A PRELIMINARY PROJECT REPORT ON

Land Classification On Satellite Images By Using CNN

SUBMITTED TOWARDS THE
PARTIAL FULFILLMENT OF THE REQUIREMENTS OF

BACHELOR OF ENGINEERING (INFORMATION TECHNOLOGY)

BY

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CERTIFICATE

This is to certify that the Project Entitled

Land Classification On Satellite Images By Using CNN

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is a bonafide work carried out by Students under the supervision of Prof.Dr.D.S.Hirolikar and it is submitted towards the partial fulfillment of the requirement of Bachelor of Engineering (IT Engineering) Project.

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It gives us great pleasure in presenting the preliminary project report on ***Land Classification On Satellite Images By Using CNN '****.*

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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.

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CHAPTER 1

INTRODUCTION

1.1 OVERVIEW

Classification of large satellite imagery is a challenging task for understanding and portraying land cover information. Land cover is the physical land which includes trees, crop fields, barren lands, rivers, forests, etc. Information about land cover is an input for classifying, planning, monitoring and devising ways to use earth resources potentially in greater interest of the human race. This classification is important for various geospatial application like agriculture, environmental and urban management. Accurate and up-to-date information about land cover goes a long way in helping various government and other agencies to update their plans on regular basis. Traditional methods of gathering land cover information are field surveys that are time consuming as well as include much physical labour.

1.1.1 Objective

- To achieve long term growth and economic development. To achieve this vision , we must redouble our efforts to increase agricultural productivity , while protecting the environment. The main Motivation of the land classification System is that to classify which land is good for the crops ,which land is the forest land /tress and which land is Water Bodies.

CHAPTER 2

LITERATURE SURVEY

2.1 STUDY OF RESEARCH PAPER

1.Paper Name: RANDOM FOREST DATA CUBE BASED ALGORITHM FOR LAND COVER CLASSIFICATION: A COLOMBIAN CASE

Author: Indira Pachón(a), Salomón Ramírez(a), Diana Fonseca(a), Pilar Lozano-Rivera(a), Christian Ariza(b), María Paula Mancipe(b), Mario Villamizar(b), Harold Castro(b), Edersson Cabrera(a), María Teresa Becerra(a)

Abstract :-The potential of discrimination and grouping of digital levels of image classification methods based on machinelearning algorithms allow obtaining good results in the classification of land coverages. The machine-learning algorithm Random Forest is considered a robust algorithm for classification and regression, presenting good performance for data of high dimensionality, as is the case of the satellite imagery stored in the Colombian Data Cube (CDCol). This paper aims to present the implementation of Radom Forest on the CDCol infrastructure for land cover classification, on the Orinoquía Natural Region in Colombia. We used Landsat 8 OLI imagery data for 2016 at surface reflectance level and seven thematic land cover classes for the supervised classification. The overall thematic accuracy assessment was 8679accurate sub-pixel characterization of the land cover classes that is acceptable for practical applications

2.Paper Name: :- Evaluation of Different Approaches of Convolutional Neural Networks for Land Use and Land Cover Classification Based on High Resolution Remote Sensing Images

Author: Jianwei Ma1 , Yayong Sun1 , Guohui Deng2*, Shifeng Huang1 , Yiting Tao2 , He Zhu1 , Qiang Teng3 , Xianchao Meng4

Abstract : —Land use and land cover mapping is very important in the fields of urban planning, land management, and natural resource conservation. Recently, convolutional neural networks (CNNs) are applied widely in land use and land cover (LULC) classification as the acquisition of high resolution satellite images becomes easier owing to technological advancements. In this paper, we explore how to better exploit existed CNNs in LULC classification task. Three different learning modalities: full-trained, fine-tuning and pretrained CNNs were used as feature extractors, and two promising CNNs models (AlexNet and GoogLeNet) and two remote sensing datasets (UC Merced Land Use dataset and Brazilian Coffee Scenes dataset) were studied. Results show that the both AlexNet and GoogLeNet can be used in high remote sensing classification with a great performance. What is more, the full-trained CNNs is not always the best approach, on the contrary, fine-tuning based on pretrained CNNs, tends to be the best approach.

3.Paper Name: Differences of Image Classification Techniques for Land Use and Land Cover Classification

Author name: Nur Anis Mahmon1, Norsuzila Ya'acob 1,* Azita Laily Yusof2,*

abstract : Land use and land cover classification of remotely sensed data is an important research and commonly used in remote sensing application. In this study, the different types of classification techniques were used by using satellite image of some part of Selangor, Malaysia. For this objective, the land use and land cover was classified with Landsat 8 satellite image and ERDAS Imagine software as the image processing packages. From the classification output, the accuracy assessment and kappa statistic were evaluated to get the most accurate classifier. The optimal performance would be identified by validating the classification results with ground truth data. Of classified image, the Maximum Likelihood technique (overall accuracy 82.5applicable for satellite image classification compared with Mahalanobis Distance and Minimum Distance. The accurate classification can produce the correct Land Use and Land Cover map that can be used for many varieties purposes..

4.Paper Name: Satellite Image Classification of Different Resolution Images Using Cluster Ensemble Techniques

Author::- K. Radhika

abstract : The classification of Satellite image is an imperative system utilized to retrieve information in remote sensing. Primary data of extraordinary significance to several difficulties can be acquired straightforwardly from Land-cover observing. As it is required to discuss about the issue of supervised Land-cover classification of multispectral satellite images in the perspective of cluster ensemble and self learning. Different information partitions inferred by several clustering methods which are gathered into a better solution by cluster ensembles. supervised iterative Expectation-Maximization (EM) method can be initialized by cluster ensemble based strategy which will be examined in the paper. This will deliver better approximation of cluster parameters. Here definition of Land-cover classes is vital. Another method for producing suitable labeling model for each and every clustering of the consensus is introduced for cluster ensembles. The upgraded parameter set acquired from the EM step is trained by maximum likely-hood classifier to classify the rest of the pixels. The effect of data overlapping from several clusters can be reduced by the self learning classifier. Comparison is made on the performance of the clustering between the proposed method and individual clustering of the ensemble for medium resolution and a very high spatial resolution images..

