

## Poverty prediction by using deep learning on satellite images

Dataset:

<https://www.kaggle.com/datasets/sandeshbhat/satellite-images-to-predict-povertyafrica>

Paper:

<https://www.researchpublish.com/upload/book/Poverty%20Prediction%20by%20Using%20Deep%20Learning%20on%20Satellite%20Images-24032023-3.pdf>

### Basic Idea

**Abstract:** The study split the datasets of satellite images of four (4) countries: Nigeria, Mali, Malawi, and Ethiopia obtained from Kaggle in 90% for training with 15% of it for validation and 10% for testing. The datasets were analysed using CNN, VGG16, ResNet50, which shows that the VGG16 model performs better than the other two models with the validation accuracy of 94%, while CNN has 91%. ResNet has the lowest validation accuracy of 62%. We should focus on satellite images to predict poverty and the application of satellite images in detecting crime, road traffic, agricultural soil, and the like.

**Materials and Methodology:**

- Artificial Neural Network (ANN), the foundation of the Deep Learning (DL) algorithm, has been used in satellite images for almost/over a decade. Before DL emerged, researchers focused on using Support Vector Machines (SVM) and ensemble classifiers such as Random Forest (RF) for image classification and detection.
- The machine learning approach is the effective methodology needed for transforming these enormous amounts of unstructured satellite images into organized predicted ground status.
- The study adopted satellite images and a machine learning approach tailored to predict poverty using satellite images. This approach can improve the excellent segmentation of land use, poverty status, forest cover, and population unit, thereby enabling decision-making and research studies. The study obtained huge algorithmic possessions in model training & testing, connecting to leading artificial neural networks, via algorithmic validations that get the opportunity that satellite pictures are snapped from a fixed length and seeing angle from and capture repeating features and objects.
- The satellite images consist of the four African countries Nigeria, Mali, Malawi, and Ethiopia.

**Dataset:** The datasets were satellite images from [1] Kaggle website captured using satellite technology. The images involve a large scale of information concerned with landscape patterns related to livelihood operation and recognize some main factors like the source of water, road, roof building, building, and farmlands. The image is in original pixels size of 256x256 Red Green Blue (RGB), i.e., colour images. The datasets' images are in four African countries: Malawi, Ethiopia, Mali, and Nigeria. Mali has 14,759 images, Ethiopia 8,590 images, Malawi 12,700 images, and Nigeria 11,551 images. Therefore, the total images of 47,600.

**Conclusion-**

The CNN model performs averagely with a percentage of 75%, which shows that it is better than ResNet. The VGG16 model was the model that performs best compared to the CNN and ResNet, with an accurate performance of 87%. While the ResNet was the model with the lowest version of 62% compared to the other two models. The VGG16 was the best model with the highest performance, CNN with medium performance, and ResNet was the lowest performance.