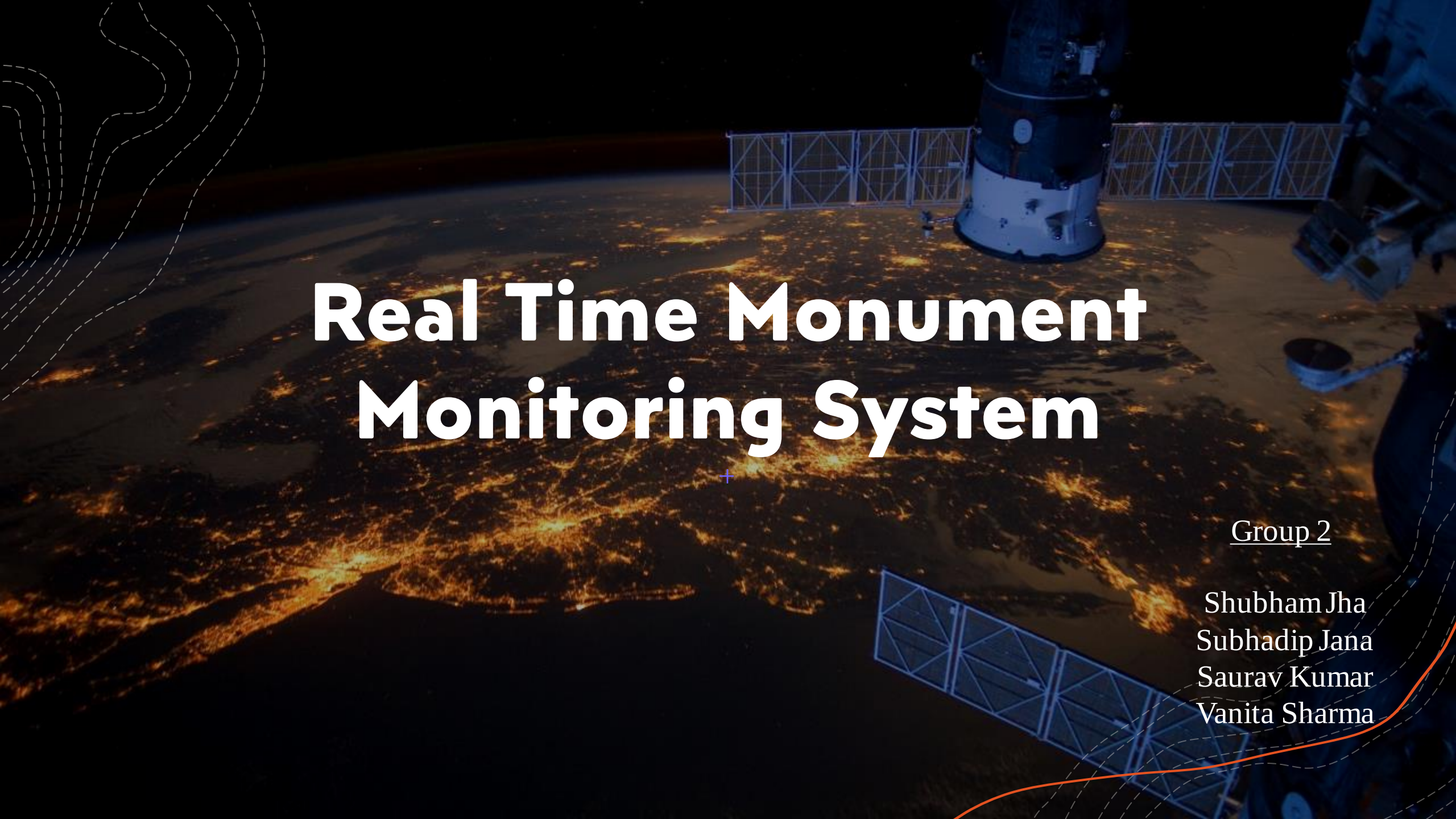


Real Time Monument Monitoring System

Group 2

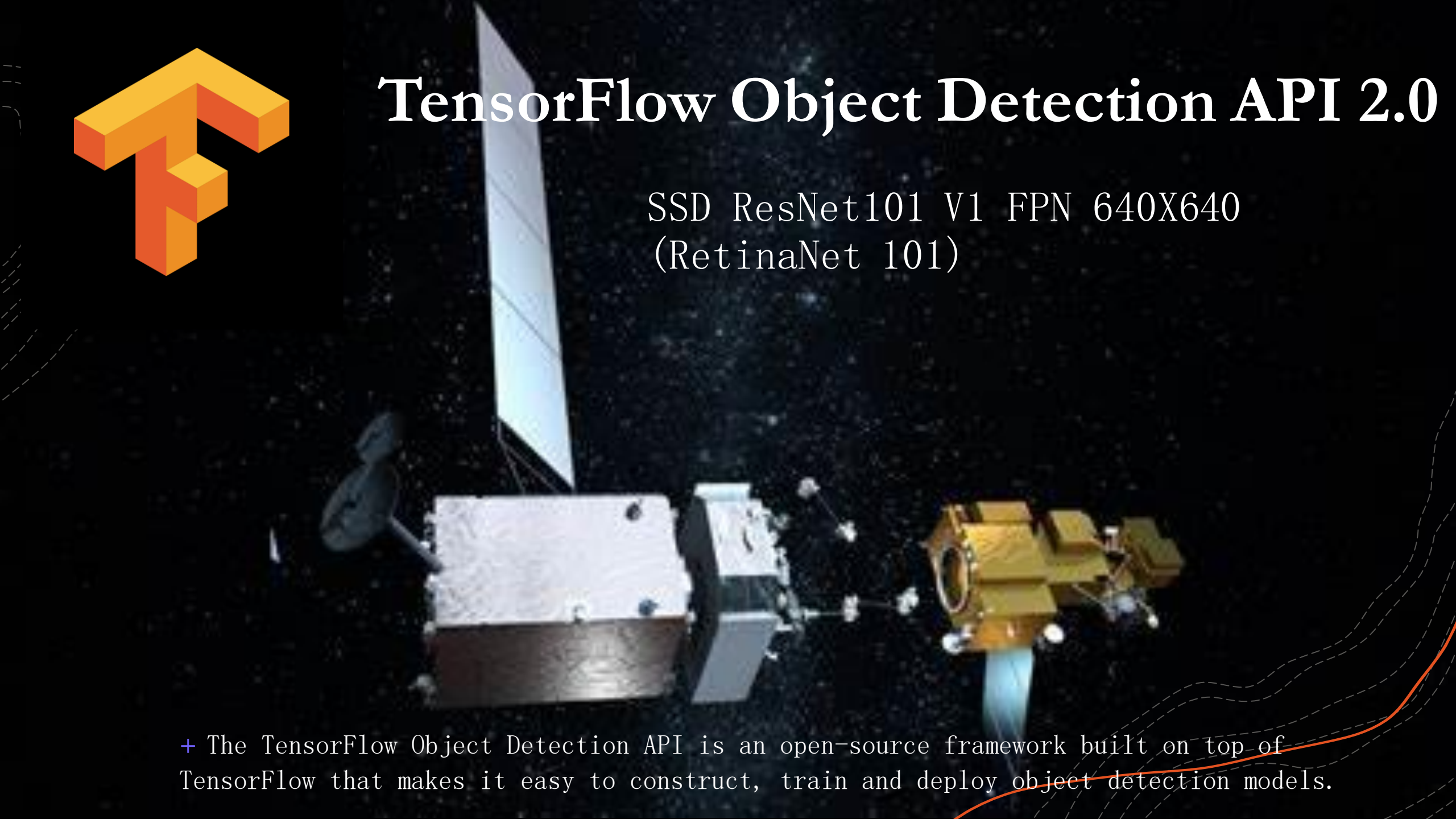
Shubham Jha
Subhadip Jana
Saurav Kumar
Vanita Sharma

+To make a prototype that identifies monuments from the Space

+ Technologies we are using :

Python

TensorFlow Object Detection API 2.0



TensorFlow Object Detection API 2.0

SSD ResNet101 V1 FPN 640X640
(RetinaNet 101)

+ The TensorFlow Object Detection API is an open-source framework built on top of TensorFlow that makes it easy to construct, train and deploy object detection models.

