

Illegal Mining Activity Detection Using satellite Images

Shashidhara S and Thouseef Ulla Khan

Department of MCA

Vidya Vikas Institute of Engineering and Technology, Mysuru, India

shashis41297@gmail.com and thouseef.khan@vidyavikas.edu.in

Abstract: *Illegal mining poses a significant threat to ecological balance, biodiversity, and lawful economic systems. Across the globe, unsanctioned mining operations lead to air pollution, water pollution, deforestation, and loss of natural habitats, causing irreversible damage to the environment. Traditional methods for monitoring mining activities—such as physical patrolling or bureaucratic inspections—are often inefficient, slow, and unable to deliver info in real time.*

In order to overcome these constraints, this proposal suggests an AI-powered system capable of detecting illegal mining activities Using satellite photos with deep learning and computer vision techniques. The system integrates a custom Convolutional Neural Network Cnn and transfer learning via DenseNet121 for image classification, distinguishing between forested and illegally mined regions with very high accuracy. To enhance functionality, YOLO (You Only Look Once) is incorporated as a real-time object detection algorithm to identify and localize rivers and mining zones in satellite images. This two-pronged strategy guarantees both classification and spatial localization, enabling authorities to take prompt and informed action. A robust preprocessing pipeline—comprising RGB channel visualization, histogram equalization, Gaussian blurring, Sobel filtering, segmentation, and Canny edge detection—was implemented to enhance image clarity and highlight distinguishing features. The dataset consists of high-resolution satellite images annotated into two categories: forest and illegal mining zones.

The system is deployed using a Flask-based web application, allowing users to upload satellite images and receive real-time predictions with highlighted illegal zones. Designed for environmental agencies, researchers, and government bodies, this solution demonstrates the potential of AI and remote sensing as powerful tools for sustainable environmental monitoring and the mitigation of illegal mining activities..

Keywords: Illegal mining detection, satellite imagery, deep learning, convolutional neural networks cnn, DenseNet121, YOLOv8, object detection, image preprocessing, computer vision, environmental monitoring, Flask web application.

