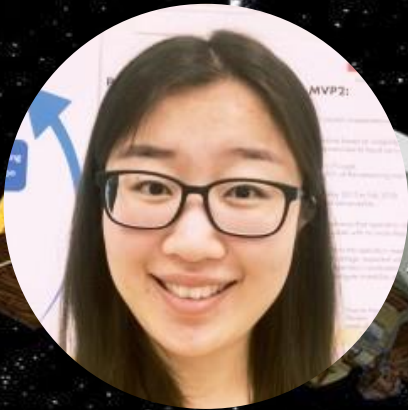


Wildfire Real Time Detection System using Satellite Imagery



Disha An
Data Scientist – Shell



Boran Han
AI resident – Shell



Yanxiang Yu
AI resident – Shell



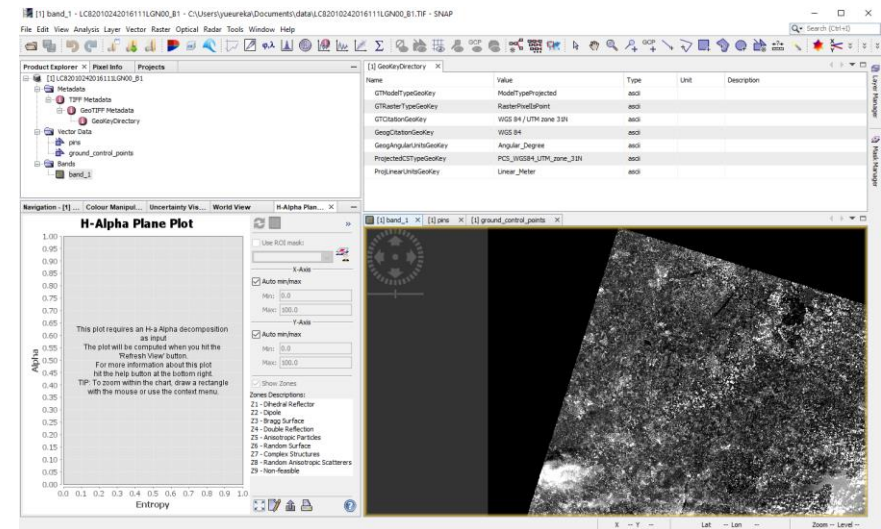
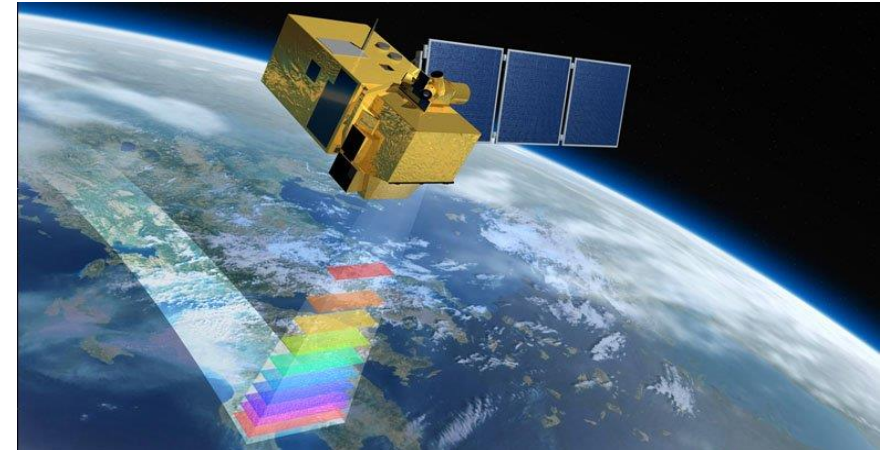
Zhijuan Zhang
Data Scientist – Enbridge

