Object Detection using Faster R-CNN network

Implemented Faster R-CNN object detection algorithms with one class (i.e Building) on satellite area images.

After preprocess image with Python Image Library that also include conversion of .tif format to .png, image will looks like as shown in Fig1.

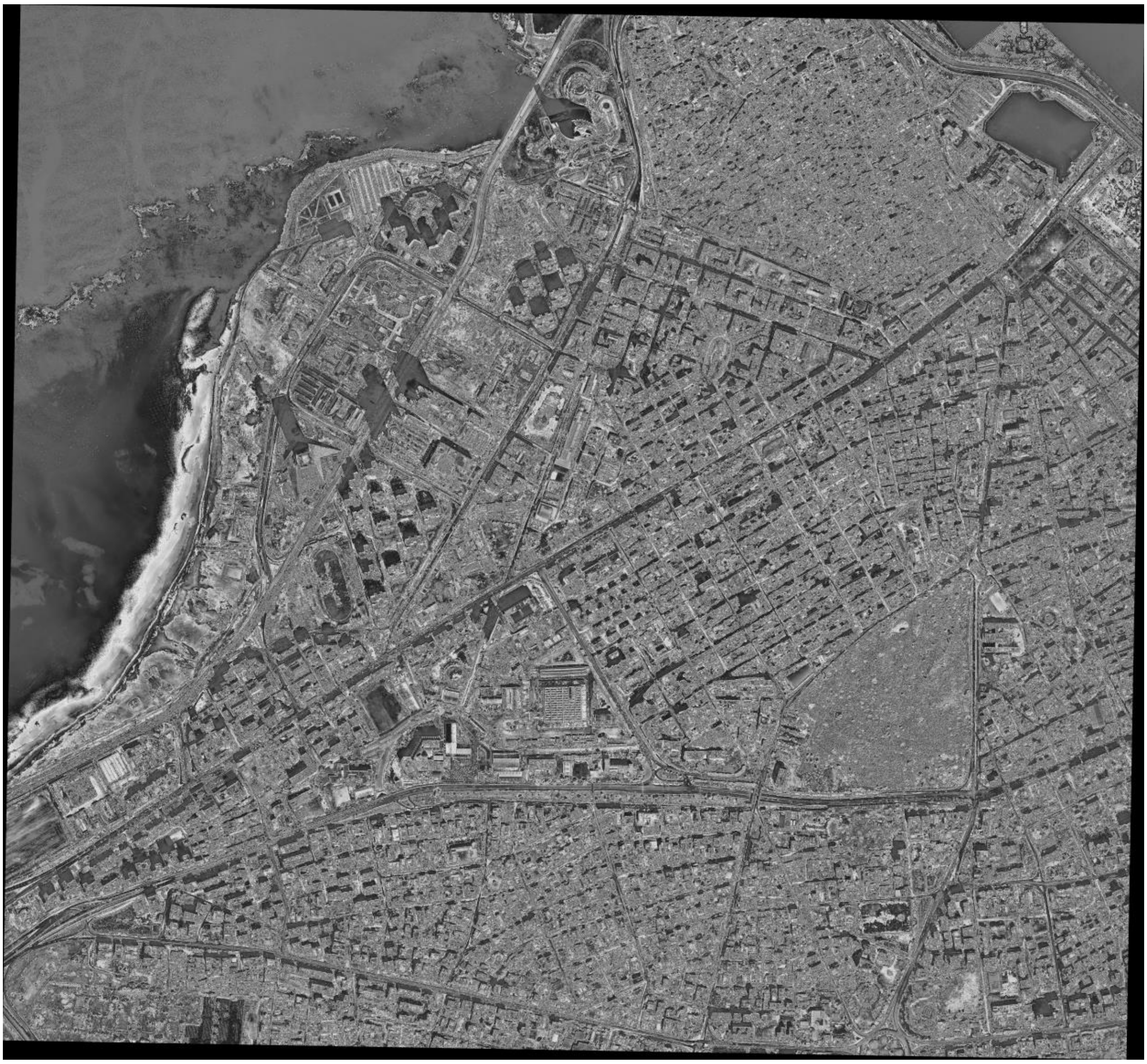


Figure 1 Pre-processed image which is used as dataset to train and test the model

Tripoli_zipped\Tripoli_Map-Ready_Ortho_30cm\Tripoli_Map-Ready_Ortho_30cm\055675519050\055675519050_01_P001_PAN\16MAR08101213-P3DS-055675519050_01_P001

Data Creation:

100 images were obtained by random cropping of dimension 1000 x1000 px boxes from the entire images shown in Fig1.

Obtained 100 images is splitted in ratio of 85:10:5 for the purpose of training, validation and test respectively. After cropping images our data looks like Fig2.