5.Paper Name:PRELIMINARY QUALITY ANALYSIS OF THE TRIPLE LINEAR-ARRAY AND MULTISPECTRAL IMAGES OF ZY-3 02 SATELLITE

Author: Tao Zhang1 , Bing Lei1 , Jingjing Wang1 ,Yunqing Li2 ,Ke Liu1 ,Tao Li

Abstract: The ZiYuan-3 02 (ZY-3 02) is the subsequent satellite of ZY-3 01, which is the first civilian high-resolution stereo mapping satellite of China. Since its launch on May 30, 2016, it has been in operation for 2 years. The ZY-3 02 has similar characteristics comparing with ZY-3 01 except a higher spatial resolution for the forward and backward panchromatic images. Image quality assessment is very important for the promotion and application of satellite images. Considering the quality of ZY-3 01 images have been evaluated in previous studies, several objective factors were introduced to compare the image quality between ZY3 01 and ZY-3 02. In this study, the images of ZY-3 01 and ZY-3 02 with same season and spatial extent were used. The objective factors in different land cover types, e.g., forest, urban, farmland, were then analyzed. The difference of objective factors between two satellite images was expected to explore the image quality of ZY-3 02. The results have shown that the image quality of ZY-3 02 is almost the same and sometimes ever better comparing with that of ZY-3 01.

6.paper Name: LineCast: Line-Based Distributed Coding and Transmission for Broadcasting Satellite Images

Author: Feng Wu

Abstract: In this paper, we propose a novel coding and transmission scheme, called LineCast, for broadcasting satellite images to a large number of receivers. The proposed LineCast matches perfectly with the line scanning cameras that are widely adopted in orbit satellites to capture high-resolution images. On the sender side, each captured line is immediately compressed by a transform-domain scalar modulo quantization. Without syndrome coding, the transmission power is directly allocated to quantized coefficients by scaling the coefficients according to their distributions. Finally, the scaled coefficients are transmitted over a dense constellation. This line-based distributed scheme features low delay, low memory cost, and low complexity. On the receiver side, our proposed line-based prediction is used to generate side information from previously decoded lines, which fully utilizes the correlation among lines. The quantized coefficients are decoded by the linear least square estimator from the received data. The image line is then reconstructed by the scalar modulo dequantization using the generated side information. Since there is neither syndrome coding nor channel coding, the proposed LineCast can make a large number of receivers reach the qualities matching their channel conditions. Our theoretical analysis shows that the proposed LineCast can achieve Shannon's optimum performance by using a high-dimensional modulolattice quantization. Experiments on satellite images demonstrate that it achieves up to 1.9-dB gain over the state-of-the-art 2D broadcasting scheme and a gain of more than 5 dB over JPEG 2000 with forward error correction. .

7. Paper Name:SATELLITE IMAGE SEGMENTATION: A NOVEL ADAPTIVE MEAN-SHIFT CLUSTERING BASED APPROACH

Author name: Biplab Banerjee, Surender Varma G, Krishna Mohan Buddhiraju

Abstract: Segmentation of satellite images using a novel adaptive non parametric mean-shift clustering algorithm is proposed in this paper. Image segmentation refers to the process of splitting up an image into its constituent objects. It is also an important step in bridging the semantic gap between low level image interpretation and high level visual analysis. Mean-shift technique is based on the concept of kernel density estimation. It has been applied successfully in diverse vision related tasks including segmentation. The performance of the mean shift algorithm is greatly affected by the size of the parzen window and the terminating criteria. These two issues have been taken care of here in a purely statistical framework. The efficiency of this newly developed adaptive clustering has been judged for segmentation of any initially oversegmented satellite image. The notion of object based image analysis is preserved by initially over segmenting the image by watershed technique. Extensive experiments on several multispectral satellite images have confirmed the effectivity of this proposed approach in comparison to some widely used state of the art segmentation methods..

8.Paper Name: Study on Super-Resolution of Images Obtained by Micro Satellite with CMOS Sensor

Author: Xu Jun*

Abstract:- This paper proposes a new image reconstruction algorithm to improve the resolution of images obtained by micro satellite with CMOS sensor. Satellite with CMOS Sensor can obtain images of same ground object in consecutive integration times. Because of the low attitude stability of micro satellite, there are sub-pixel displacements for same target between these images. In order to measure the displacements, three image registration algorithms, which are Maximum Mutual Information, SURF(Speeded Up Robust Features) and Keren, are compared through simulation experiment. Then, an image super-resolution reconstruction algorithm named Weighted Average Interpolation is proposed. Based on two sequential low-resolution images, one high-resolution image is acquired through Weighed Average Interpolation. Simulation result proved that PSNR in synthesized image is enhanced by 1.44dB compared with that in bilinear interpolated image. Test chart imaging experiment showed that Average Gradient, Edge Intensity and Space Frequency of synthesized image are all obviously greater than of bilinear interpolated image. The resolution of synthesized image is effectively improved by Weighed Average Interpolation.

9.Paper name: Scheduling Imaging Mission for Area Target Based on Satellite Constellation

Author: He Yanchao1 , Xu Ming1 , Yang Zhi2 , Liu Shengli2

Abstract:—The scheduling of satellite's constellation mode-based imaging for area target is studied in the present paper. On the basis of the properties of area target imaging, a submission model dividing the mission into a five-element set with time window and observing angle as its identification is employed. By applying the methodology of dynamic partitioning, the area target is partitioned into candidate submissions which are for multi-satellites' cooperative imaging with different observing angles respectively. In the aim of attaining the most effective imaging for satellite during the limited time window, the coverage rate for target is selected as the optimization goal. Therefore the best observing angles that satellites take in the limited time window are acquired. Finally, combined with engineering application, an example of the area target scheduling mission based on a two-satellite constellation on ultra-low orbit is taken and the final result proves the efficiency of the approach put forward in this paper. .

10.Paper name: Improving Satellite-Aerial Image Matching Success Rate by Image Fusion

Author: Jung-il Shin

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. .

CHAPTER 3

PROJECT REQUIREMENT

3.1 EXTERNAL INTERFACE REQUIREMENT

3.1.1 User Interface

Application Based malaria Detection.

