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Land Classification on Satellite Images Using CNN

Prof. Pravin Patil[1], Vishwarupa Pawar[2], Dhaneshwari Patil[3], Pratiksha Sathe[4]
[1]*Professor, Department of Computer Engineering, Zeal College of Engineering, Pune, Maharashtra, India*
[2, 3, 4]*Student, Department of Computer Engineering, Zeal College of Engineering, Pune, Maharashtra, India*

Abstract: ***Land cover classification from these images is a difficult task be- cause of very large sized data and high variation types. Satellite based information is presently available as huge sets of high resolution images from a large number of satellites like Sentinel, Landsat8, etc. Land cover classification from these images is a difficult task be- cause of very large sized data and high variation types. The purpose of land use and land cover classification is that monitoring and identifying the various land cover classes exactly. Land-use is the rational and judicious approach of allocating available land resources for different activities (such as settlements, arable fields, pastures, and managed woods) within a city. The use of a particular patch of land and its physical character are linked. However, research that establishes this link is lacking despite the proliferation of geo spatial data.***

Keywords: Land use and land cover classification, machine learning, deep learning, CNN

I. INTRODUCTION

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 labours.

A. Problem Statement

Rainforest deforestation is a important issuethat causes trees to be cut down to provide more land. It affects oxygen and carbon levels aroundthe world. So we Classify forest land . Which land is better for the crop. It also classify through the our system. We Classify land As per Feature and it will behelpful to environment.

B. Motivation

1) To achieve long term growth and economic development.
2) To achieve this vision, we must redouble our efforts to increase agricultural productivity , while protecting the environment
3) 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.

II. METHODOLOGIES

1) A CNN is a kind of network architecture for deep learning algorithm. There are other types of neural networks in deep learning, but foridentifying and recognizing objects, CNNs are the network architecture of choice
2) Pre-processing
3) Feature Extraction
4) Classification

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A. CNN

In deep learning, a convolutional neural network (CNN/ConvNet) is a class of deep neural networks, most commonly applied to analyze visual imagery. Now when we think of a neural network we think about matrix multiplications but that is not the case with ConvNet. It uses a special technique called Convolution. Now in mathematics convolution is a mathematical operation on two functions that produces a third function that expresses how the shape of one is modified by the other.

B. Pre-processing

To prepare picture data for model input, preprocessing is necessary. For instance, convolutional neural networks' fully connected layers demanded that all the images bein arrays of the same size. Additionally, modelpreprocessing may shorten model training time andspeed up model inference.

C. Feature Extraction

Feature extraction refers to the process of transforming raw data into numerical features that can be processed while preserving the information in the original data set. It yields better results than applying machine learning directly to the raw data.

D. Classification

Classification is a supervised machine learning process of categorizing a given set of input data into classes based on one or more variables. Classification neural networks used for feature categorization are very similar to fault-diagnosis networks, except that they only allow one output response for any input pattern, instead of allowing multiple faults to occur for a given setof operating conditions.

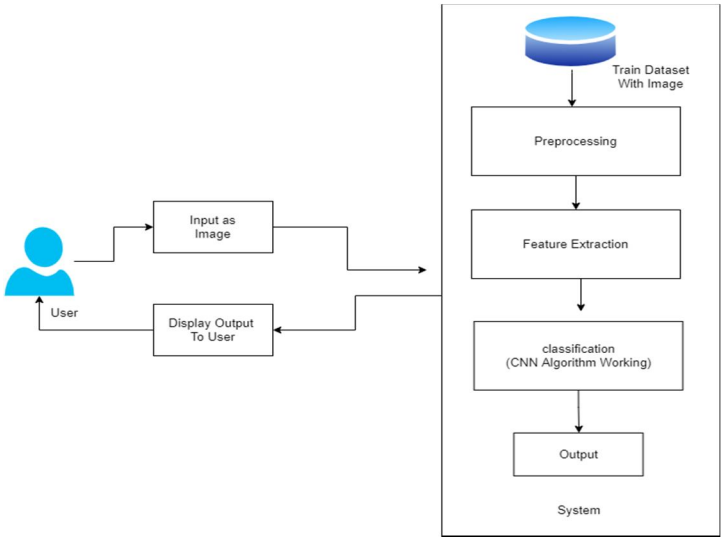
III. ALGORITHM USED

Rain forest deforestation is a important issue that causes trees to be cut down to provide more land. It affects oxygen and carbon levels around the world.

