Read Me

1. Project's Title

Object Detection using 30 cm Satellite data

2. Project Description

2.1 Problem

In humanitarian and urban development scenarios, swiftly identifying areas in need of urgent assistance poses a significant challenge. Whether triggered by natural disasters, conflicts, or economic disparities, crises demand prompt and precise identification of distressed regions. However, deploying physical teams to assess on-ground situations swiftly is hindered by logistical challenges, including resource constraints and the vast scale of data collection required. Additionally, generating relevant and current data presents another obstacle. Developing customized models tailored to specific contexts is a time-consuming endeavor, limiting adaptability in rapidly evolving situations. Consequently, organizations often resort to utilizing pre-existing generic models, which may not adequately capture the intricacies of unique scenarios.

2.2 Solution

Satellite imagery will be used to identify between temporary and constructed roofs.

Understanding the distribution of different roof types in urban areas helps in city planning and development. This information provides insights into the types of structures, their sizes, and their overall footprint, which can inform decisions related to infrastructure

development, zoning regulations, and land use planning. The following roof types will be detected in the project

- Tents: Shelter consisting of sheets of fabric or other material draped over, attached to a frame of poles or a supporting rope.

3. Results

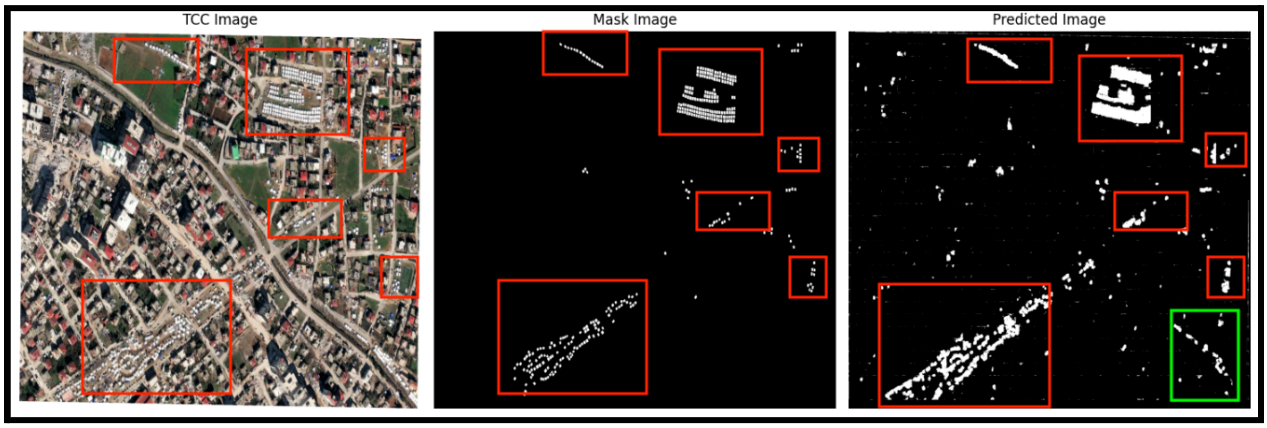

Figure1: Results, The green bounding indicates that despite the absence of training data, the model accurately detected the tents

Accuracy: 0.909
Mean IoU = 0.651
Precision: 0.126
Recall: 0.99
F1 Score: 0.224

4. Infrastructure

The Residual Unit (ResNet) model revolutionizes image analysis, making it a go-to solution for predicting tents in Turkish landscapes. Imagine it as a super detective equipped with ingenious shortcuts for solving complex puzzles. Here's a deeper dive into how it works:

ResNet tackles the challenge of deep neural networks head-on. Traditional models can struggle with vanishing gradients when they become too deep, hindering their ability to learn effectively. ResNet introduces "residual connections," which act as shortcuts that bypass certain layers. This ingenious design allows the model to learn residual functions, making it easier to train very deep networks without suffering from performance degradation. At the heart of ResNet are "residual blocks," the building blocks of the

model's success. These blocks consist of convolutional layers, followed by batch normalization and ReLU activation functions.

5. How to Install and Run the Project

Dependencies

This project requires the following libraries to run the entire process:

- numpy
- tensorflow
- matplotlib
- Pillow (PIL)
- imagecodecs
- tifffile
- rasterio
- geopandas
- shapely

These libraries are necessary for running the provided trained model and prediction code on any imagery. Additionally, ensure that you have the input imagery available. You will need to provide an output path for the predictions. Usage

1. Clone the repository to your local machine.
2. Install the required dependencies using pip:
   pip install -r requirements.txt
3. Run the prediction_code with your input imagery and specify the output path for the predictions.