3.1.2 Hardware Interfaces:

RAM : 8 GB

As we are using Machine Learning Algorithm and Various High Level Libraries Laptop

RAM minimum required is 8 GB.

Hard Disk : 40 GB

Data Set of CT Scan images is to be used hence minimum 40 GB Hard Disk memory is required.

Processor : Intel i5 Processor

Pycharm IDE that Integrated Development Environment is to be used and data loading should be fast hence Fast Processor is required

IDE : spyder

Best Integrated Development Environment as it gives possible suggestions at the time of typing code snippets that makes typing feasible and fast.

Coding Language : Python Version 3.8

Highly specified Programming Language for Machine Learning because of availability of High Performance Libraries.

Operating System : Windows 10

Latest Operating System that supports all type of installation and development Environment

3.1.3 Software Interfaces

Operating System: Windows 10

IDE: Pycharm ,Spyder

Programming Language : Python

3.2 NON FUNCTIONAL REQUIREMENT

3.2.1 PerformanceRequirements

The performance of the functions and every module must be well. The overallperformance of the software will enable the users to work eciently. Perfor-mance of encryption of data should be fast. Performance of the providingvirtual environment should be fastSafety Requirement•The application is designed in modules where errors can be detected and xedeasily. This makes it easier to install and update new functionality if required.

3.2.2 Safety Requirement

The application is designed in modules where errors can be detected and fixed easily. This makes it easier to install and update new functionality if required.

3.2.3 Software Quality Attributes

Our software has many quality attribute that are given below:-

Adaptability: This software is adaptable by all users.

Availability: This software is freely available to all users. The availability of the software is easy for everyone.

Maintainability: After the deployment of the project if any error occurs then it can be easily maintained by the software developer.

Reliability: The performance of the software is better which will increase the reliabilityof the Software.

User Friendliness: Since, the software is a GUI application; the output generated is much user friendly in its behavior.

Integrity: Integrity refers to the extent to which access to software or data by unauthorized persons can be controlled.

Security: Users are authenticated using many security phases so reliable security is provided.

Testability: The software will be tested considering all the aspects.

CHAPTER 4

SYSTEM ANALYSIS

4.1 SYSTEM ARCHITECTURE

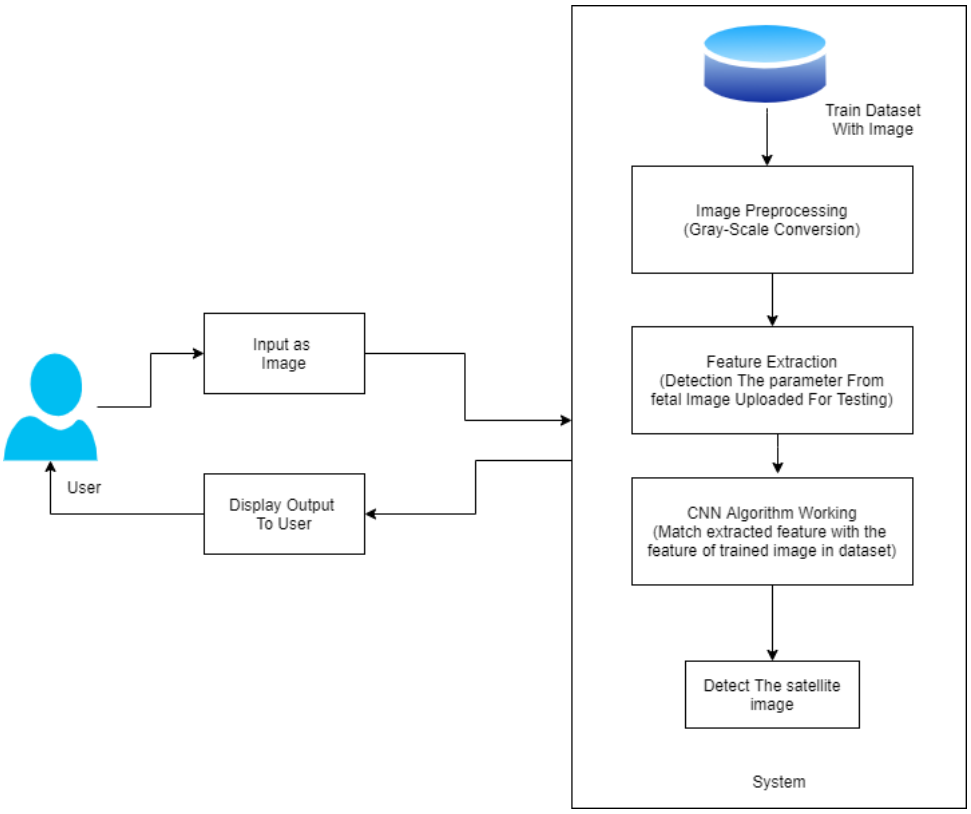


Figure 4.1: system Architecturel

4.1.1 Module

- Admin
- In this module,the Admin has to log in by using valid user name and password. After login successful he can do some operations such as View All Users and Authorize, View All E-Commerce Website and Authorize,View All Products and Reviews,View All Products Early Reviews, View All Keyword Search Details, View All Products Search Ratio, View All Keyword Search Results, View All Product Review Rank Results.

- View and Authorize Users
- In this module, the admin can view the list of users who all registered. In this, the admin can view the user's details such as, user name, email, address and

admin authorizes the users.

- View Charts Results
- View All Products Search Ratio,View All Keyword Search Results,View All Product Review Rank Results.

- Ecommerce User
- In this module, there are n numbers of users are present. User should register before doing any operations. Once user registers, their details will be stored to the database. After registration successful,he has to login by using authorized user name and password Once Login is successful user will do some operations like Add Products, View All Products with reviews, View All Early Product's reviews, View All Purchased Transactions.

- End User
- In this module, there are n numbers of users are present. User should register before doing any operations. Once user registers, their details will best or to the database. After registration successful,he has to login by using authorized user name and password. Once Login is successful user will do some operations like Manage Account, Search Products by keyword and Purchase, View Your Search Transactions, View.

