

PlantVillage (<https://plantvillage.psu.edu/>) is a public good based at Penn State University, helping African smallholder farmers achieve food security.

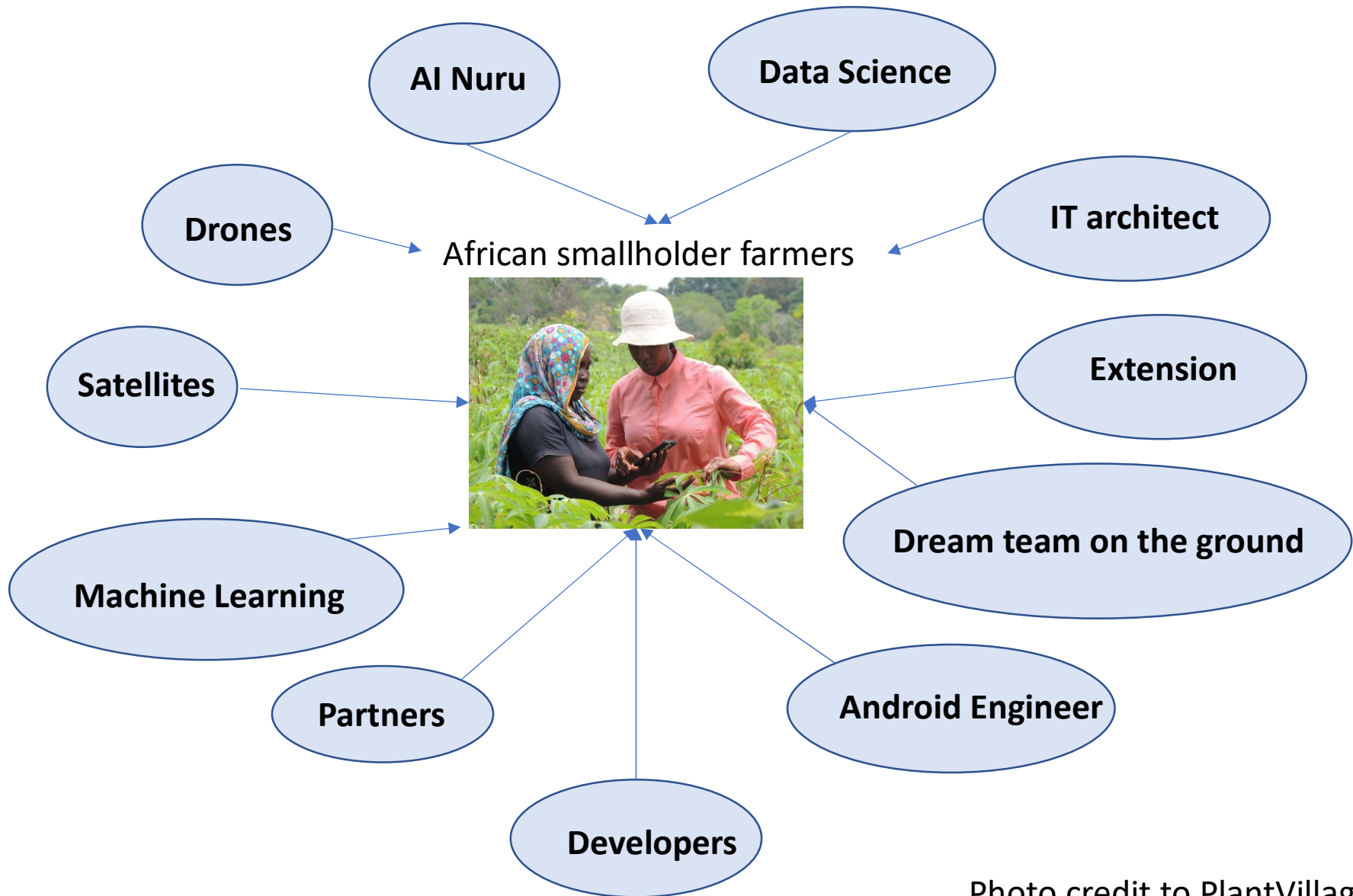


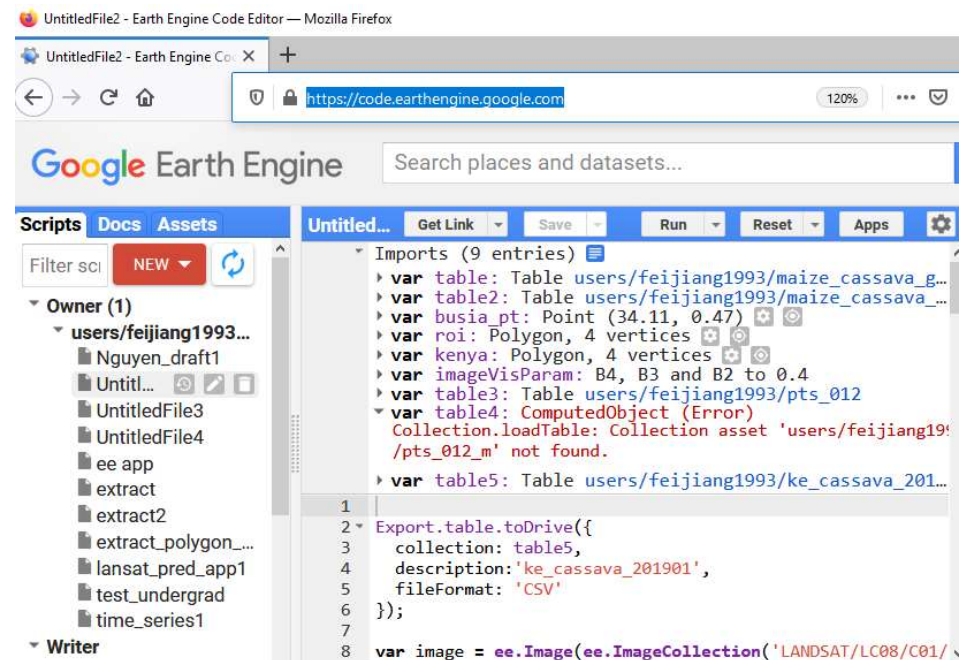
Photo credit to PlantVillage

Satellite data at high spatial resolution can be used for land cover classification, vegetation monitoring, etc.

- The science behind it: different land surfaces reflect different radiation.
- Sentinel -2 (<https://sentinel.esa.int/web/sentinel/missions/sentinel-2>):
 - ✓ European Space Agency
 - ✓ 13 bands in visible, near infrared, and short wave infrared spectrum;
 - ✓ Revisit every 10 days;
 - ✓ Spatial resolution of 10 m, 20 m and 60 m;
 - ✓ Free and open accessible;
- Landsat-8 (https://www.usgs.gov/core-science-systems/nli/landsat/landsat-8?qt-science_support_page_related_con=0#qt-science_support_page_related_con):
 - ✓ US Geological Survey;
 - ✓ 11 bands in visible, near infrared, and short wave, thermal infrared spectrum;
 - ✓ Revisit about twice per month;
 - ✓ Spatial resolution of 30m;
 - ✓ Free and open accessible.

Google Earth Engine is a good platform to extract satellite data and run land classification models.

- An example tutorials: <https://www.youtube.com/watch?v=WjKhPyiSgb8>
- Users do not have to download HUGE satellite data to their own PC.
One tile for one band can be GBs
- Faster processing time.
- <https://code.earthengine.google.com/>
<https://developers.google.com/earth-engine/guides/playground>
- JavaScript code editor



We can also visit Google Earth Engineer through Python

https://developers.google.com/earth-engine/guides/python_install

Package import

The Python API package is called `ee`. It must be imported and initialized for each new Python session and script:

```
import ee
```

Authenticate to the Earth Engine servers:

```
ee.Authenticate()
```

★ How you obtain authentication credentials may vary depending on your environment. See links for more details on auth in [Colab](#) and [Conda](#). In general, authentication for local installations is a one-time step that generates a persistent authorization token, while VM services such as Colab, limit the token's lifetime.

Initialize the API:

```
ee.Initialize()
```

Goal of this workshop – land cover classification using Sentinel 2 data

1. Dataset: 900 survey records with long, lat, survey date and land cover labels.
sources: PlantVillage locust survey collected through elocust3M
2. Collect Sentinel2 data (11 bands + NDVI) to survey points
3. Train and test an XGBoost multi classifier to predict land cover
4. Bonus: how to extract time-series sentinel2 data to the point of interest