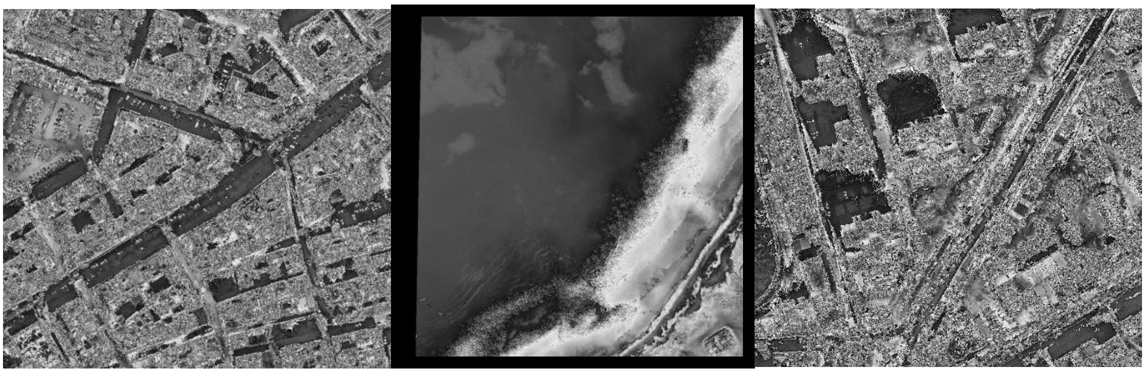
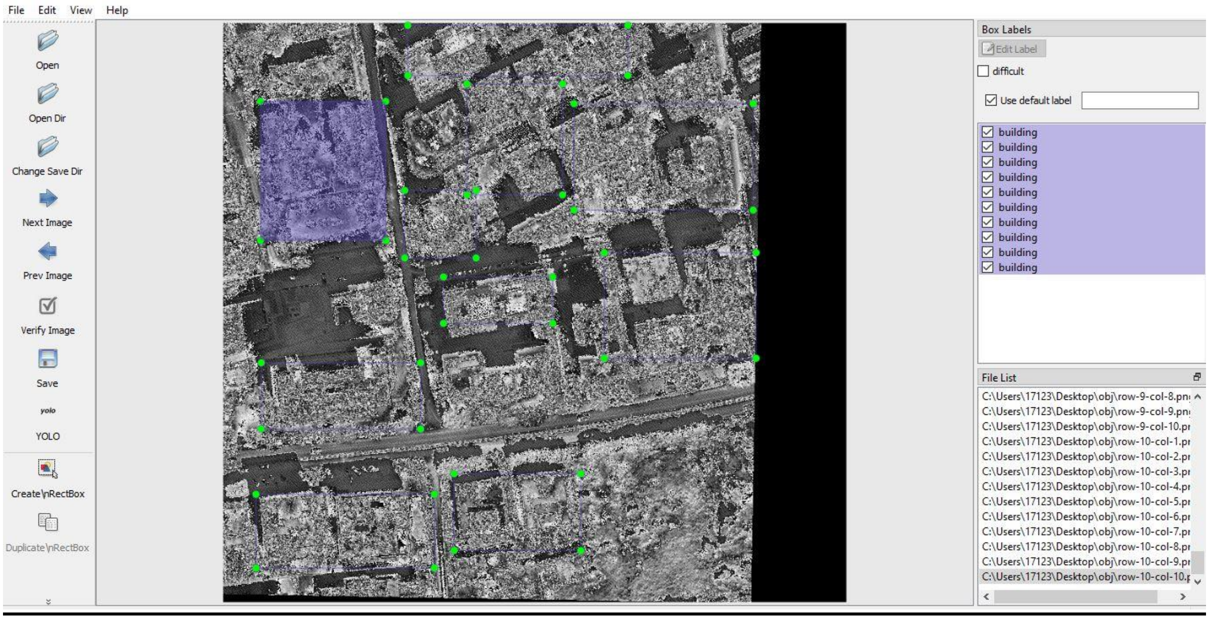


Figure 2 Cropped Images which are used to train and test the model

Labelling of Objects :

An open source graphical image annotation tool named **labelimg** is used to label object bounding boxes in images.