4.1.2 Data Flow Diagram

In Data Flow Diagram,we Show that flow of data in our system in DFD0 we show that base DFD in which rectangle present input as well as output and circle show our system,In DFD1 we show actual input and actual output of system input of our system is text or image and output is rumor detected like wise in DFD 2 we present

operation of user as well as admin.

Figure 4.2: Data Flow(0) diagram

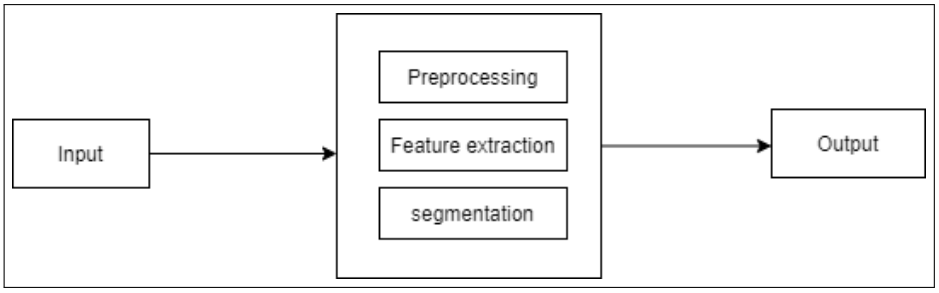


Figure 4.3: Data Flow(1) diagram

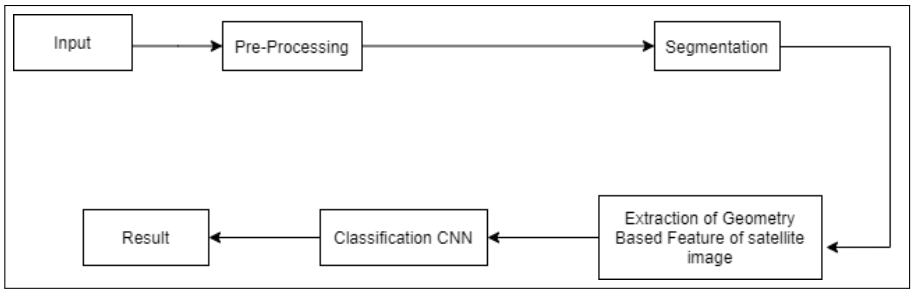


Figure 4.4: Data Flow(2) diagram

4.2 UML DIAGRAMS

Unified Modeling Language is a standard language for writing software blueprints.The UML may be used to visualize,specify,construct and document the artifacts of a softwareintensive system.UML is process independent,although optimally it should be used in process that is use case driven,architecture-centric,iterative,and incremental.The Number of UML Diagram is available.

Class Diagram.

Use case Diagram.

Activity Diagram.