So we Classify forest land . Which land is better for the crop . It also classify through the our system. We Classify land As per Feature and it will be helpful to environment.

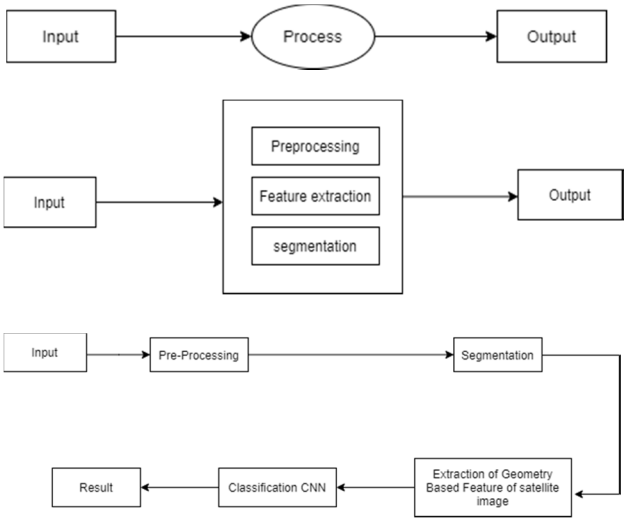
1) *Algorithm Used:* The Convolutional Neural Network (CNN) is a subtype of Neural Networks that is mainly used for applications in image and speech recognition. Its built-in convolutional layer reduces the high dimensionality of images without losing its information. That is why CNNsare especially suited for this use case. A Convolutional neural network (CNN) is a neural network that has one or more convolutional layers and are used mainly for image processing, classification, segmentation and also for other auto correlated data.

IV. SYSTEM ARCHITECTURE

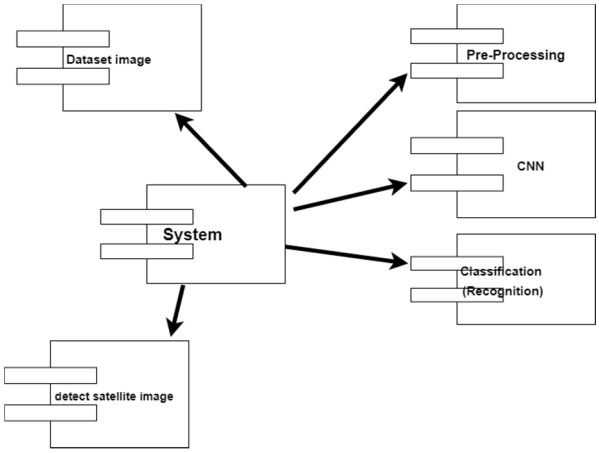


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V. DATA FLOW DIAGRAMS



VI. PACKAGE DIAGRAM



VII. MODULE

A. Admin

In this module, the Admin has to log in by usingvalid username 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 AllProducts 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.

1) 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.

2) View Charts Results: View All Products Search Ratio,View All Keyword Search Results, View All Product Review Rank Results.

3) Ecommerce User: In this module, there are n numbers of users arepresent. 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.

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B. End User

In this module, there are n numbers of users arepresent. 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.

C. Libraries Used

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 andobject-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.

