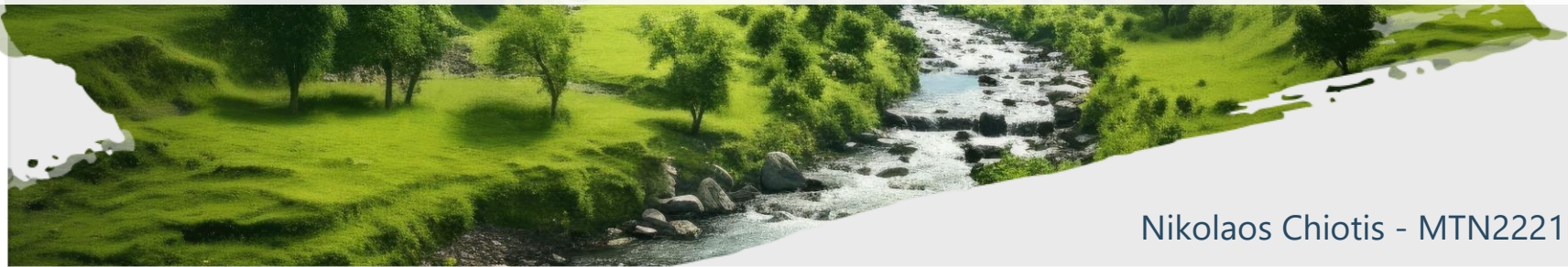


Natural Scenery Image Multilabel Classification using CNN



Nikolaos Chiotis - MTN2221

Agenda

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Dataset Description

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Method

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Results

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Questions

Dataset Description

1

CNN Image Classification | Dataset Description



2000 Images

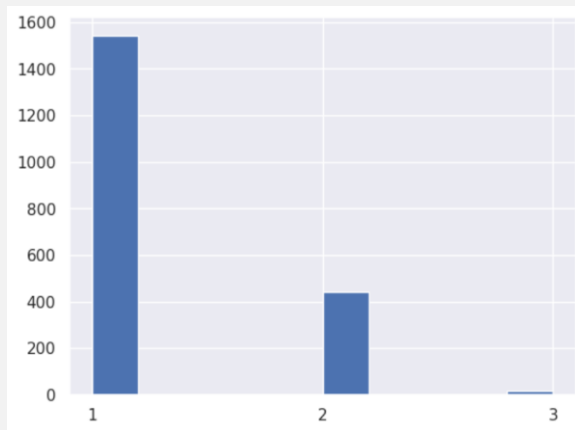


5 Labels

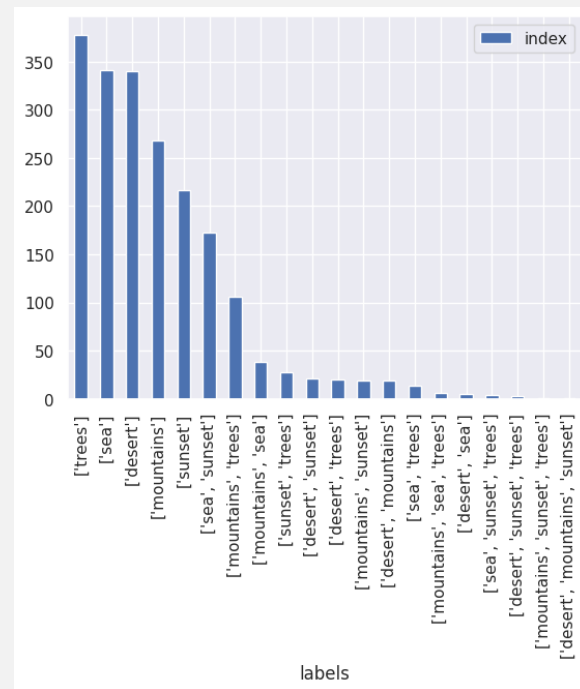