component Diagram

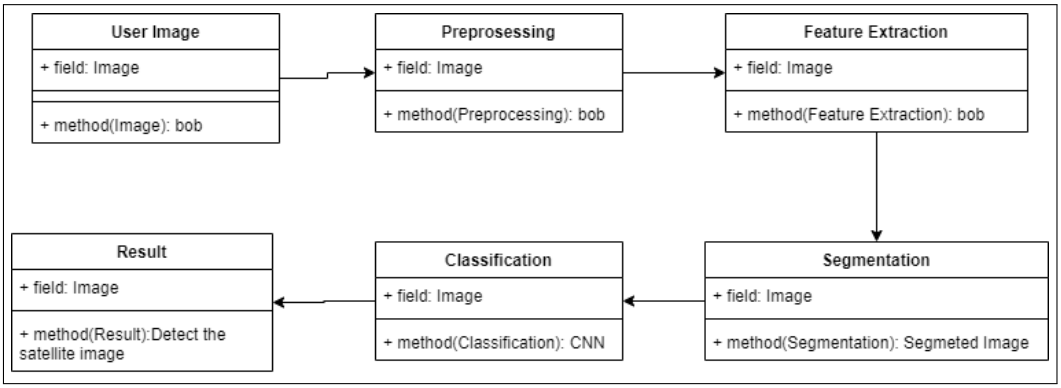


Figure 4.5: Class Diagram Diagram

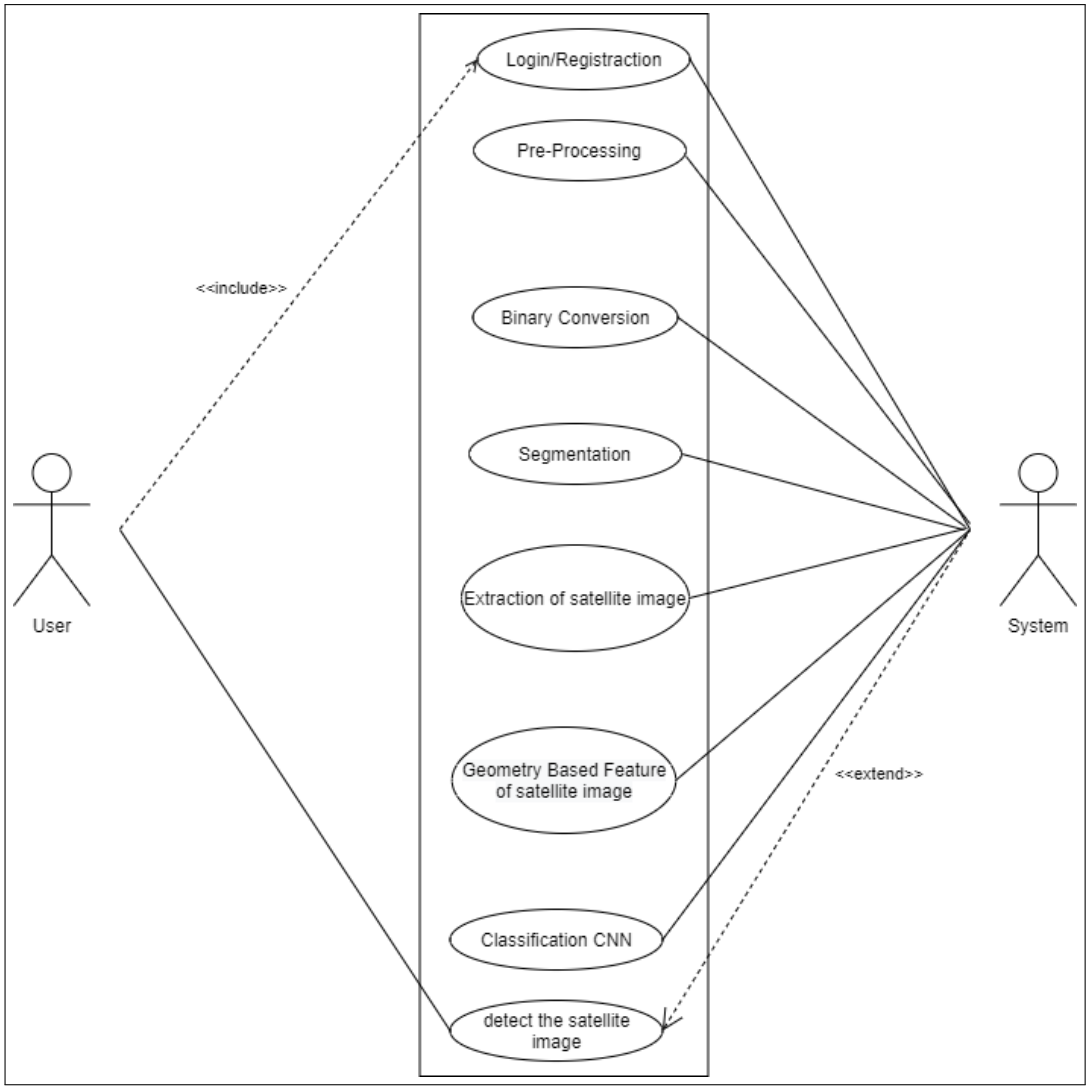


Figure 4.6: Use case Diagram

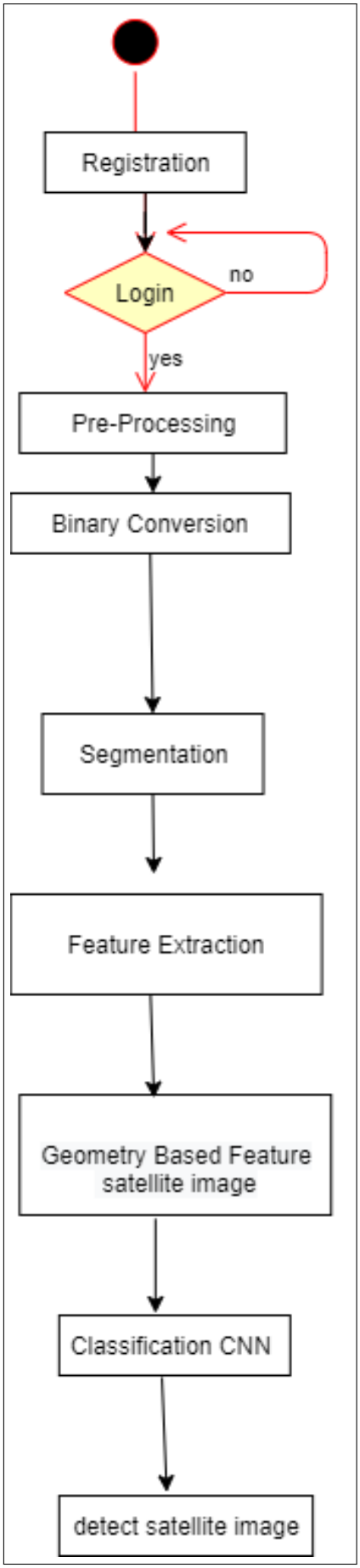


Figure 4.7: Activity Diagram

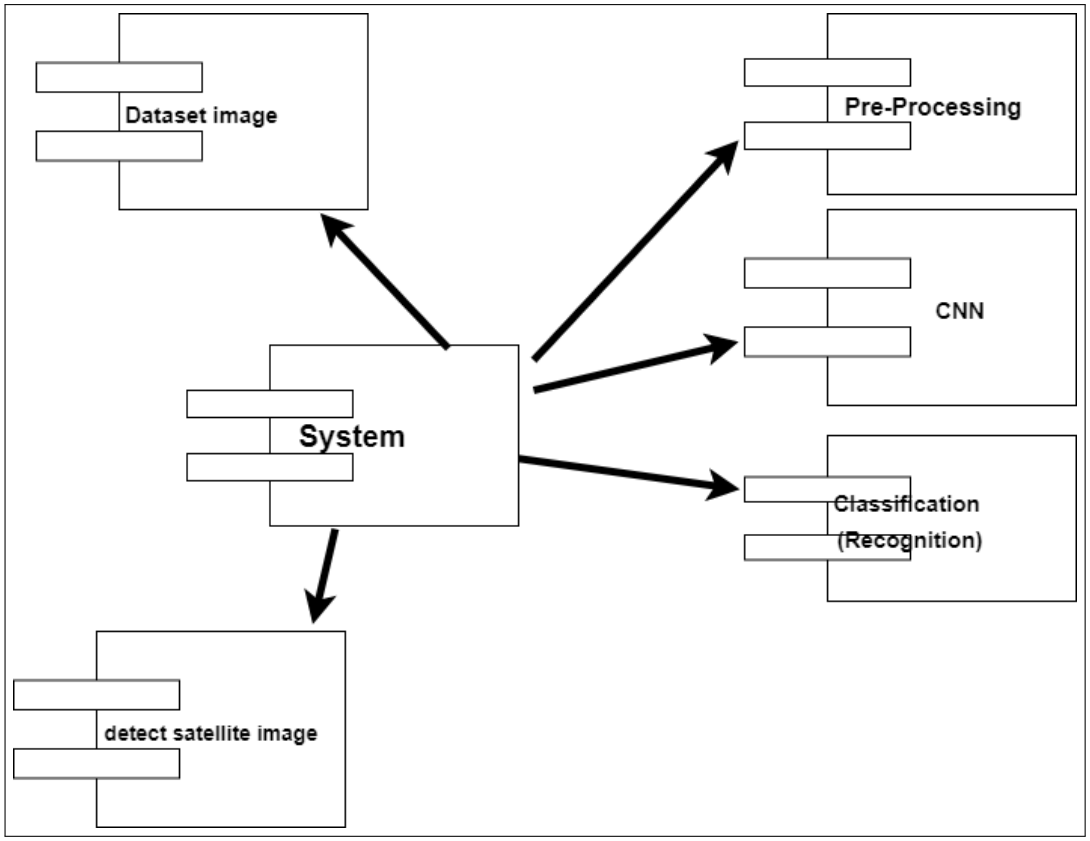


Figure 4.8: component Diagram

CHAPTER 5

SOFTWARE INFORMATION

Python is an interpreted, high-level and general-purpose programming language. Created by Guido van Rossum and first released in 1991, Python's design philosophy emphasizes code readability with its notable use of significant whitespace. Its language constructs and object-oriented approach aim to help programmers write clear, logical code for small and large-scale projects.