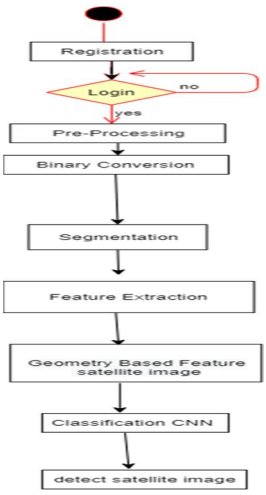
1) *Anaconda:* Anaconda is a free and open-source distribution of the Python and R programming languages for scientific computing (data science, machine learning applications, large-scale data processing, predictive analytics, etc.), that aimsto simplify package management and deployment. The distribution 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.
2) *Spyder:* Spyder is a powerful scientific environment written in Python, for Python, and designed by and for scientists, engineers and data analysts. It offers a unique combination of the advanced editing, analysis, debugging, and profiling functionality of a comprehensive development tool with the data exploration, interactive execution, deep inspection, and beautiful visualization capabilities of a scientific package.

Beyond its many built-in features, its abilities canbe extended even further via its plugin system and API. Furthermore, Spyder can also be used as a PyQt5 extension library, allowing you to build upon its functionality and embed its components, such as the interactive console, in your own software.

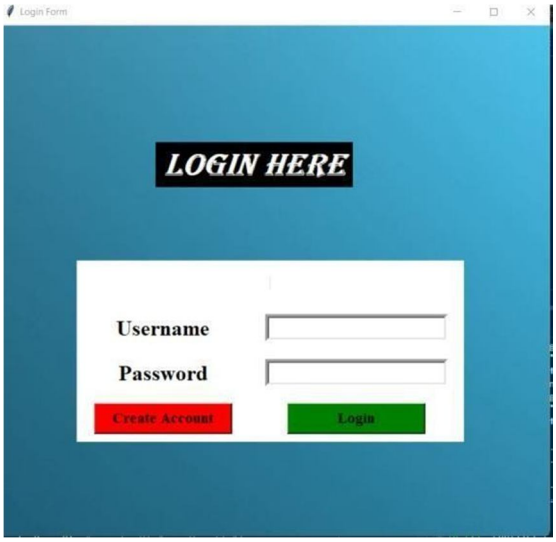
D. Features

1) *Editor:* Work efficiently in a multi-language editor with a function/class browser, realtime code analysis tools (pyflakes, pylint, and pycodestyle), automatic code completion (jedi and rope), horizontal/vertical splitting, and go-to-definition.
2) *Interactive Console:* Hardness the power of as many IPython consolesas you like with full workspace and debugging support, all within the flexibility of a full GUI interface. Instantly run your code by line, cell, or file, and render plots right inline with the output or in interactive windows.

