

Halil İbrahim Taşkömür

Mail : taskomurhalilibrahim@gmail.com

linkedin.com/in/hitaskomur

Phone number : +90 544 410 67 71

github.com/hitaskomur

Introduction :

- Purpose of Project
- Dataset
- Deep Learning Model
- Improvements
- Conclusions

Purpose of Project:

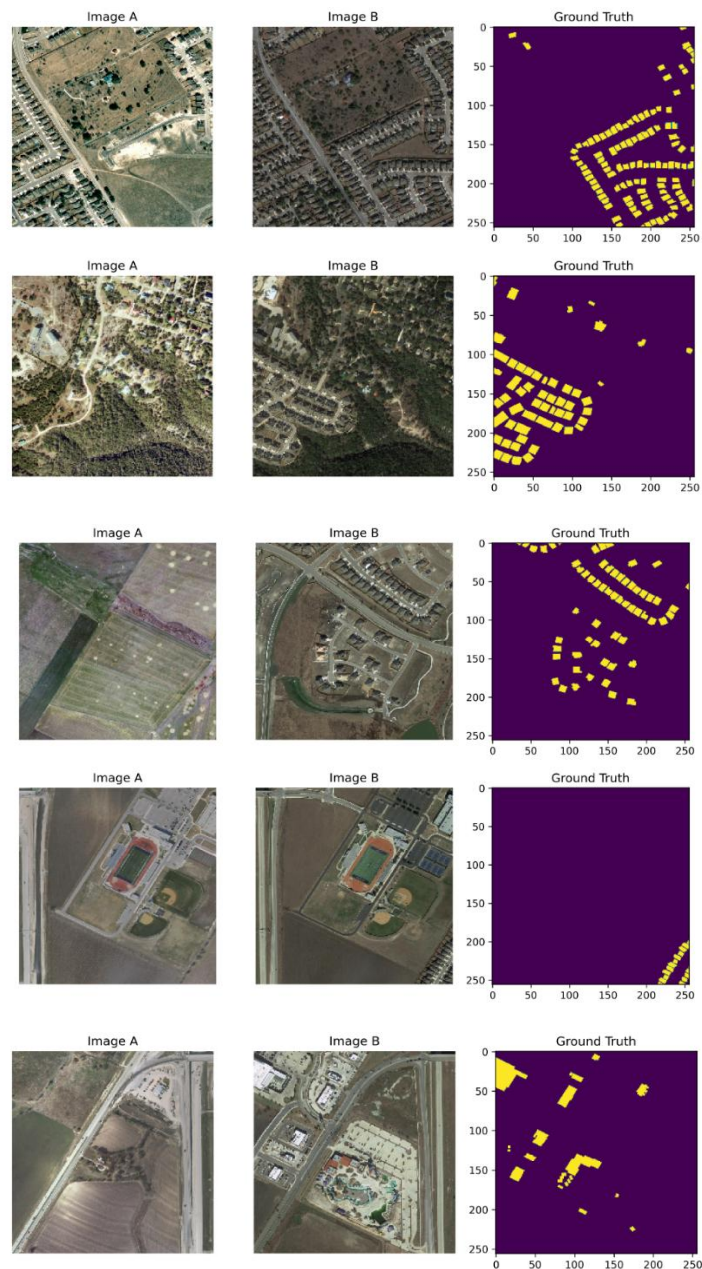
-Detecting differences between satellite images taken at two different times.

Dataset:

-[Used LEVIR_CD Dataset](#).

- LEVIR-CD consists of 637 very high-resolution (VHR, 0.5m/pixel) Google Earth (GE) image patch pairs with a size of 1024×1024 pixels. These bitemporal images with time span of 5 to 14 years have significant land-use changes, especially the construction growth. LEVIR-CD covers various types of buildings, such as villa residences, tall apartments, small garages and large warehouses.