The Inspiration

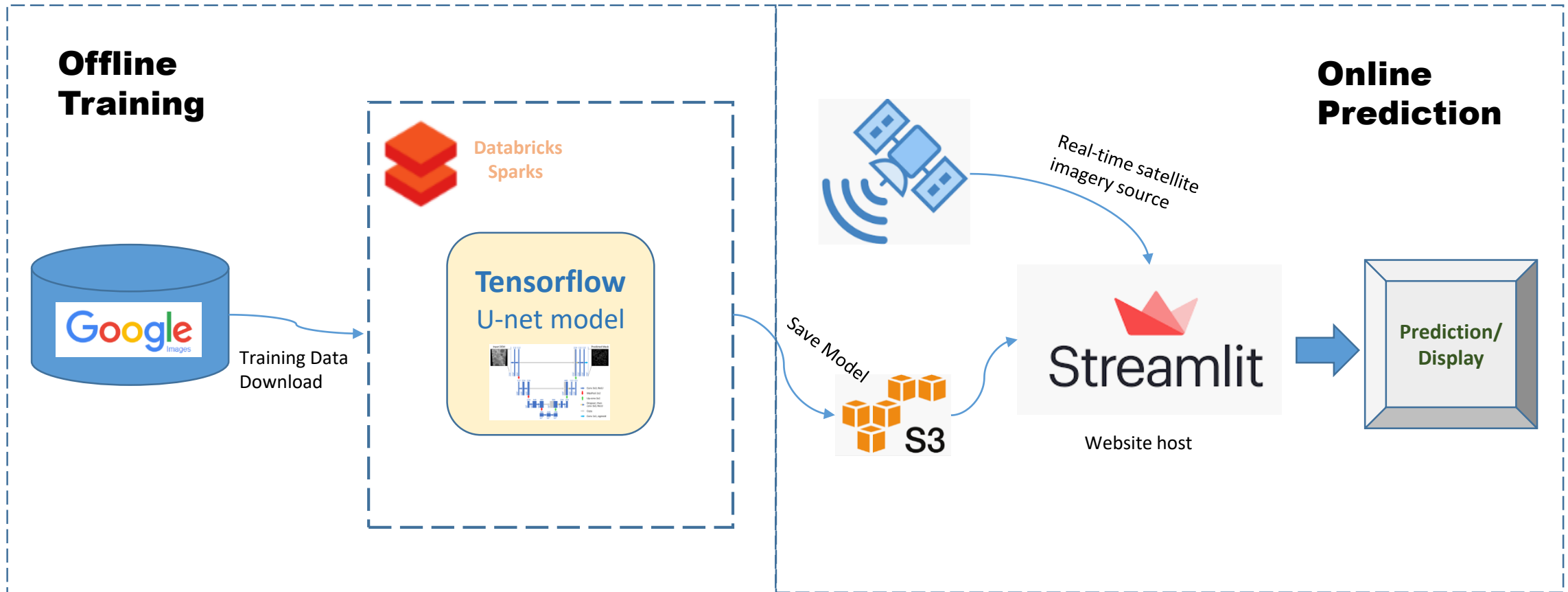


Issues with existing methods

- Dedicated EO satellites only cover small portion of area.
- Orbiting causes the monitoring with long delay and discrete.
- Requires extensive specialties and dedicate preprocessing skills.
- Hard to process in real time.