Our Approach

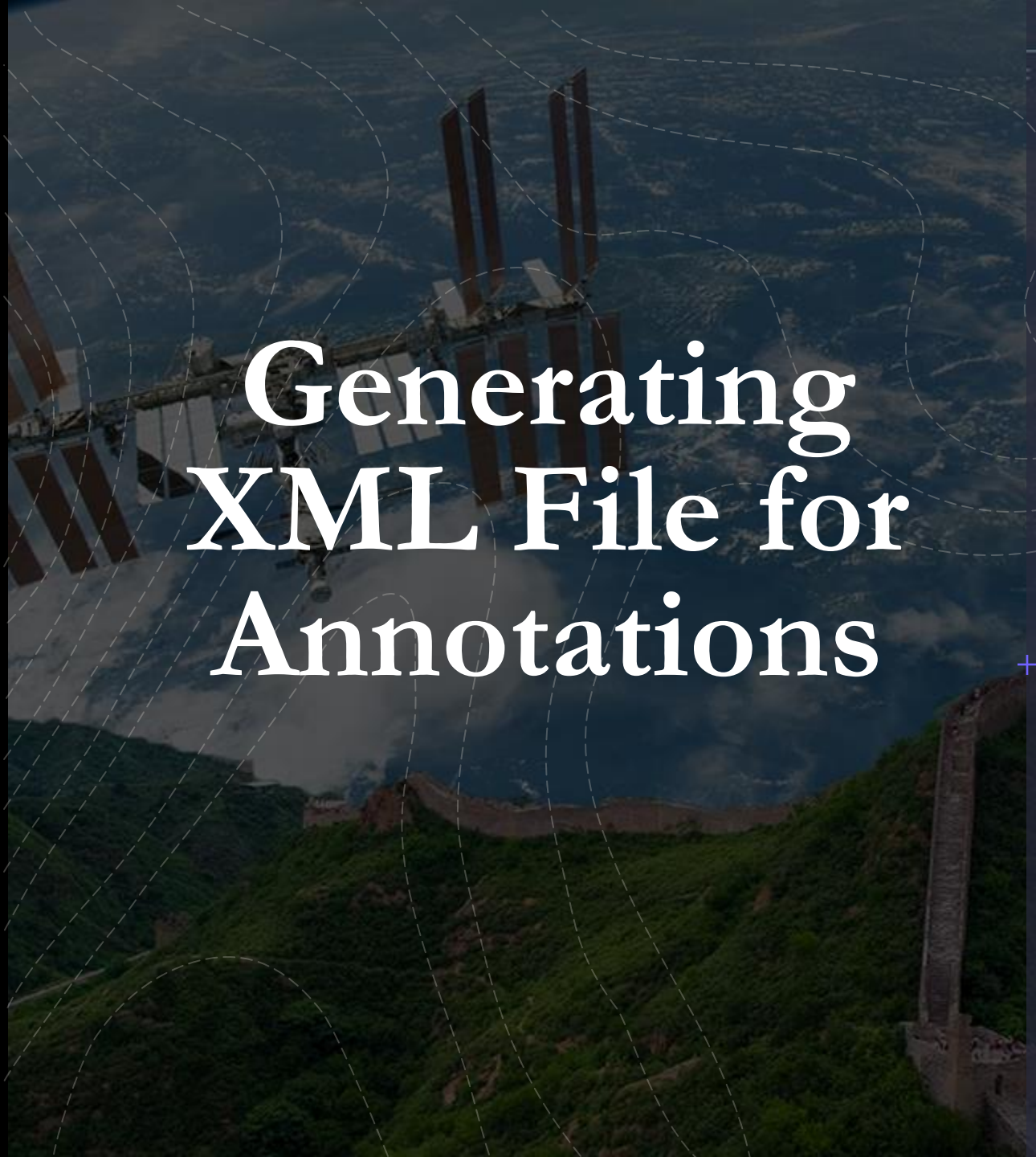
Collecting Dataset

Gathering images of famous monuments

Sources :

