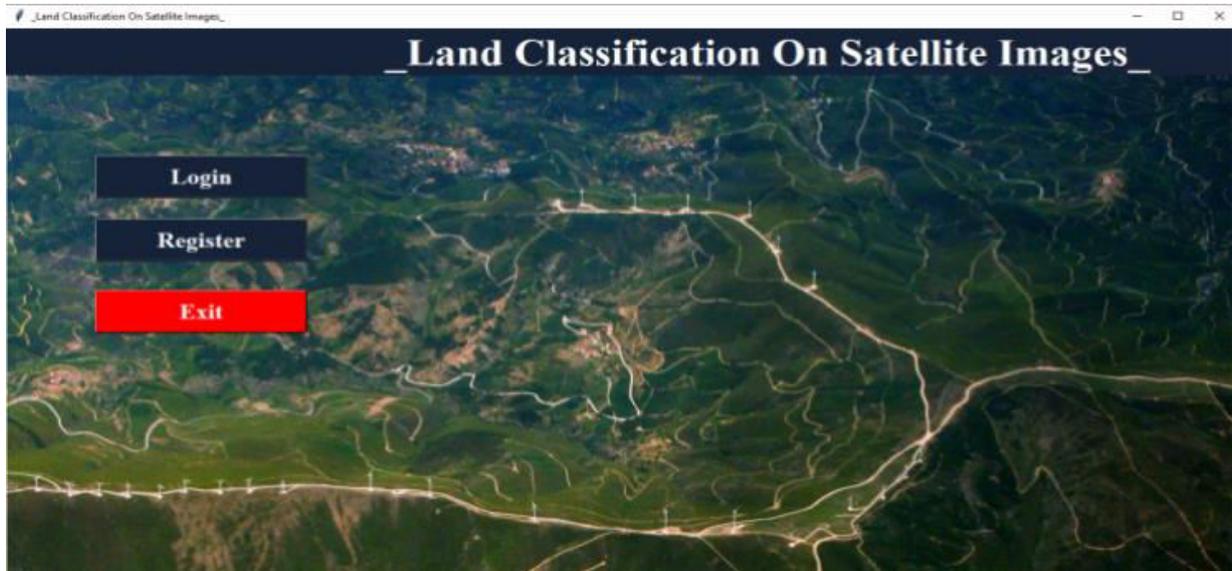


Fig.2.Main Page

2. Registration page: Here, on this page user can register by filling below information to access or use the application. without registration it wont able to allow further steps.