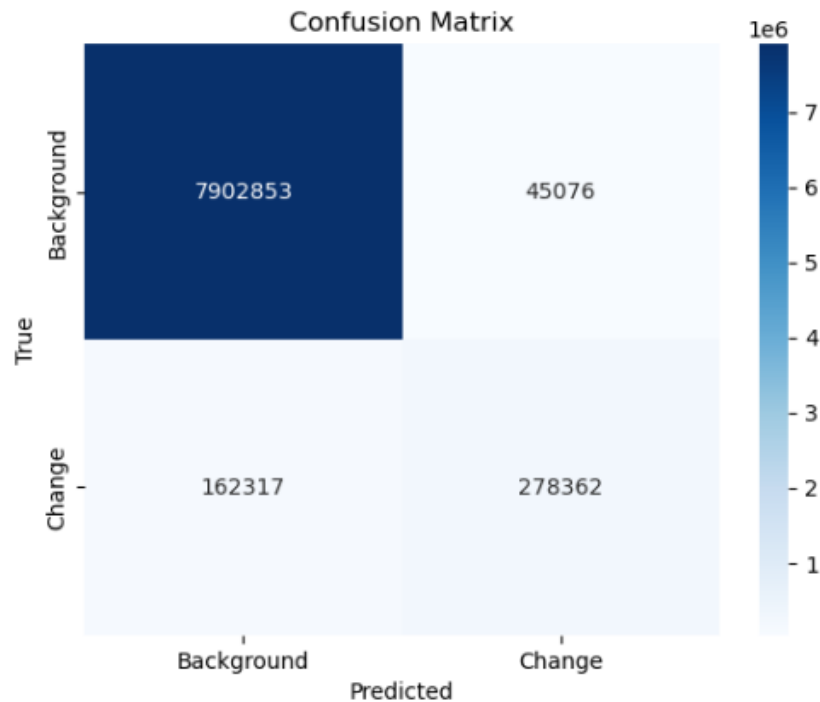
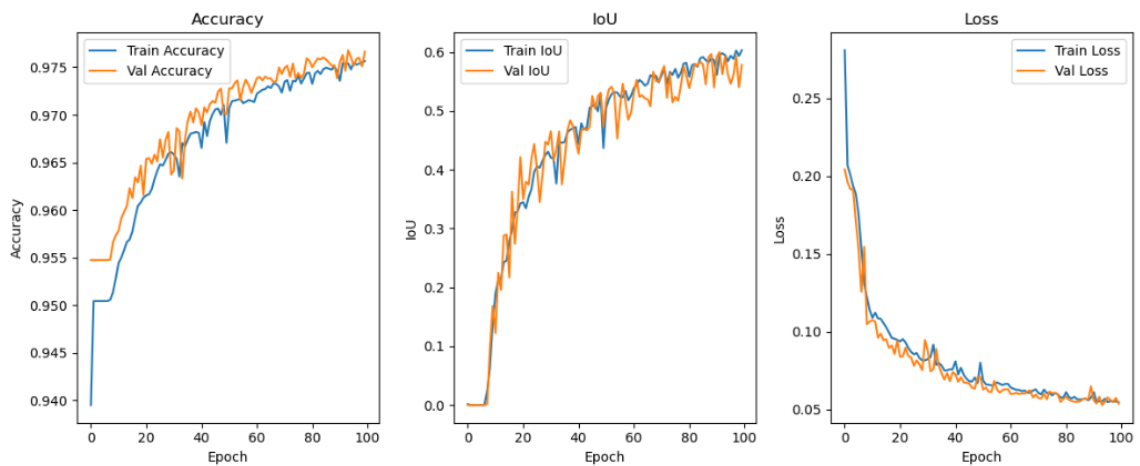
Dataset Samples



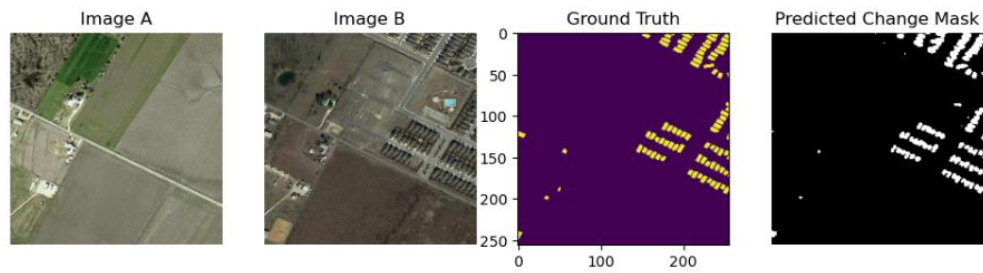
Deep Learning Model:

A fully connected neural network algorithm was used. It comprises input, encoder, decoder, and output layers. The train dataset was used for model training, the validation dataset for validation, and the test dataset for testing. Although various techniques and parameters were tested, this model was selected as the most cost-effective (U-Net, Siamese-U-Net, augmentation data, etc.).

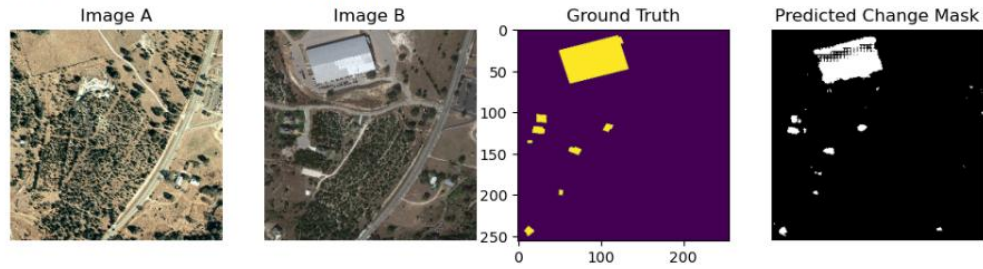
Model Parameters Results



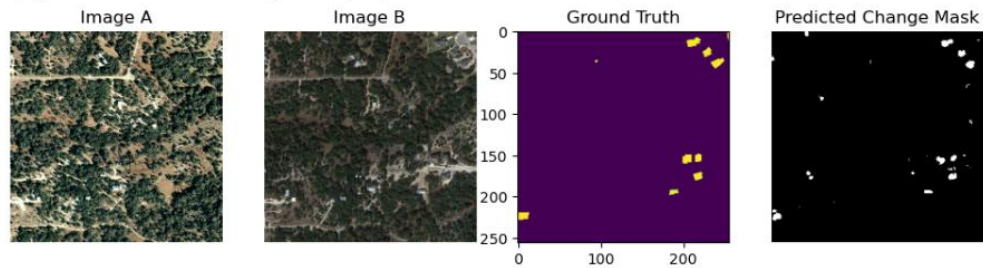
Visualizing Test Samples



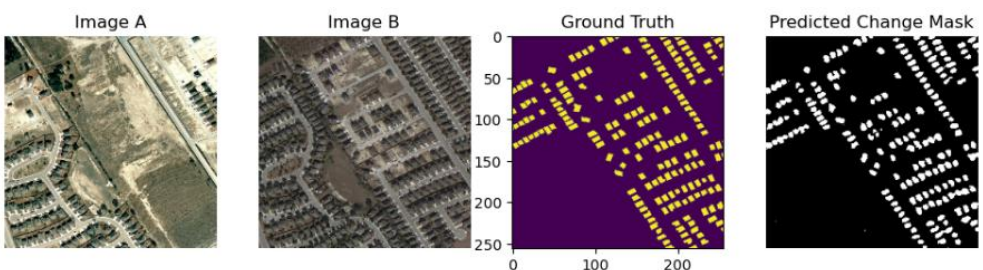
1/1 [=====] - 0s 32ms/step



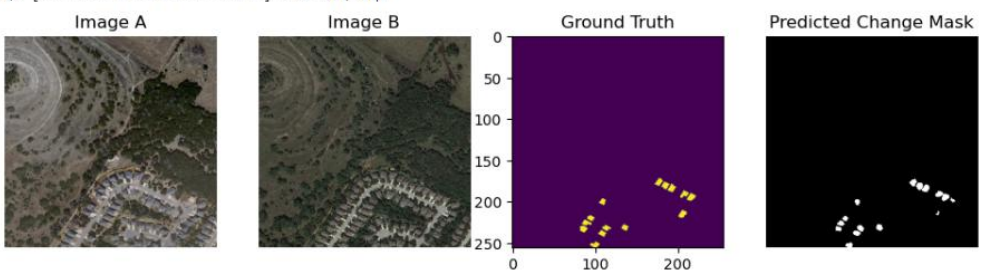
1/1 [=====] - 0s 30ms/step



1/1 [=====] - 0s 26ms/step



1/1 [=====] - 0s 26ms/step



Test Evaluation Scores

-Test Loss: 0.0573, -Test Accuracy: 0.9733, -Test IoU: 0.6190

-Precision: 0.8413579301898346, -Recall: 0.6983813614898826,

-F1 Score: 0.7632314119168575

Improvements:

- Created UI web page with streamlit

Change Detection with Satellite Images

Timezone 1 Image (T1)

Drag and drop file here