- Google Images
- Google Earth
- iStock
- Shutterstock

Making Annotation



Generating XML File for Annotations

Taj_Mahal_IMG8.xml

Users > acer > Downloads > labels_my-project-name_2022-06-16-05-23-27 > Taj_Mahal_IMG8.

```xml
<annotation>
    <folder>my-project-name</folder>
    <filename>Taj_Mahal_IMG8.jpg</filename>
    <path>/my-project-name/Taj_Mahal_IMG8.jpg</path>
    <source>
        <database>Unspecified</database>
    </source>
    <size>
        <width>750</width>
        <height>496</height>
        <depth>3</depth>
    </size>
    <object>
        <name>Taj Mahal</name>
        <pose>Unspecified</pose>
        <truncated>Unspecified</truncated>
        <difficult>Unspecified</difficult>
        <bndbox>
            <xmin>320</xmin>
            <ymin>102</ymin>
            <xmax>443</xmax>
            <ymax>240</ymax>
        </bndbox>
    </object>
</annotation>
```

Getting Pre-trained Model

rmm.ipynb

File Edit View Insert Runtime Tools Help All changes saved

Comment Share

+ Code + Text Connect Editing

```
cd /content/training_demo/pre-trained-models
```

```
/content/training_demo/pre-trained-models
```