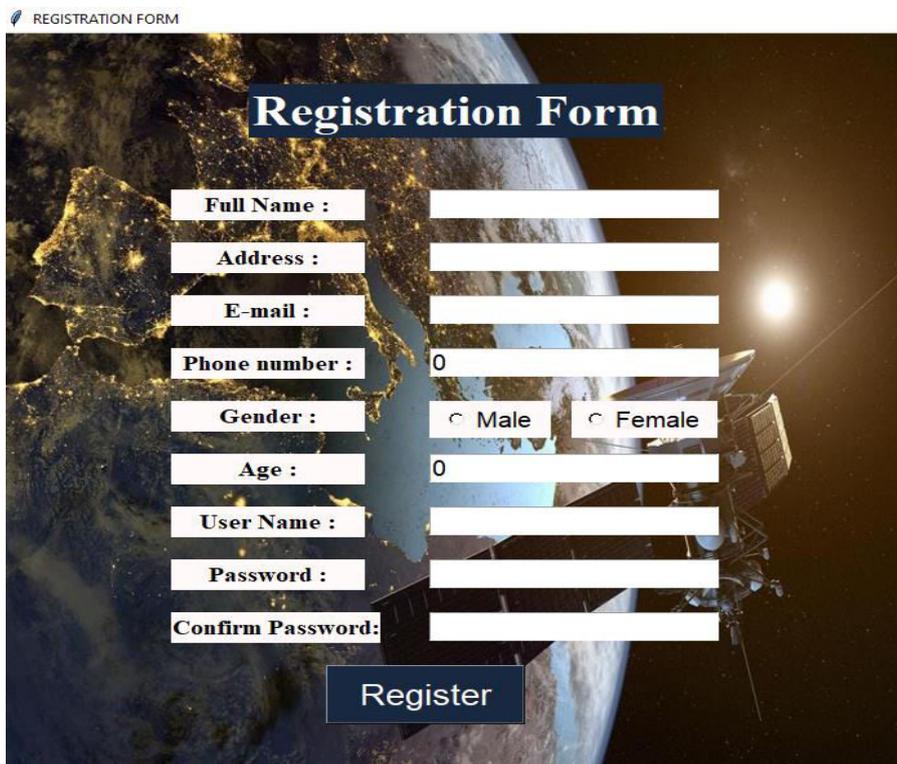


Fig.3.Registration form

3. Login page: Here, user have to login into by there username or password.



Fig.4.Login page

4. Master page: On this page user have to select image from dataset then by click on next button (Image_process) image is converted into gray scale which is preprocessing step then it turn into binary scale in feature extraction then next button is CNN_Prediction which is Classify type of land(Beach land, Forest land, Agriculture land) through selected satellite image.All three results are shown below.