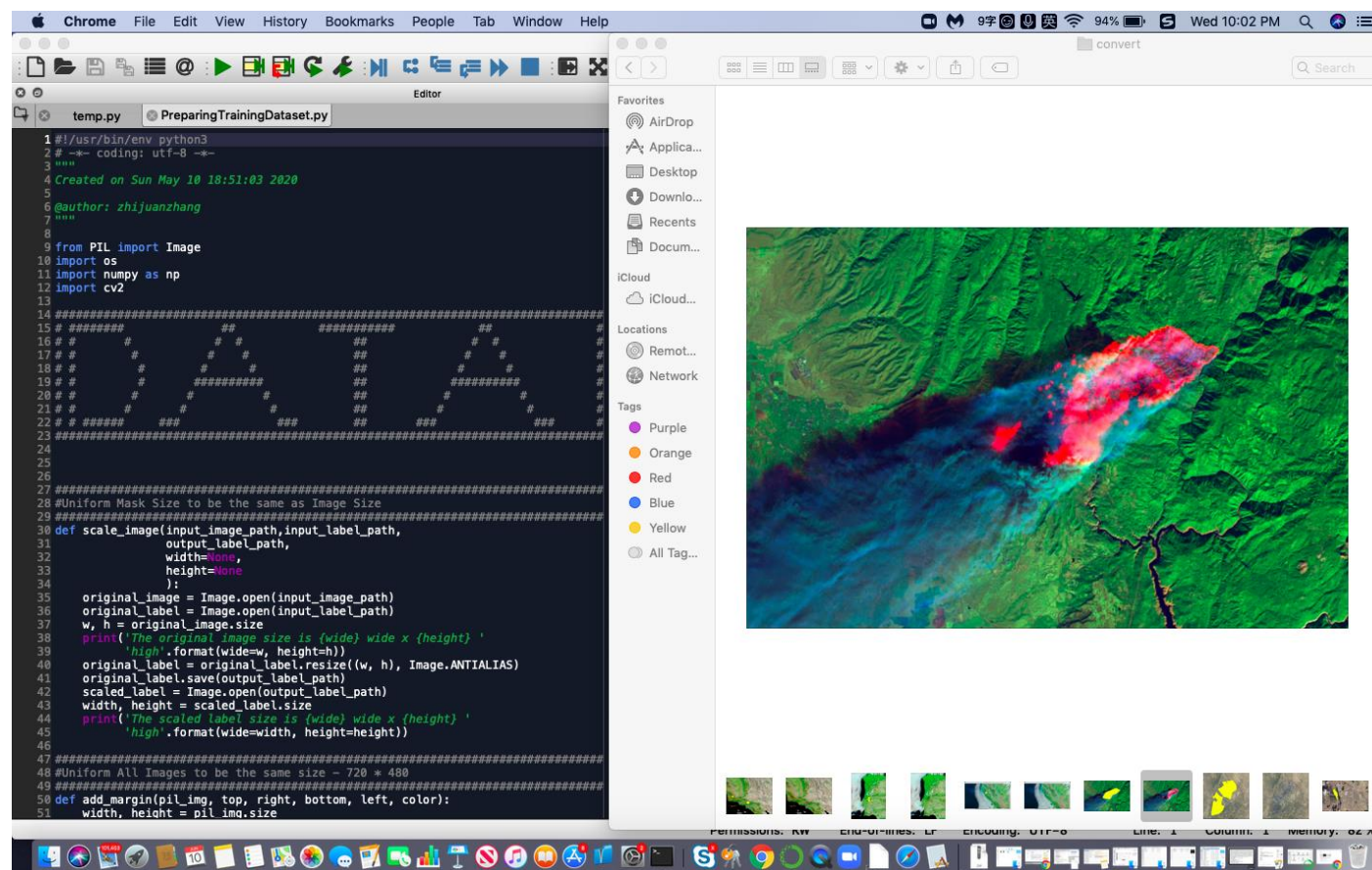


Workflow



Dataset Preprocessing

- Batch downloaded images using Google Image API.
- Manually contour the burning scar zones as the label.
- Resize and padding the images, and conduct data augmentation.



Databricks Setup

Cluster Mode

Standard

Databricks Runtime Version

6.5 (includes Apache Spark 2.4.5, Scala 2.11)

New

 This Runtime version supports only Python 3.

Autopilot Options

☐ Enable autoscaling

☐ Enable autoscaling local storage

☒ Terminate after

60

 minutes of inactivity

Worker Type

i3.xlarge 30.5 GB Memory, 4 Cores, 1 DBU

Workers

1

Driver Type

i3.xlarge 30.5 GB Memory, 4 Cores, 1 DBU

Home

Workspace

Recents

Data

Clusters

Jobs

Models

Search

WildFire_Training_Pipeline_Encrypt (Python)