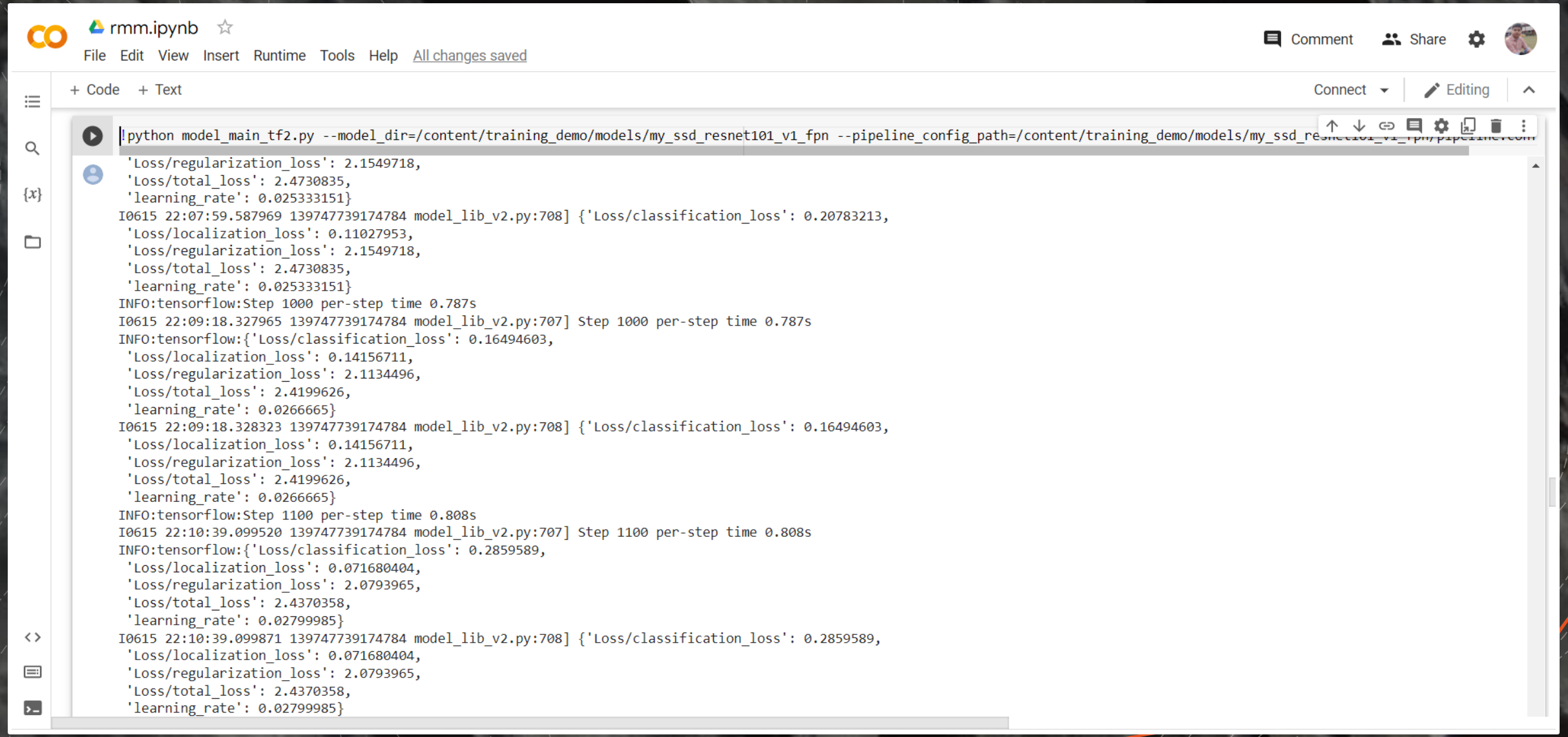
```
[ ] !wget http://download.tensorflow.org/models/object_detection/tf2/20200711/ssd_resnet101_v1_fpn_640x640_coco17_tpu-8.tar.gz
```

```
--2022-06-15 21:32:53--  http://download.tensorflow.org/models/object_detection/tf2/20200711/ssd_resnet101_v1_fpn_640x640_coco17_tpu-8.tar.gz
Resolving download.tensorflow.org (download.tensorflow.org)... 74.125.139.128, 2607:f8b0:400c:c05::80
Connecting to download.tensorflow.org (download.tensorflow.org)|74.125.139.128|:80... connected.
HTTP request sent, awaiting response... 200 OK
Length: 386527459 (369M) [application/x-tar]
Saving to: ‘ssd_resnet101_v1_fpn_640x640_coco17_tpu-8.tar.gz’

ssd_resnet101_v1_fp 100%[===================>] 368.62M   187MB/s    in 2.0s

2022-06-15 21:32:56 (187 MB/s) - ‘ssd_resnet101_v1_fpn_640x640_coco17_tpu-8.tar.gz’ saved [386527459/386527459]
```

```
[ ] !tar -xvf ssd_resnet101_v1_fpn_640x640_coco17_tpu-8.tar.gz
```

```
ssd_resnet101_v1_fpn_640x640_coco17_tpu-8/
ssd_resnet101_v1_fpn_640x640_coco17_tpu-8/checkpoint/
ssd_resnet101_v1_fpn_640x640_coco17_tpu-8/checkpoint/ckpt-0.data-00000-of-00001
ssd_resnet101_v1_fpn_640x640_coco17_tpu-8/checkpoint/checkpoint
ssd_resnet101_v1_fpn_640x640_coco17_tpu-8/checkpoint/ckpt-0.index
ssd_resnet101_v1_fpn_640x640_coco17_tpu-8/pipeline.config
ssd_resnet101_v1_fpn_640x640_coco17_tpu-8/saved_model/
ssd_resnet101_v1_fpn_640x640_coco17_tpu-8/saved_model/saved_model.pb
ssd_resnet101_v1_fpn_640x640_coco17_tpu-8/saved_model/assets/
ssd_resnet101_v1_fpn_640x640_coco17_tpu-8/saved_model/variables/
ssd_resnet101_v1_fpn_640x640_coco17_tpu-8/saved_model/variables/variables.data-00000-of-00001
```