Fig.5.Beach land detected

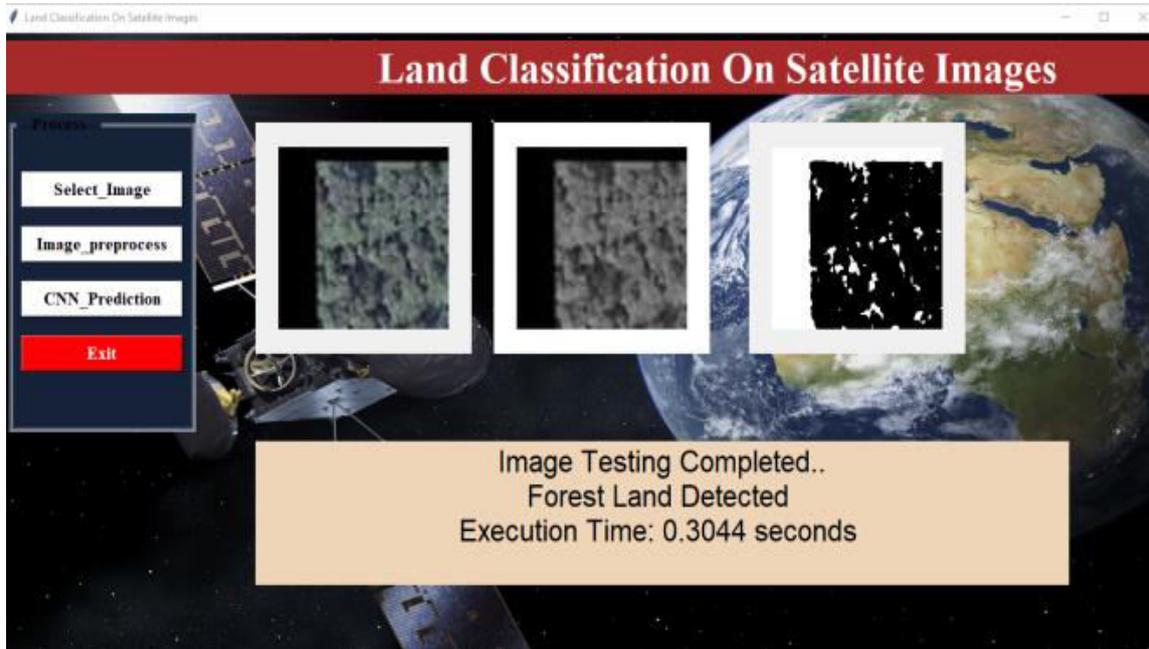


Fig.6.Forest land detected

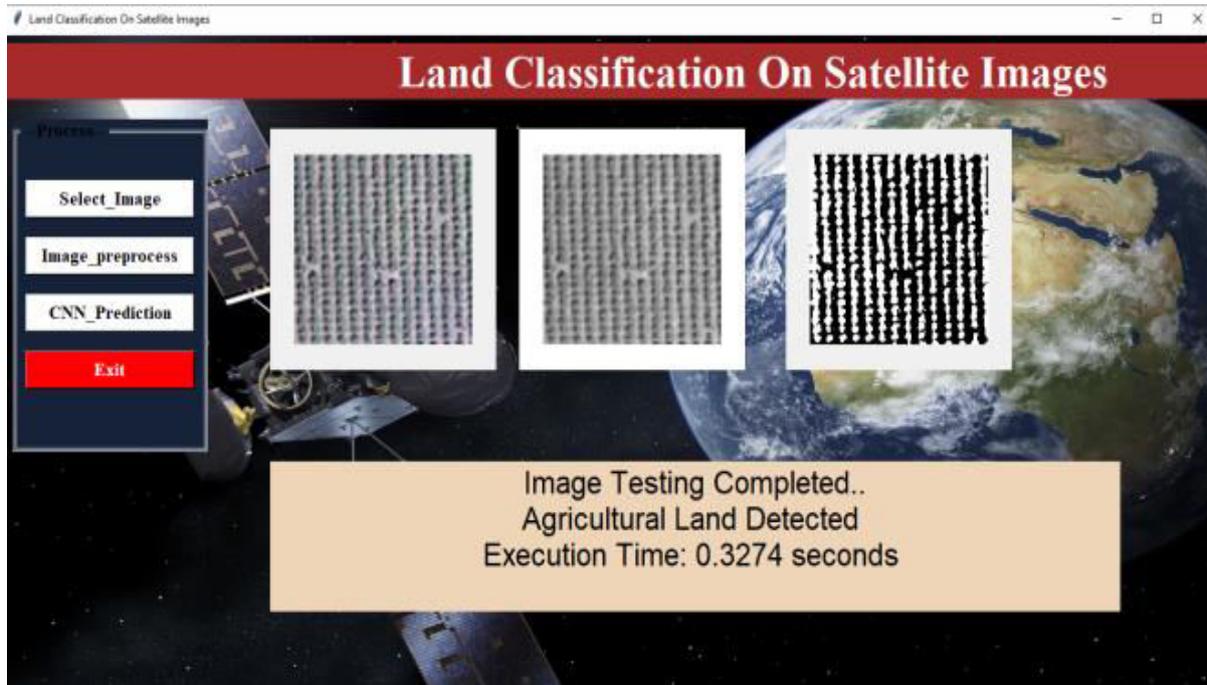


Fig.7.Agricultural land detected

VI. CONCLUSIONS

Satellite image processing is a vital and dynamic field that plays a crucial role in our understanding of the Earth's environment and its applications across various domains.

Land classification using satellite imagery involves categorizing different land cover types based on the spectral signatures obtained from satellite data.

REFERENCES

- [1] Ibrahim Onuralp Yigit; Havelsan A:valuation of Transfer Learning Approach for Satellite Image Classification, *journalofbigdata.springeropen.com*,2023.
- [2]Jicheng Quan; Chen Wu :Scene Classification of Optical Remote Sensing Images Based on CNN Automatic Transfer,IEEE International Geoscience and Remote Sensing Symposium 2021
- [3] Sergii V. Skakun;Marcos Adami;Ieda Sanches;; SAR Data for Land Use Land Cover Classification in a Tropical Region with Frequent Cloud CoverConference: IEEE International Geoscience and Remote Sensing Symposium 2020
- [4] Yuan, X.; Chen, S.; Yuan, W.; Cai, Y. Poor textural image tie point matching via graph theory. *ISPRS J. Photogramm. Remote Sens.* 2021, 129, 21–31
- [5] Sedaghat, A.; Mohammadi, N. Uniform competency-based local feature extraction for remote sensing images. *ISPRS J. Photogramm. Remote Sens.* 2020, 135, 142–157.
- [6] Rathore, M.M.U.; Ahmad, A.; Paul, A.; Wu, J. Real-time continuous feature extraction in large size satellite images. *J. Syst. Archit.* 2019, 64, 122–132.
- [7] Zhang, L.; Sun, Q. Saliency detection and region of interest extraction based on multi-image common saliency analysis in satellite images. *Neurocomputing* 2021, 283, 150–165.
- [8] A Lightweight CNN Architecture for Land Classification on Satellite Images. Gourab Patowary, Meenakshi Agarwalla © 2020 IEEE



INTERNATIONAL
STANDARD
SERIAL
NUMBER
INDIA



INTERNATIONAL JOURNAL OF INNOVATIVE RESEARCH

IN SCIENCE | ENGINEERING | TECHNOLOGY

 9940 572 462  6381 907 438  ijirset@gmail.com



www.ijirset.com

Scan to save the contact details