Detached File Edit View: Code Permissions Run All Clear

Cmd 1

1 ##### 1 . MOUNT TO AWS S3 #####

Cmd 2

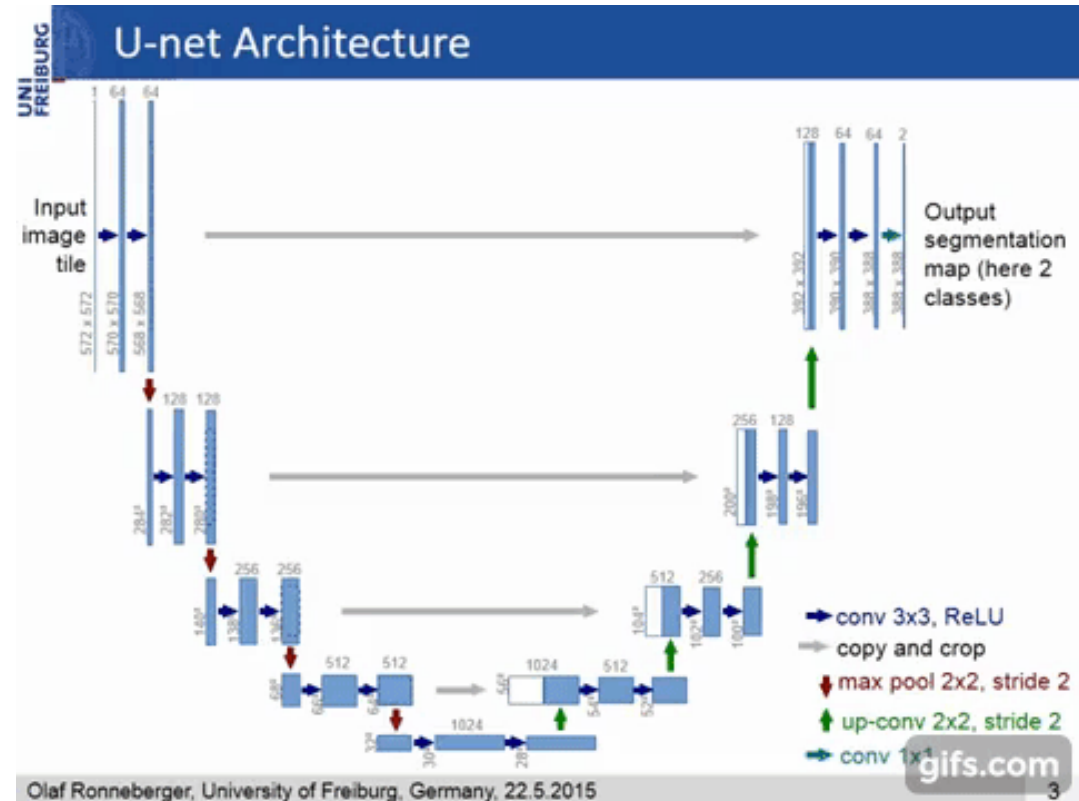
```
1 # mount s3 to dbfs
2 ACCESS_KEY = *****
3 SECRET_KEY = *****
4 ENCODED_SECRET_KEY = SECRET_KEY.replace("/", "%2F")
5 AWS_BUCKET_NAME = *****
6 MOUNT_NAME = "wildFire-Project"
7 dbutils.fs.mount("s3a://%s:%s@%s" % (ACCESS_KEY, ENCODED_SECRET_KEY, AWS_BUCKET_NAME), "/mnt/%s" % MOUNT_NAME)
8 display(dbutils.fs.ls("/mnt/%s" % MOUNT_NAME))
```

path	name
dbfs:/mnt/wildFire-Project/1.0/	1.0/
dbfs:/mnt/wildFire-Project/1.1/	1.1/
dbfs:/mnt/wildFire-Project/2.0 beta/	2.0 beta/
dbfs:/mnt/wildFire-Project/2.1 beta/	2.1 beta/
dbfs:/mnt/wildFire-Project/2.1 beta forrest only/	2.1 beta forrest only/
dbfs:/mnt/wildFire-Project/2.1 beta forrest only _Yanxiang Testing/	2.1 beta forrest only _Yanxiang Testing/
dbfs:/mnt/wildFire-Project/2.2 beta forrest only/	2.2 beta forrest only/
dbfs:/mnt/wildFire-Project/2.3 beta burn scar only/	2.3 beta burn scar only/
dbfs:/mnt/wildFire-Project/2.3 beta burn scar only mas/	2.3 beta burn scar only mas/