Multilabeled

Label Number Distribution



Labels Distribution



Method

2

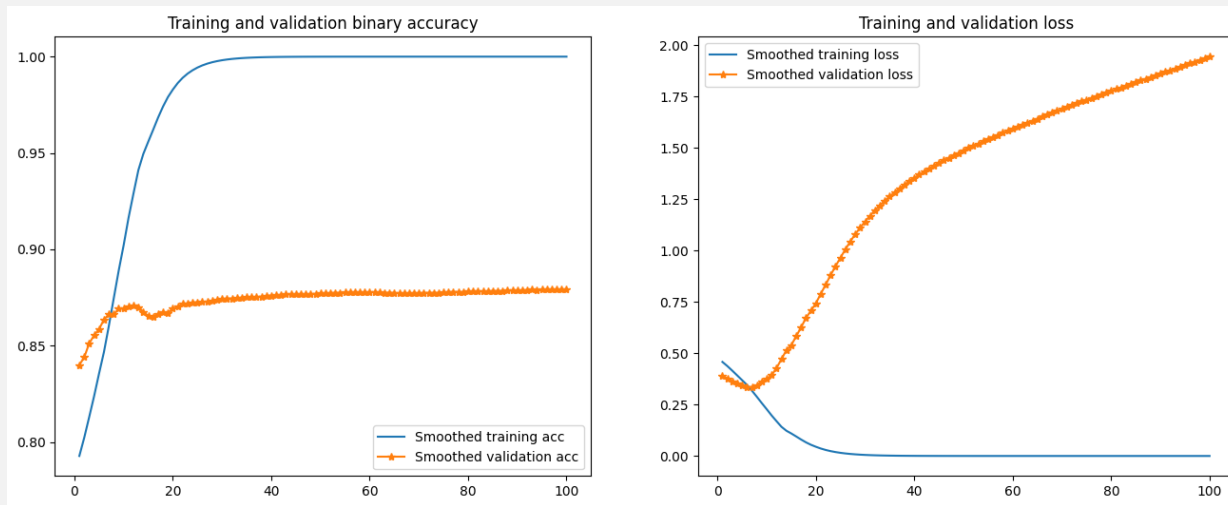
CNN Image Classification | Method

Started with a simple CNN with **3 Convolutional Layers & Maxpooling**
Last layer has **sigmoid** activation due to multilabel nature of dataset

```
Conv2D(32, (3,3), activation='relu', input_shape=  
MaxPooling2D(),  
Conv2D(64, (3,3), activation='relu'),  
MaxPooling2D(),  
Conv2D(128, (3,3), activation='relu'),  
MaxPooling2D(),  
Flatten(),  
Dense(64, activation='relu'),  
Dense(N_LABELS, activation='sigmoid')
```