Python is dynamically typed and garbage-collected. It supports multiple programming paradigms, including structured (particularly, procedural), object-oriented, and functional programming. Python is often described as a "batteries included" language due to its comprehensive standard library.

Python was created in the late 1980s as a successor to the ABC language. Python 2.0, released in 2000, introduced features like list comprehensions and a garbage collection system with reference counting.

Python 3.0, released in 2008, was a major revision of the language that is not completely backward-compatible, and much Python 2 code does not run unmodified on Python 3.

The Python 2 language was officially discontinued in 2020 (first planned for 2015), and "Python 2.7.18 is the last Python 2.7 release and therefore the last Python 2 release."[30] No more security patches or other improvements will be released for it. With Python 2's end-of-life, only Python 3.6.x and later are supported.

Python interpreters are available for many operating systems. A global community of programmers develops and maintains CPython, a free and open-source reference implementation. A non-profit organization, the Python Software Foundation, manages and directs resources for Python and CPython development.

Python was conceived in the late 1980s by Guido van Rossum at Centrum Wiskunde Informatica (CWI) in the Netherlands as a successor to the ABC language (itself inspired by SETL), capable of exception handling and interfacing with the Amoeba operating system. Its implementation began in December 1989. Van Rossum shouldered sole responsibility for the project, as the lead developer, until 12 July 2018, when he announced his "permanent vacation" from his responsibilities as Python's Benevolent Dictator For Life, a title the Python community bestowed

upon him to reflect his long-term commitment as the project's chief decision-maker. He now shares his leadership as a member of a five-person steering council. In January 2019, active Python core developers elected Brett Cannon, Nick Coghlan, Barry Warsaw, Carol Willing and Van Rossum to a five-member "Steering Council" to lead the project.

Anaconda: Anaconda is a free and open-source distribution of the Python and R programming languages for scientific computing (data science, machine learning applications, large-scale data processing, predictive analytics, etc.), that aims to simplify package management and deployment. The distribution includes data-science packages suitable for Windows, Linux, and macOS. It is developed and maintained by Anaconda, Inc., which was founded by Peter Wang and Travis Oliphant in 2012. As an Anaconda, Inc. product, it is also known as Anaconda Distribution or Anaconda Individual Edition, while other products from the company are Anaconda Team Edition and Anaconda Enterprise Edition, both of which are not free.

Package versions in Anaconda are managed by the package management system conda. This package manager was spun out as a separate open-source package as it ended up being useful on its own and for other things than Python. There is also a small, bootstrap version of Anaconda called Miniconda, which includes only conda, Python, the packages they depend on, and a small number of other packages. Anaconda distribution comes with over 250 packages automatically installed, and over 7,500 additional open-source packages can be installed from PyPI as well as the conda package and virtual environment manager. It also includes a GUI, Anaconda Navigator, as a graphical alternative to the command line interface (CLI).

The big difference between conda and the pip package manager is in how package dependencies are managed, which is a significant challenge for Python data science and the reason conda exists.

When pip installs a package, it automatically installs any dependent Python packages without checking if these conflict with previously installed packages[citation needed]. It will install a package and any of its dependencies regardless of the state of the existing installation[citation needed]. Because of this, a user with a working installation of, for example, Google Tensorflow, can find that it stops working having used pip to install a different package that requires a different version of the dependent numpy library than the one used by Tensorflow. In some cases, the package may appear to work but produce different results in detail.

In contrast, conda analyses the current environment including everything currently installed, and, together with any version limitations specified (e.g. the user

may wish to have Tensorflow version 2,0 or higher), works out how to install a compatible set of dependencies, and shows a warning if this cannot be done.

Open source packages can be individually installed from the Anaconda repository, Anaconda Cloud (anaconda.org), or the user's own private repository or mirror, using the conda install command. Anaconda, Inc. compiles and builds the packages available in the Anaconda repository itself, and provides binaries for Windows 32/64 bit, Linux 64 bit and MacOS 64-bit. Anything available on PyPI may be installed into a conda environment using pip, and conda will keep track of what it has installed itself and what pip has installed.

Custom packages can be made using the conda build command, and can be shared with others by uploading them to Anaconda Cloud, PyPI or other repositories.

The default installation of Anaconda2 includes Python 2.7 and Anaconda3 includes Python 3.7. However, it is possible to create new environments that include any version of Python packaged with conda

PyCharm

PyCharm is an integrated development environment (IDE) used in computer programming, specifically for the Python language. It is developed by the Czech company JetBrains. It provides code analysis, a graphical debugger, an integrated unit tester, integration with version control systems (VCSes), and supports web development with Django as well as Data Science with Anaconda.

PyCharm is cross-platform, with Windows, macOS and Linux versions. The Community Edition is released under the Apache License, and there is also Professional Edition with extra features –

Features

- Coding assistance and analysis, with code completion, syntax and error highlighting, linter integration, and quick fixes
- Project and code navigation: specialized project views, file structure views and quick jumping between files, classes, methods and usages
- Python refactoring: includes rename, extract method, introduce variable, introduce constant, pull up, push down and others
- Support for web frameworks: Django, web2py and Flask [professional edition only]
- Integrated Python debugger
- Integrated unit testing, with line-by-line code coverage Google App Engine Python development [professional edition only]
- Version control integration: unified user interface for Mercurial, Git, Subversion, Perforce and CVS with change lists and merge

- Support for scientific tools like matplotlib, numpy and scipy [professional edition only]

CHAPTER 6

PROJECT PLAN

In this chapter we are going to have an overview about how much time does it took to complete each task like- Preliminray Survey Introduction and Problem Statement, Literature Survey, Project Statement, Software Requirement and Specification, System Design, Partial Report Submission, Architecture Design, Implementation, Deployment, Testing, Paper Publish, Report Submission and etcetera. This chapter also gives focus on stakeholder list which gives information about project type, customer of the proposed system, user and project member who developed the system.