Limit 200MB per file • PNG, JPG, JPEG

Browse files

test_20.png 2.4MB

Timezone 2 Image (T2)

Drag and drop file here
Limit 200MB per file • PNG, JPG, JPEG

Browse files

test_20.png 2.3MB

Loaded Images




image T1 image T2



Change Detection (Mask)



- Created Api by fastapi.

default

POST /predict Predict

Parameters

No parameters

Request body **required**

multipart/form-data

image1 **required**
string(binary)

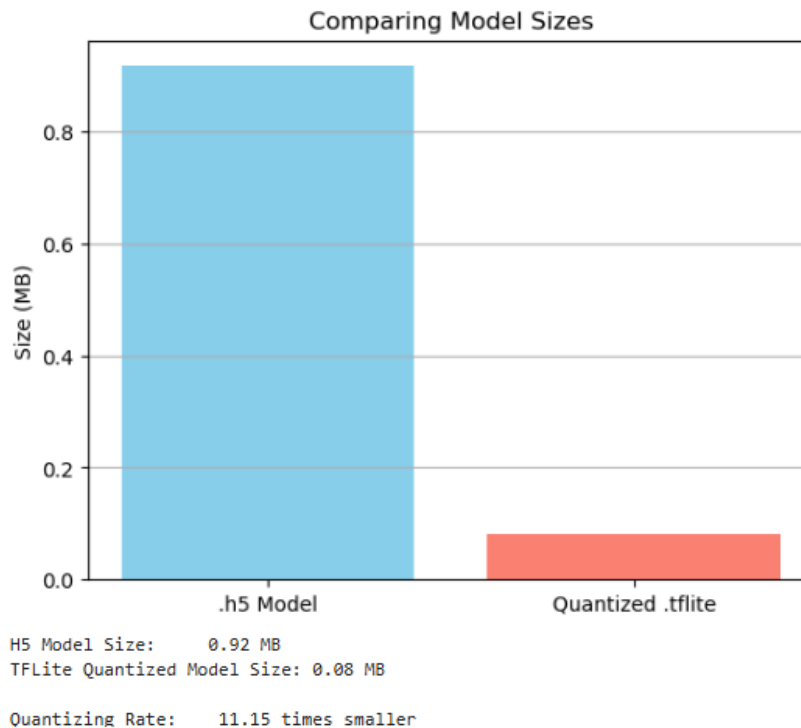
image2 **required**
string(binary)

Execute Clear

- Quantization (Size reduction has been made so that it can be used on hardware with low resources (mobile, embedded systems, etc.)

◆ Keras Model:
Precision: 0.7926137284783243
Recall: 0.7562726232094793
F1 Score: 0.7740168450383128

◆ Quantized TFLite Model:
Precision: 0.7991544736929022
Recall: 0.7485691303406243
F1 Score: 0.773035143769968



Conclusions:

- More detailed fine-tuning can be done for specific areas or structures in the model.
- Model results can be re-evaluated with data augmentation.
- Improvements can be made based on the area to be used.