Training Custom Monument Detector



Exporting The Model

rmm.ipynb

File Edit View Insert Runtime Tools Help All changes saved

Comment Share

+ Code + Text

Connect Editing

```
!python exporter_main_v2.py --input_type image_tensor --pipeline_config_path /content/training_demo/models/my_ssd_resnet101_v1_fpn/pipeline.config --trained_checkpoint_dir /content/t
```

```
2022-06-15 22:31:38.464353: W tensorflow/core/common_runtime/gpu/gpu_bfc_allocator.cc:39] Overriding allow_growth setting because the TF_FORCE_GPU_ALLOW_GROWTH environment variable is
WARNING:tensorflow:From /usr/local/lib/python3.7/dist-packages/tensorflow/python/autograph/impl/api.py:464: calling map_fn_v2 (from tensorflow.python.ops.map_fn) with back_prop=False
Instructions for updating:
back_prop=False is deprecated. Consider using tf.stop_gradient instead.
Instead of:
results = tf.map_fn(fn, elems, back_prop=False)
Use:
results = tf.nest.map_structure(tf.stop_gradient, tf.map_fn(fn, elems))
W0615 22:31:38.600855 139886634874752 deprecation.py:619] From /usr/local/lib/python3.7/dist-packages/tensorflow/python/autograph/impl/api.py:464: calling map_fn_v2 (from tensorflow.p
Instructions for updating:
back_prop=False is deprecated. Consider using tf.stop_gradient instead.
Instead of:
results = tf.map_fn(fn, elems, back_prop=False)
Use:
results = tf.nest.map_structure(tf.stop_gradient, tf.map_fn(fn, elems))
WARNING:tensorflow:Skipping full serialization of Keras layer <object_detection.meta_architectures.ssd_meta_arch.SSDMetaArch object at 0x7f38da6afd50>, because it is not built.
W0615 22:31:57.425013 139886634874752 save_impl.py:72] Skipping full serialization of Keras layer <object_detection.meta_architectures.ssd_meta_arch.SSDMetaArch object at 0x7f38da6afd
2022-06-15 22:32:16.865621: W tensorflow/python/util/util.cc:368] Sets are not currently considered sequences, but this may change in the future, so consider avoiding using them.
W0615 22:32:44.111922 139886634874752 save.py:268] Found untraced functions such as WeightSharedConvolutionalBoxPredictor_layer_call_fn, WeightSharedConvolutionalBoxPredictor_layer_ca
INFO:tensorflow:Assets written to: /content/training_demo/exported_models/my_model/saved_model/assets
I0615 22:32:54.291331 139886634874752 builder_impl.py:784] Assets written to: /content/training_demo/exported_models/my_model/saved_model/assets
INFO:tensorflow:Writing pipeline config file to /content/training_demo/exported_models/my_model/pipeline.config
I0615 22:32:55.435585 139886634874752 config_util.py:254] Writing pipeline config file to /content/training_demo/exported_models/my_model/pipeline.config
```

Testing The Model

+ Code + Text Connect Editing

```
import os
os.environ['TF_CPP_MIN_LOG_LEVEL'] = '2'    # Suppress TensorFlow logging (1)
import pathlib
import tensorflow as tf
import cv2
import argparse
from google.colab.patches import cv2_imshow

# Enable GPU dynamic memory allocation
gpus = tf.config.experimental.list_physical_devices('GPU')
for gpu in gpus:
    tf.config.experimental.set_memory_growth(gpu, True)

# PROVIDE PATH TO IMAGE DIRECTORY
IMAGE_PATHS = '/content/training_demo/images/test/Screenshot 2022-06-15 223223.png'


# PROVIDE PATH TO MODEL DIRECTORY
PATH_TO_MODEL_DIR = '/content/training_demo/exported_models/my_model'

# PROVIDE PATH TO LABEL MAP
PATH_TO_LABELS = '/content/training_demo/annotations/label_map.pbtxt'

# PROVIDE THE MINIMUM CONFIDENCE THRESHOLD
MIN_CONF_THRESH = float(0.60)

# LOAD THE MODEL

import time
from object_detection.utils import label_map_util
from object_detection.utils import visualization_utils as viz_utils
```