6.1 STAKEHOLDER LIST

6.2 SYSTEM IMPLEMENTATION PLAN

The System Implementation plan table, shows the overall schedule of tasks compilation and time duration required for each task.

Sr. No.	Name/Title	Start Date	End Date
1	Preliminary Survey	22/07/2023	04/08/2023
2	Introduction and Problem Statement	05/08/2023	18/08/2023
3	Literature Survey	19/08/2023	25/08/2023
4	Project Statement	26/08/2023	01/09/2023
5	Software Requirement And Specification	16/09/2023	23/09/2023
6	System Design	01/10/2023	14/10/2023
7	Partial Report Submission	20/10/2023	25/10/2023
8	Architecture Design	27/10/2023	04/11/2023
9	Implementation	09/11/2023	04/12/2023
10	Deployement	10/12/2023	05/01/2024
11	Testing	10/01/2023	02/02/2024
12	Paper Publish		
13	Report Submission	01/06/2024	01/06/2024

CHAPTER 7

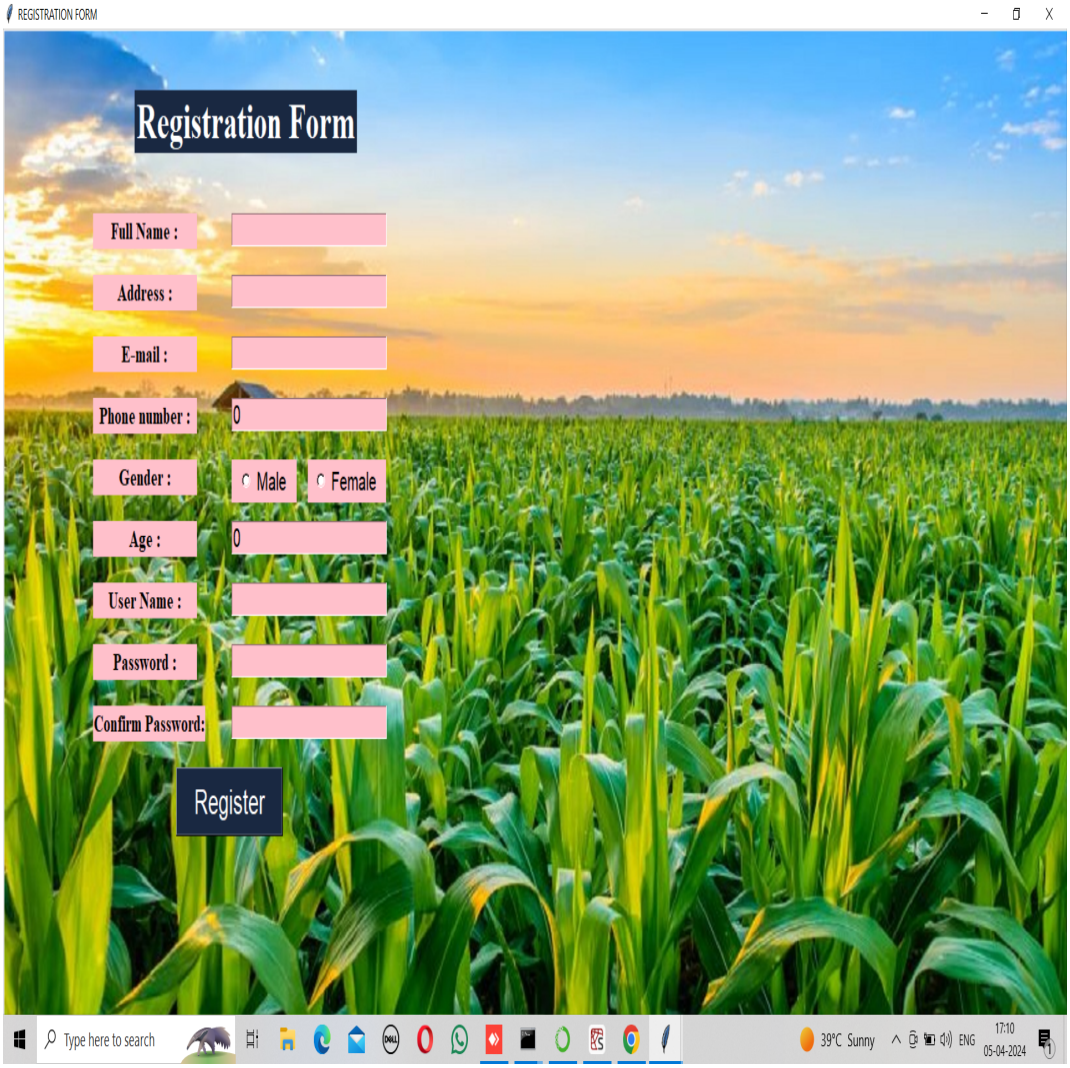
RESULT

7.1 LOGIN PAGE

”Welcome to our satellite image land classification platform! Utilizing cutting-edge Convolutional Neural Networks (CNN), we offer seamless login access for precise land classification. Experience rapid, accurate analysis of satellite imagery for various land types. Our login page ensures secure access to our robust CNN-powered classification system. Join us in revolutionizing satellite-based land classification with advanced machine learning technology.”