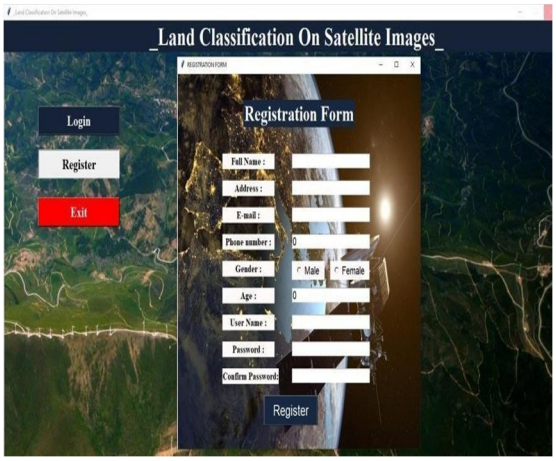
E. Activity Diagram



VIII. RESULT



Login Page



Registration Page



Output Screen

IX. FUTURE WORK

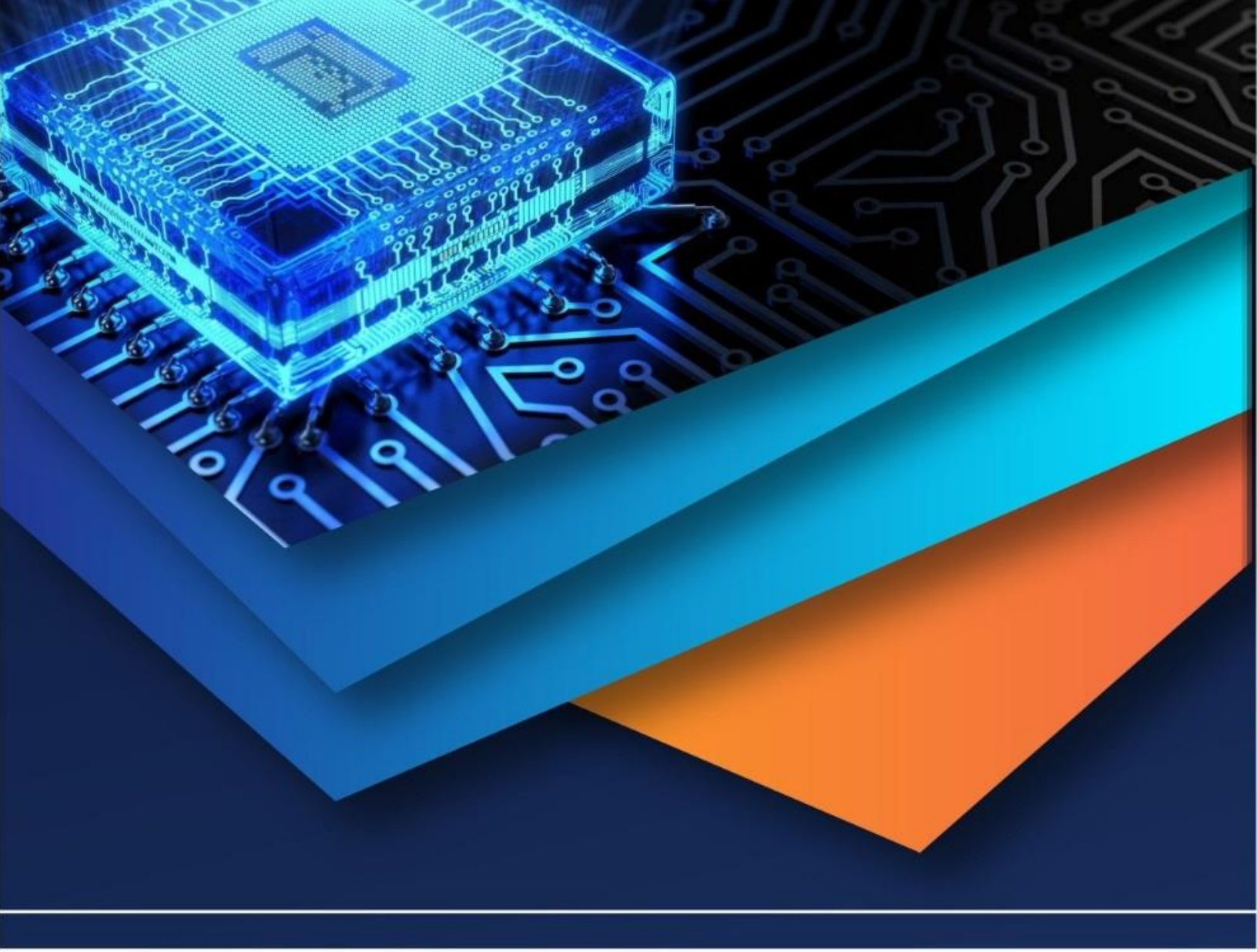
The future land Classification use map should bring together most if not all of the elements of the comprehensive plan such as natural resources,economic development, housing and transportation.

X. CONCLUSION

In this project we are concluding the land classification. firstly we get dataset of image then machine will be preprocessing the image means noise and blur part Remove then train images. With CNN algorithm Machine generate one module then this module put in testing and machine Classify & detect the output.

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