**Customized Land Cover Classification using Deep Learning and Convolutional Neural Network (CNN)**

**Objective:** We are living in a time when we have around 8.2 billion individuals in this Earth. Now we have various kinds of land in this Earth which has various kinds of land cover—forests, water bodies, urban, agricultural fields, and barren lands and many more—manual classification of them is a busy job. visiting each site for analysis is time-consuming, expensive, and often impractical. This is where land cover classification comes into play.

Now if we are planning something for a specific area, we require a lot of information regarding the location. While planning massive projects like amusement parks, office complexes, or industrial areas, the developers need to have proper knowledge about the surrounding environment. For example, before building a commercial complex, one needs to analyse the infrastructure around it, residential areas, green belts, and water bodies. This assists in finding out if the suggested project is viable or whether it may cause environmental problems like flooding, rampant deforestation, or traffic. Therefore, in this process, one should familiarize themselves with their neighbourhood structures or water bodies to see if the forthcoming plan of construction ought to or not occur. So, it would be beneficial for all the industries who are working on environment to verify that how much percentage of what is being covered in the area Even Governments and private sectors can utilize this information to maintain sustainable land use and reduce ecological harm.

This event may assist organisations where we must forecast any type of natural calamities by giving our own CNN model for the land classification information

Therefore, our primary intention is to assist such organisations to segment the land in various parts so that it would be beneficial to make a fruitful decision. we also can increase planning, maximize land use, and help bring about a greener and well-planned future for businesses as well as the environment.

**Methodology:**  The dataset from open-source dataset providers such as Kaggle. Then what we require is preprocessing the dataset which comprises

• Data Collection – Collect images  
• Data Cleaning – Eliminate noise, atmospheric distortions, and unwanted data.  
• Image Enhancement – Enhance image quality by contrast adjustment, filtering, or sharpening.  
• Band Selection – Select suitable spectral bands (e.g., RGB, infrared) for classification.  
• Data Normalization – Normalize pixel values to maintain consistency between images.  
• Segmentation – Split the image into meaningful regions for improved classification.  
• Feature Extraction – Extract and identify useful features such as vegetation index, texture, or elevation.  
• Dimensionality Reduction – Employ methods like PCA (Principal Component Analysis) to minimize redundant data.

NOTE: We might add or remove few steps from the above-mentioned data preprocessing techniques. This is just a concept or a basic approach on the topic

Then after all preprocessing is done, we would use a CNN network for image recognition and detection. We would build our own CNN custom layers to train the datasets. CNN is good for data like images or any time series data. CNN has automatic feature extraction techniques which would make our work even simpler.

**Key Findings:** The key finding is the most important aspect of finding in what kind of industries our project would be helpful and why is it easy for the industries to opt it for their own needs. So according to out team’s observation, we have concluded in the following points

* Segmenting land and other parts of land would be helpful for the department who his responsible for handling Natural Calamities
* It would be helpful for real estate agents to analyse weather we could construct the building in the area or not
* It could also help for scientist who are involved in satellite Data Analysis to find their findings in our model and enhance them in them for their research purposes
* For Government sectors it would be helpful to take a decision in making a new road or a new flyover in that locality
* With All these, we could integrate Deep Learning techniques so that it would be helpful for future research or any future work.

**References:**

1. [**https://isprs-annals.copernicus.org/articles/IV-3/251/2018/isprs-annals-IV-3-251-2018.pdf**](https://isprs-annals.copernicus.org/articles/IV-3/251/2018/isprs-annals-IV-3-251-2018.pdf)
2. [**https://arxiv.org/pdf/1807.05713**](https://arxiv.org/pdf/1807.05713)
3. [**https://ieeexplore.ieee.org/stamp/stamp.jsp?arnumber=9177262**](https://ieeexplore.ieee.org/stamp/stamp.jsp?arnumber=9177262)
4. [**https://www.researchgate.net/profile/Reham-Gharbia/publication/352058947\_Land\_Cover\_Classification\_Using\_Deep\_Convolutional\_Neural\_Networks/links/60d674d0a6fdccb745e42352/Land-Cover-Classification-Using-Deep-Convolutional-Neural-Networks.pdf**](https://www.researchgate.net/profile/Reham-Gharbia/publication/352058947_Land_Cover_Classification_Using_Deep_Convolutional_Neural_Networks/links/60d674d0a6fdccb745e42352/Land-Cover-Classification-Using-Deep-Convolutional-Neural-Networks.pdf)

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