Input Image

Final Output

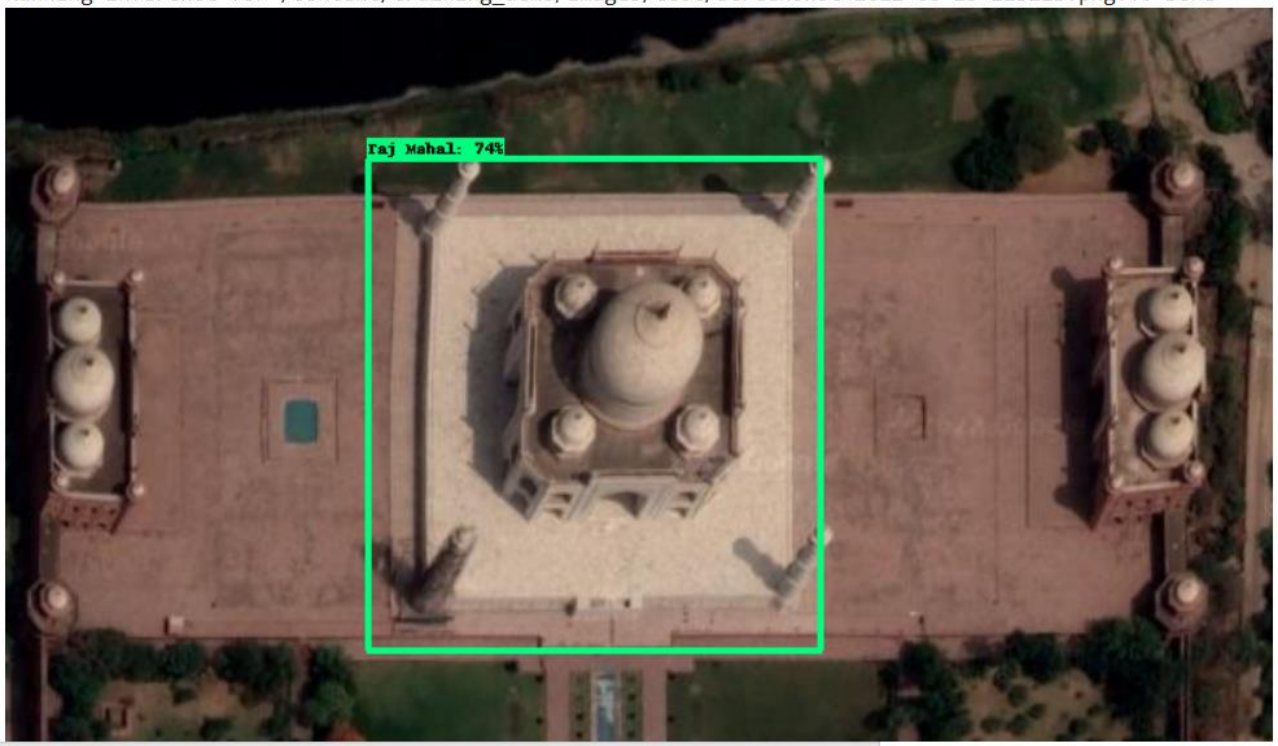
+ Code + Text

RAM Disk

Editing

```
print('Done')
# DISPLAYS OUTPUT IMAGE
cv2_imshow(image_with_detections)
# CLOSES WINDOW ONCE KEY IS PRESSED
```

```
Loading model...Done! Took 24.462425708770752 seconds
Running inference for /content/training_demo/images/test/Screenshot 2022-06-15 223223.png... Done
```



29s completed at 4:25 AM

30°C Haze ENG 04:27 16-06-2022


Thank You