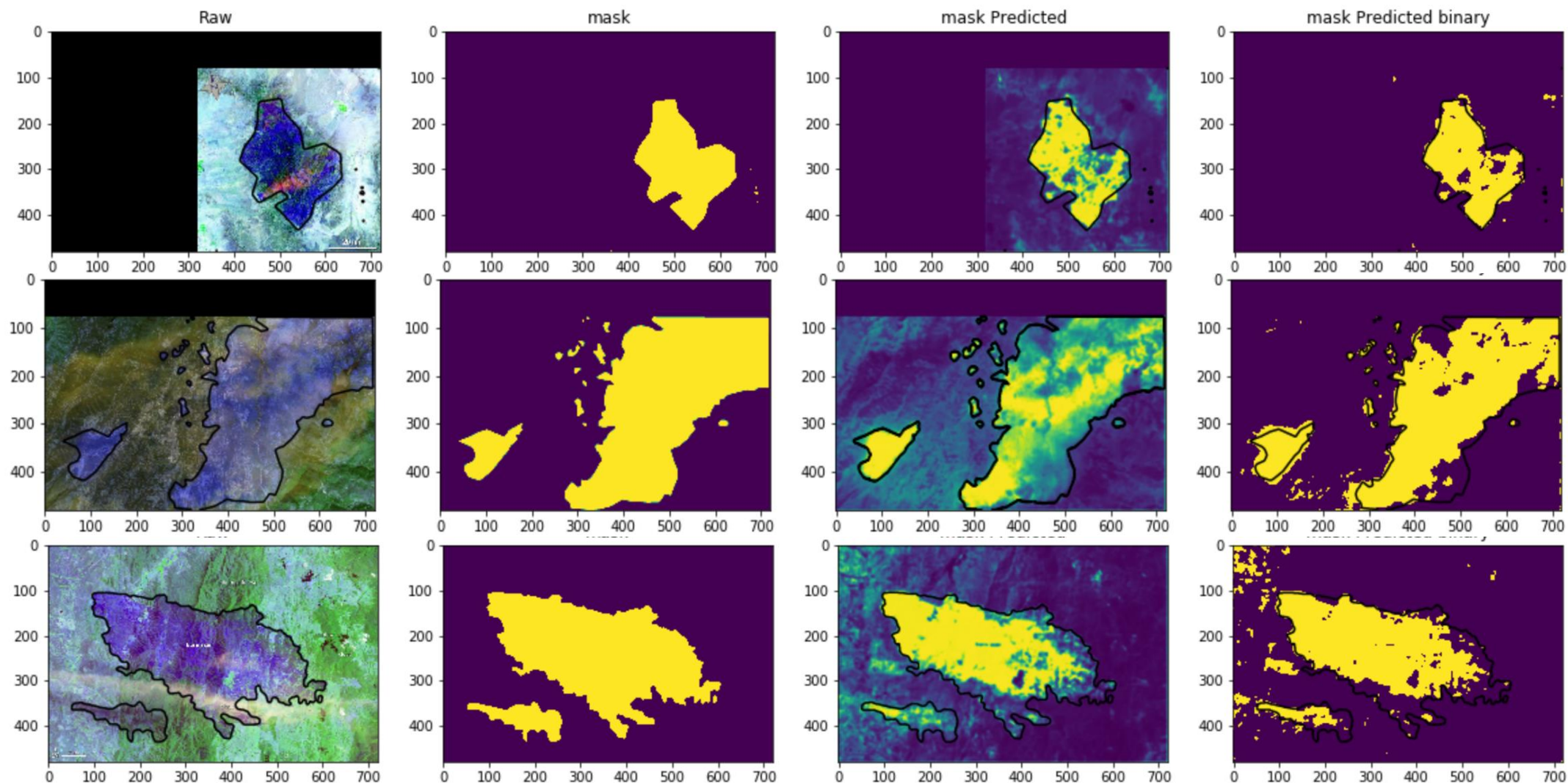
Command took 27.43 seconds -- by zzhijuan@yahoo.com at 6/8/2020, 6:44:40 PM on unknown cluster

Deep Learning Model: U-Net

- U-net learning segmentation in an end-to-end fashion.
- We trained on 110 images with labels



Prediction Results



Use the Application

- Deployed on Streamlit with the Docker Container.
- Simple to use: directly drag and predict the imagery;
- Predict the CO2 emissions and burning area given by the input parameters.