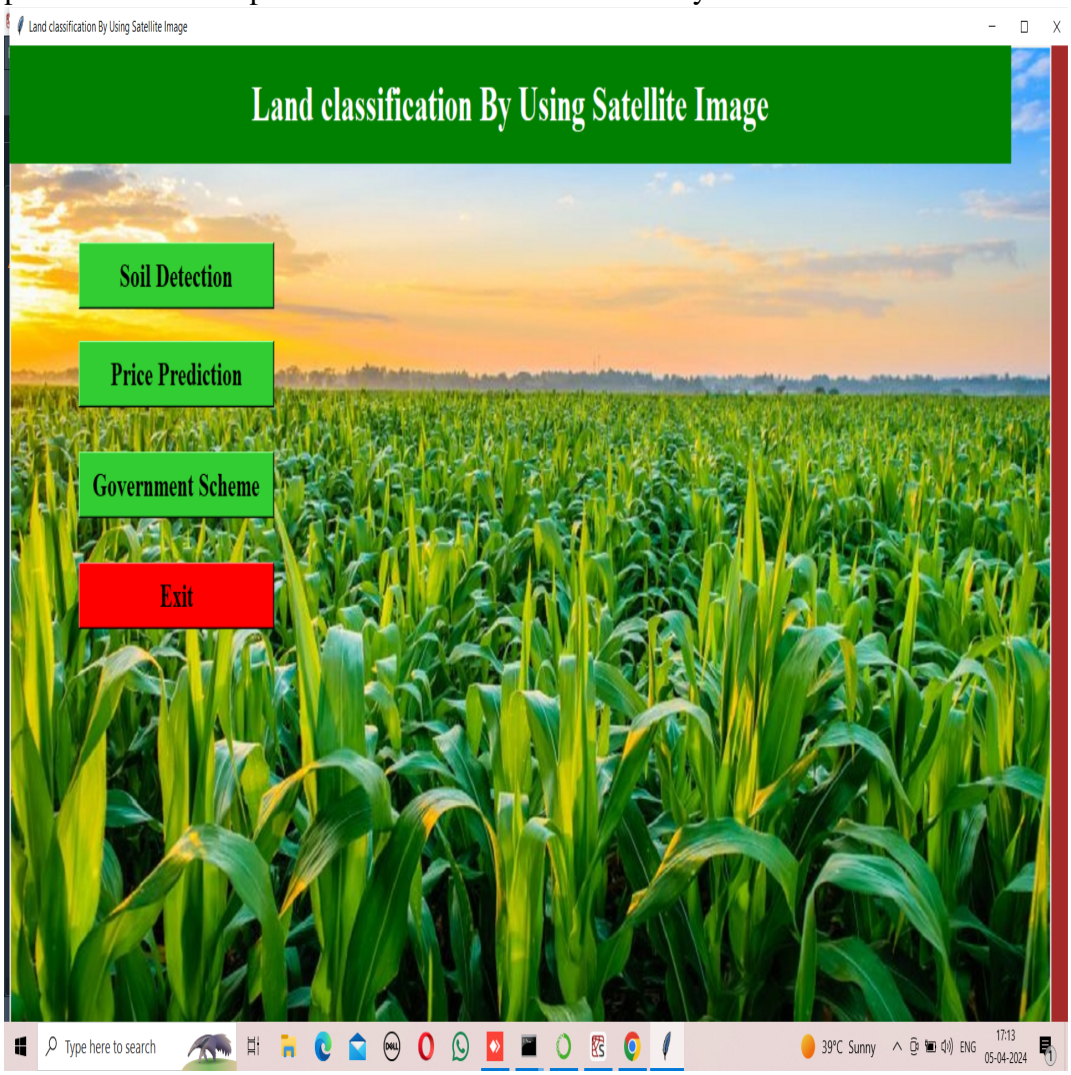
7.2 REGISTRATION PAGE

The personal information registration page for land classification on satellite images utilizes Convolutional Neural Networks (CNNs) to analyze and categorize land features. Users input personal details and preferences to customize classification parameters. Through CNNs, the system identifies various land types such as forests, water bodies, urban areas, and agricultural lands with high accuracy. This registration page empowers users to contribute to environmental studies, urban planning, and disaster management by providing valuable data for land classification and analysis.



7.3 LAND SELECTION PAGE

”Revolutionize land classification with our cutting-edge CNN-based satellite image analysis. Our platform employs advanced Convolutional Neural Networks to accurately identify and categorize land features from satellite imagery, facilitating informed decision-making for various applications. Experience efficient land selection processes with our precise and reliable classification system.”



7.4 IMAGE PROCESSING PAGE

”Explore the power of convolutional neural networks (CNNs) in satellite image processing for land classification. Our page delves into advanced CNN techniques tailored specifically for analyzing satellite imagery, offering insights into efficient land cover classification methods. Unlock the potential of deep learning algorithms to accurately identify and categorize land features from satellite data with our comprehensive resources.”

7.5 FINAL OUTPUT PAGE

The final output page of land classification on satellite images using Convolutional Neural Networks (CNN) typically presents a detailed map or image showcasing accurately classified land cover types such as urban areas, vegetation, water bodies, and more. This output provides valuable insights for various applications including urban planning, environmental monitoring, and natural resource management. The CNN-based classification ensures high accuracy by leveraging deep learning techniques to analyze complex spatial patterns within satellite imagery.

Chapter 8

Conclusion

8.1 CONCLUSION

This paper proposes a CNN architecture for extracting scene information 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 99.84 and 99.47 on SAT4 and SAT6 satellite image datasets respectively. The 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.

Chapter 9

Future Scope

9.1 FUTURE SCOPE

The future scope of land classification using Convolutional Neural Networks (CNN) applied to satellite images is promising and multifaceted. With advancing technology, CNN algorithms can enhance accuracy and efficiency in distinguishing various land cover types such as urban areas, forests, agriculture, and water bodies. Future research may focus on refining CNN architectures to handle complex features and textures inherent in satellite imagery, improving classification accuracy even further. Moreover, the integration of CNN with other machine learning techniques like transfer learning and ensemble methods could enhance classification robustness and generalization. Additionally, exploring the potential of CNN in real-time or near real-time monitoring of land cover changes can aid in environmental conservation, urban planning, disaster management, and agricultural monitoring. As computational resources continue to evolve, the scalability and applicability of CNN for land classification on satellite images will likely expand, unlocking new avenues for remote sensing applications.

Chapter 10

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