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# Predicting Socio-Economic Development Using Deep Learning

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***Abstract***— *For Uniform growth across the country there is a need to find socio-economic status and monitoring of remote areas. It is about the current state of development or the process state of socio-economy of that place. In our paper, we will predict the development in an location using satellite images provided by various sources using a model that we create which will perform classification and use various image preprocessing techniques. The top things considered during monitoring are the roof top of houses, agriculture, water bodies and constructed roads etc. Convolution neural networks are known for its inbuilt libraries such as OpenCV, NumPy etc. OpenCV is good library has it known for increasing speed of process that is executing and also classifying the image. CNN also provides better accuracy for deep learning processes. In this paper we have use basically three modules: preprocessing of image, CNN classification and predict the social economic status by using the four basic parameters agriculture land, water resources, roads, and structure.*

***Keywords-*** *Numpy, Open CV, Satellite dataset, CNN, google Maps*

## I- INTRODUCTION

Social and economic research is the toughest task in any government, especially for a country with a vast population. Economic research must be realistic and credible to development and it's important to accordingly understand the diversity of the country by its area, the government has taken a survey of required location that requires a lot of human efforts and also it is a time-consuming process overall. There are too many areas in the world where people live but do not have the resources to support themselves and contribute in their personal progress. People in this location suffer a lot for basic necessities like food, water etc. Problems in this locations vary a lot some regions have problems of electricity other have problem of clean water. some regions have problems of clean air. some region have problem of illegal constructions. It has now become important for a developing country to attain Uniform growth throughout the country for transforming into a Developed nation.

Therefore, to solve this type of problem we use deep learning on satellite images to predict the output. In this project we use CNN model to create a deep learning model which is able to predict the output accurately

## II -LITERATURE REVIEW

[1] Deep Learning Model for Prediction of Socio-Economic Status using Satellite image
Our proposed system comprises two main roles: the admin and the user. The admin is responsible for uploading datasets to train the model, while the user can use a desktop application to upload satellite images and obtain results by clicking the "compare" button.

[2] Predictability of Poverty by Public Landsat 7 Satellite Imagery and Machine Learning
The findings of this study reveal that the existing approach to predicting poverty based on satellite

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data is limited to country-level analysis, which may encounter challenges that extend beyond national boundaries.

[3] Infrastructure Quality testing in Africa using satellite imagery and in-depth learning.
The specifics of the quality of infrastructure in developing nations are not readily accessible. To address this issue, our team utilized research data from Afrobarometer and implemented a deep learning technique, which demonstrated promising predictive capabilities. However, the availability and quality of data remain a significant challenge in this endeavor. It is important to emphasize that the accuracy of deep learning models is heavily reliant on the quality and quantity of available data. Therefore, maximizing the utility of existing image and survey data should be a primary focus.

## III-PROPOSED SYSTEM

We propose to develop a system that can accurately predict and calculate the economical area, with the inclusion of additional parameters, such as

-roads,
-structures,
-water resources,
-barren land.

Economic development is the must for uniform growth of a nation, it's impossible to grow each part with same pace but still some betterment can be done to the completely isolated areas of nation. When it comes to such type of project the data and process are the foremost important part and hence To create a user-friendly interface for deploying the machine learning model, we will be using the Gradio library. The OpenCV library in Python will be utilized for pre-processing the input images.

One of the project's main task involves collecting satellite image datasets, which will be achieved through the use of Google Maps satellite images and Landsat 7 images. Large amount of storage is needed to store and process the amount of data. In our case, we will be using a pre-existing dataset of Dubai.

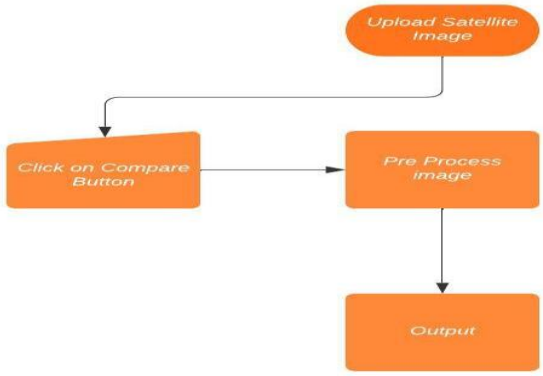


*Fig 1. System Architecture*

## IV-METHODOLOGY

A Convolutional Neural Network (CNN) is a type of neural network that is primarily used for image processing, classification, and segmentation. It consists of one or more convolutional layers that apply a sliding filter over the input to extract features such as edges, corners, shapes, and pixel intensities. The output of a trained CNN model is classified into one of four classes - land, water, road, or barren land.

CNNs are designed to require minimal preprocessing and use various multilayer perceptron techniques. They are called space variant artificial networks because of their ability to extract invariant features from visual images. The architecture of a CNN consists of an input layer, an output layer, and multiple hidden layers, which typically include convolutional layers, pooling layers, fully connected layers, and normalization layers.

The main operations of a CNN are convolution, non-linearity (ReLU), pooling or subsampling, and classification (fully connected layer). Convolutional layers apply the convolution operation on the input to generate a feature map that predicts the category of the feature. Pooling combines the outputs of clusters of neurons in a single neuron in the following layer. Fully connected layers connect every neuron in one layer to every neuron in the next layer.

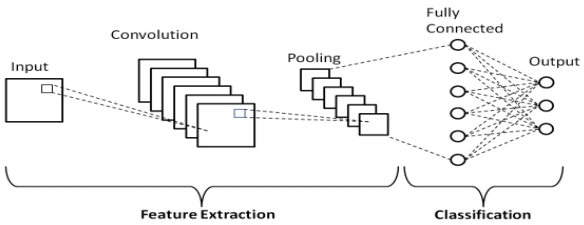


*Fig2. Simple ConvNet*

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## V-RESULT

Our system will use the UNet model, a convolutional neural network originally designed for biomedical image classification at the University of Freiburg in 2015. UNet is effective at localizing and distinguishing borders by classifying every pixel, resulting in input and output images with the same size. For instance, a 2x2 input image will produce a 2x2 output image. Our model uses water, empty land, road structures and other structures to classify image with better accuracy compared to other models. UNet is very well known to provide high accuracies by leveraging deep learning and is supported by many lightweight library.

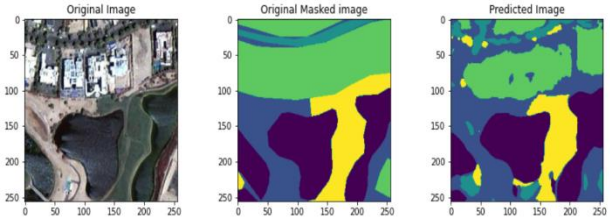


*Fig.3: Output*

## VI -CONCLUSION

To predict the socio-economic status of an area using satellite imagery, we need to gather a set of satellite images and develop an application that enables users to make predictions. Our proposed system has successfully completed all required tasks. However, there is a great potential for future development in this project, which requires significant computational power and capital investment. Similar systems are already being used by various government and private agencies worldwide for confidential and research purposes.

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