☐ difficult

☑ Use default label

☑ building
☑ building
☑ building
☑ building
☑ building
☑ building
☑ building
☑ building
☑ building
☑ building

C:\Users\17123\Desktop\obj\row-9-col-8.pn
C:\Users\17123\Desktop\obj\row-9-col-9.pn
C:\Users\17123\Desktop\obj\row-9-col-10.pn
C:\Users\17123\Desktop\obj\row-10-col-1.pn
C:\Users\17123\Desktop\obj\row-10-col-2.pn
C:\Users\17123\Desktop\obj\row-10-col-3.pn
C:\Users\17123\Desktop\obj\row-10-col-4.pn
C:\Users\17123\Desktop\obj\row-10-col-5.pn
C:\Users\17123\Desktop\obj\row-10-col-6.pn
C:\Users\17123\Desktop\obj\row-10-col-7.pn
C:\Users\17123\Desktop\obj\row-10-col-8.pn
C:\Users\17123\Desktop\obj\row-10-col-9.pn
C:\Users\17123\Desktop\obj\row-10-col-10.p

Figure 3 Illustration of labelimg tool

Faster R-CNN Object detection Model :

Faster R-CNN model is implemented using tensorflow-api on google colab. And colab notebook can be access by the below link

https://colab.research.google.com/drive/1RKdyHVJy9WDrtfrkedLbUvmqTKW4aqQ7?usp=sharing

Creation of TF Records :

Before feding training and test data in tensorflow-api model of Faster R-CNN. The TFRecod file format is a simple record-oriented binary format for storing a sequence of binary records.

Roboflow tools are used here to make TFRecord file.

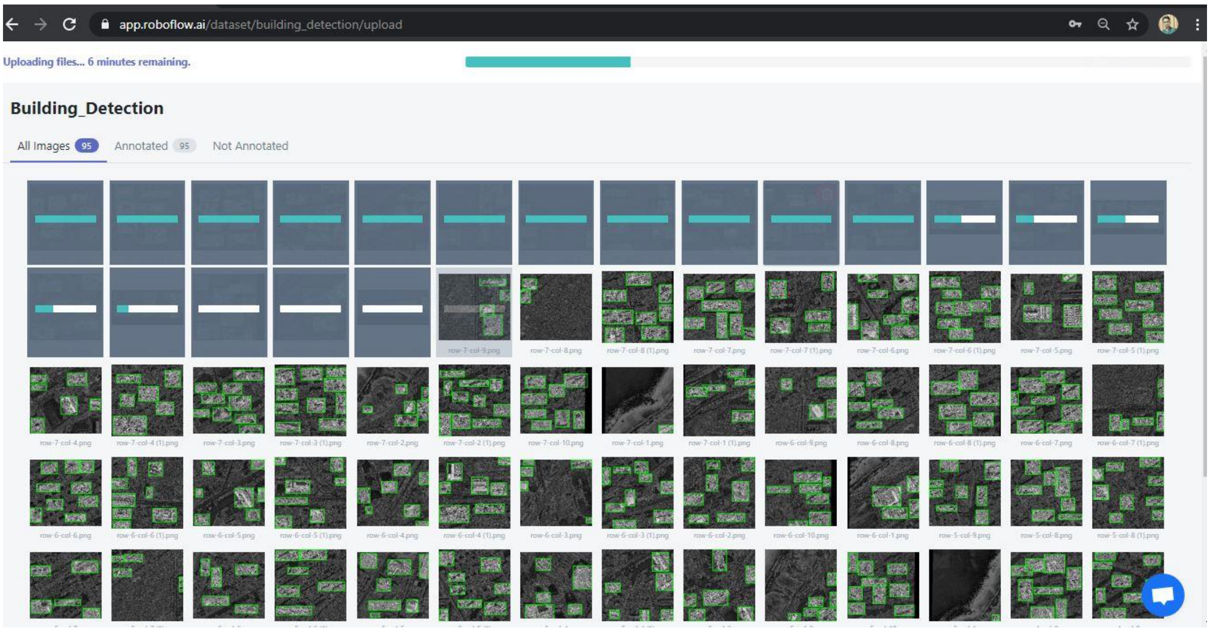
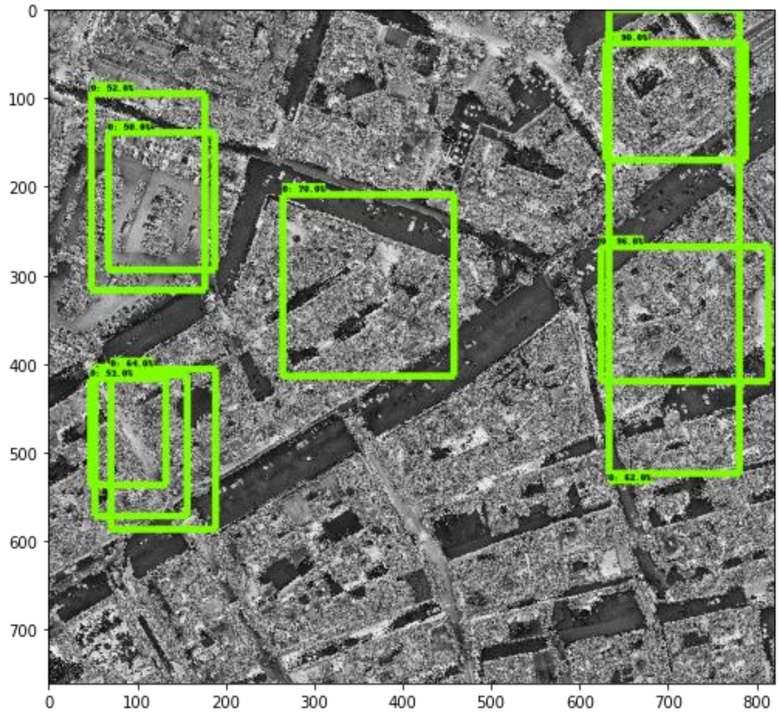


