West Virginia View 2020 - 2021

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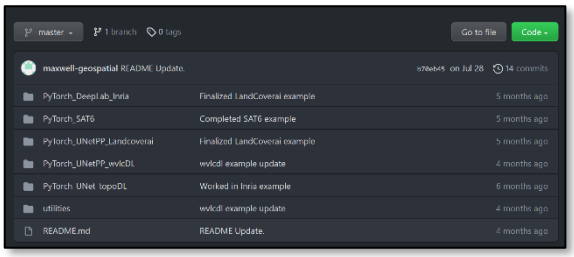
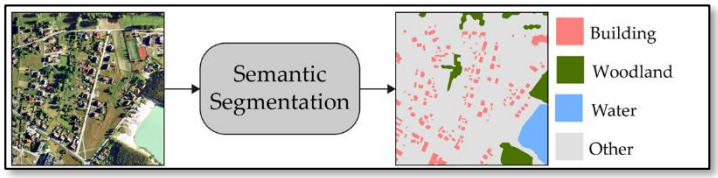
Our **first HIA** this year focused on the development of **free**, **online course materials** relating to geospatial deep learning using Python, PyTorch, R, and ArcGIS Pro. Our new **Geospatial Deep Learning Seminar** includes:

- Overview of deep learning and working with tensors
- Conceptualization of artificial neural networks (ANNs) and convolutional neural networks (CNNs)
- Loss metrics and methods for assessing model accuracy
- Example use cases and architectures for scene classification, object detection, semantic segmentation, and instance segmentation
- YouTube videos showing workflows in **ArcGIS Pro** and using code
- Example code and GitHub repo for deep learning using **Python**, **PyTorch**, and **R**

Course website for deep learning seminar



GiHhub Repo for deep learning seminar



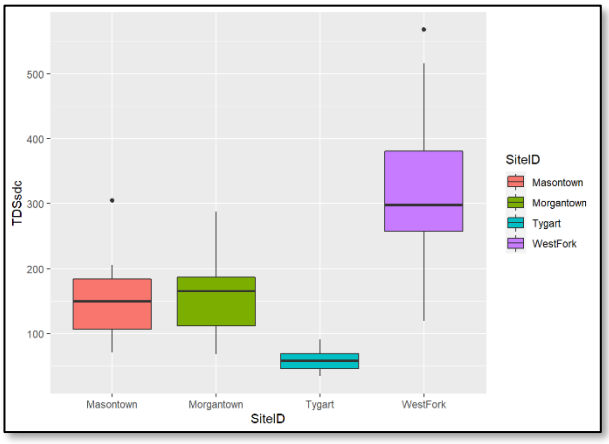
Pixel-level classification using CNN-based deep learning

```
for i in siteSet:
    df1 = gee_subset.gee_subset(product = "LANDSAT/LC08/C01/
    T1_SR", bands = ["B1", "B2", "B3", "B4", "B5", "B6", "B7",
    "B10","B11", "sr_aerosol", "pixel_qa", "radsat_qa"],
                                start_date = "2018-04-11",
                                end_date = "2020-12-31",
                                latitude = pnts.iloc[i, 2],
                                longitude = pnts.iloc[i ,1],
                                scale = 30)

    sid = str(pnts.iloc[i, 3])
    df1["SiteID"] = sid
    df1.to_csv("D:/gee_examples/tables/ls/" + "site_" + str(pnts.
    iloc[i, 3]) + ".csv")
```

Extraction of Landsat 8 surface reflectance data at water quality sample point locations using Python and Google Earth Engine

Our **second HIA** this year focused on estimating water quality parameters using remotely sensed data and ground sample points. This was the first year of this joint project (**ORIGIN**) with Kentucky View and Ohio View.



Turbidity steam sampling data for four different streams

West Virginia View is a member of the AmericaView Consortium, a nationally coordinated network of academic, agency, non-profit, and industry partners and cooperators that share the vision of promoting and supporting the use of remote sensing data and technology within each state. AmericaView is funded by USGS grant agreement G18AP00077.

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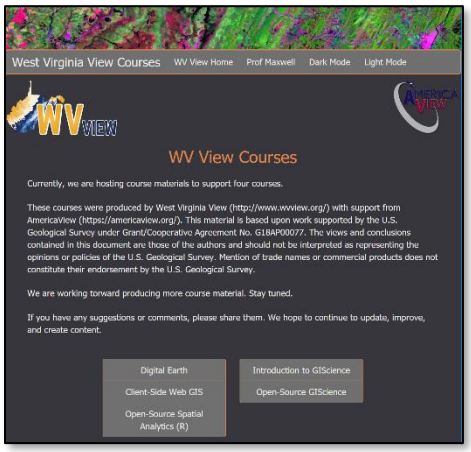
BENEFITS TO WEST VIRGINIA

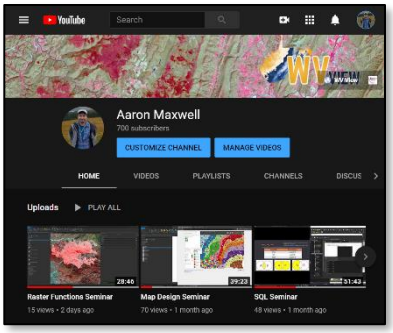
- Provide educational materials for students and geospatial professionals
- Foster remote sensing education, outreach, and research in the state
- Provide access to LiDAR data via a web app
- Fund software purchases
- Support graduate student travel and data needs
- Provide summer funding for graduate students

```
for i in range(0, 10):

    print('\nEpoch: {}'.format(i))
    train_logs = train_epoch.run(trainDL)
    test_logs = test_epoch.run(testDL)

    # do something (save model, change lr, etc.)
    if max_score < test_logs['fscore']:
        max_score = test_logs['fscore']
        torch.save(model, './best_model.pth')
        print('Model saved!')

    if i == 25:
        optimizer.param_groups[0]['lr'] = 1e-5
        print('Decrease decoder learning rate to 1e-5!')
```

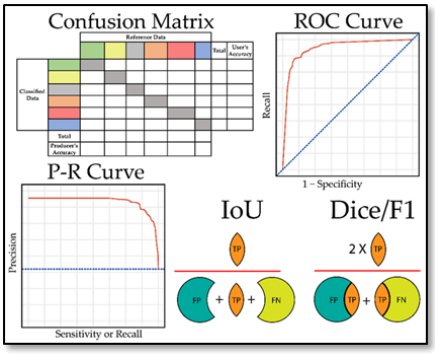
Python and PyTorch code for deep learning



WVView courses web page



WVView YouTube channel



Deep learning accuracy assessment methods

<YOURSTATE>VIEW CONSORTIUM MEMBERSHIP

Federal consortium members identified above do not receive funding from AmericaView.

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http://www.wvview.org/