Forest Terrain Identification

using Semantic Segmentation on UAV Images

Muhammad Umar (mu283@student.aru.ac.uk)

Lakshmi Saheer (lakshmi.babu-saheer@aru.ac.uk)

Javed Zarrin (Javed.zarrin@aru.ac.uk)

Introduction

Why?

- Beavers effect climate change!!
- Estimate changes in terrain

- **How?**
- Terrain Semantic Segmentation
- Requires Dataset

Dataset

Table 1. Distribution of classes in the dataset

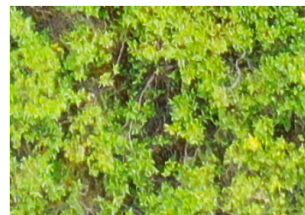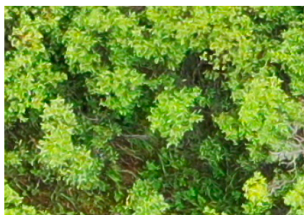| CLASS	TRAIN(%)	VALIDATION(%)
UNKNOWN	1.58	1.64
SHRUBS	15.72	13.83
GRASS	14.05	13.74
LARGE SHRUBS	10.22	11.22
VEGETATION	13.41	13.16
STONES	11.38	10.43
WATER	12.35	13.73
SOIL	13.05	14.26
BEAVER DAM	8.24	7.99

(a) Stones   (b) Water   (c) Grass   (d) Dam

(e) Shrub   (f) Large Shrubs   (g) Vegetation   (h) Soil

- **Classification**

- 8 Classes
- 100 Images Labelled
- Image Resolution 5472*3648

- **Collection**

- LabelBox (https://www.labelbox.com)

- Size (340*240)
- 70% for training
- 30% for validation

Evaluations

Performed tests with multiple trained models as backbone

- **Vgg19**

- **InceptionV3**

- **ResNet50**

Parameters

- **50 Epoch**

- **32 Batch Size**

- **Accuracy / IOU / F1 Score**

Conclusion

Best results

- **FPN/Inceptionv3 (Accuracy 0.71)**

- **HR-Net/Inceptionv3 (IOU 0.83)**

- **HR-Net/Inceptionv3 (F1 0.87)**

Table 3. Baseline Experimental Results

Model	Backbone	Batch	Epoch	Accuracy	IOU	FI
UNet (Ronneberger et al., 2015)	Vgg19 (Simonyan & Zisserman, 2015)	32	50	0.52	0.32	0.39
UNet (Ronneberger et al., 2015)	InceptionV3 (Szegedy et al., 2017)	32	50	0.64	0.37	0.44
UNet (Ronneberger et al., 2015)	ResNet50 (He et al., 2015)	32	50	0.55	0.33	0.42
FPN (Lin et al., 2017)	Vgg19 (Simonyan & Zisserman, 2015)	32	50	0.68	0.72	0.78
FPN (Lin et al., 2017)	InceptionV3 (Szegedy et al., 2017)	32	50	**0.71**	0.81	0.84
FPN (Lin et al., 2017)	ResNet50 (He et al., 2015)	32	50	0.67	0.76	0.82
HR-Net (Sun et al., 2019b)	Vgg19 (Simonyan & Zisserman, 2015)	32	50	0.61	0.76	0.82
HR-Net (Sun et al., 2019b)	InceptionV3 (Szegedy et al., 2017)	32	50	0.68	**0.83**	**0.87**
HR-Net (Sun et al., 2019b)	ResNet50 (He et al., 2015)	32	50	0.65	0.81	0.85