Figure 4 Roboflow view to generate TF-Record file

Results :

Implemented Faster R-CNN model is run at 10,000 iterations with batch size of 12 images. The performance on test data are as follows:



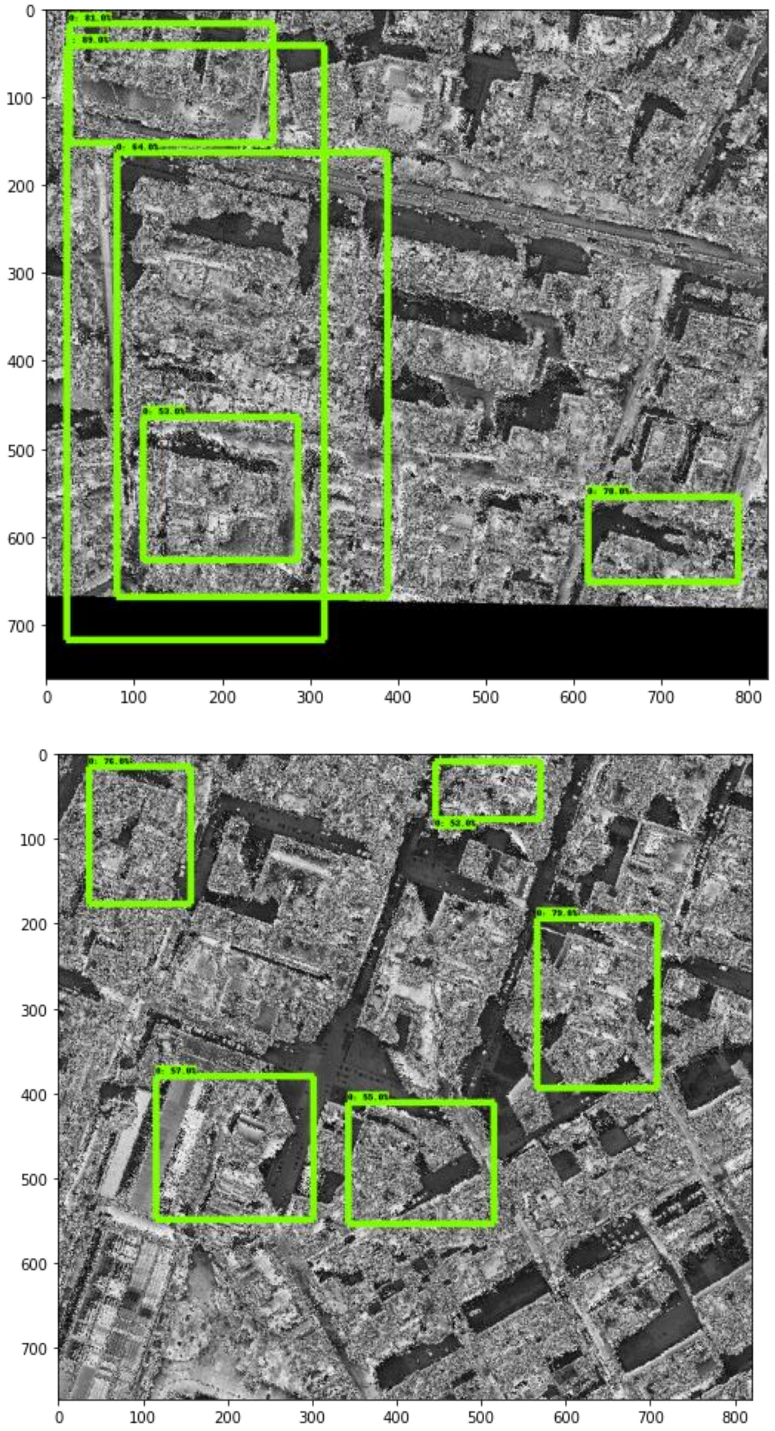


Figure 4Result of Building Detection using FRCNN

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