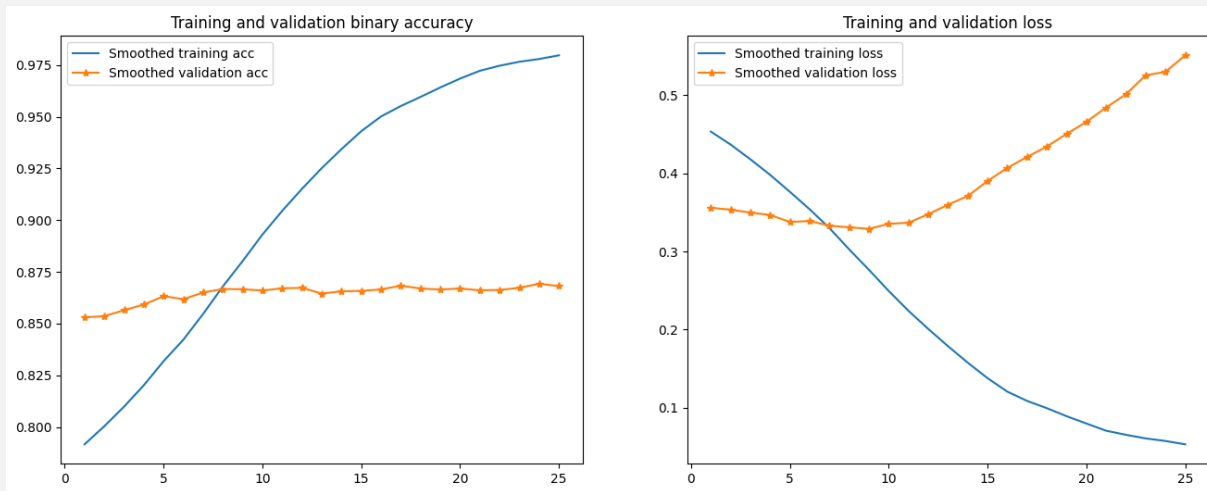
CNN Image Classification | Method

Started with a simple CNN with **3 Convolutional Layers & Maxpooling**
Last layer has **sigmoid** activation due to multilabel nature of dataset



CNN Image Classification | Method

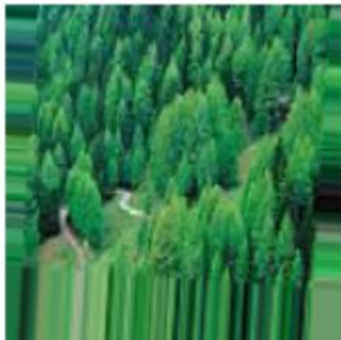
To deal with overfitting, we added **Dropout Layers**
& **Early Stop** callback



CNN Image Classification | Method

Finally, we did **Image Augmentation** & **Batch Normalization** layers

['trees']

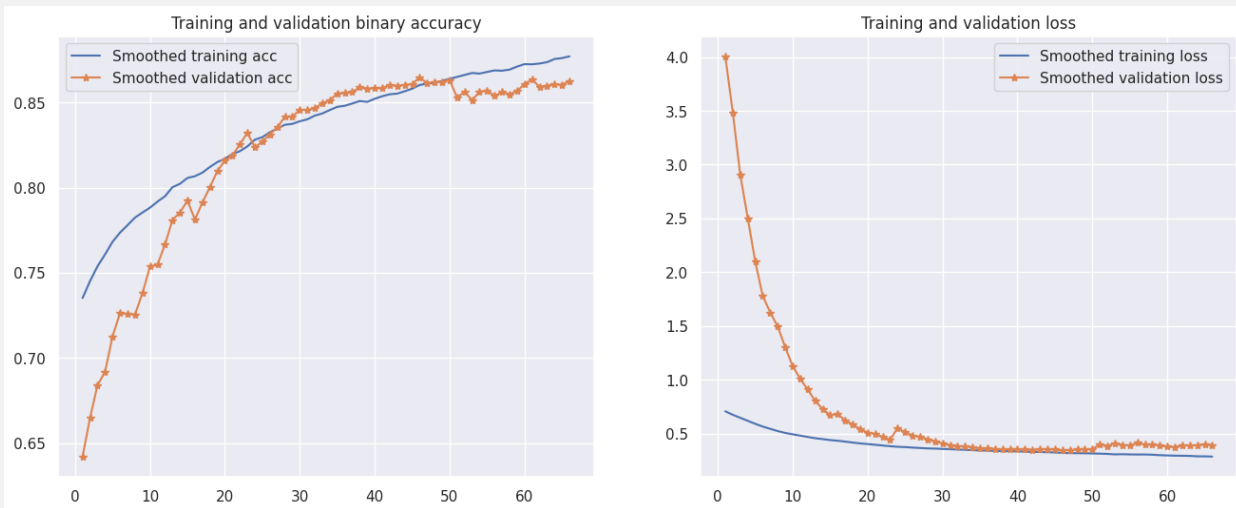


['mountains']



CNN Image Classification | Method

Finally, we did **Image Augmentation** & **Batch Normalization** layers



Results

3

CNN Image Classification | Comparing with Dummy Classifier

Dummy Classifier

	precision	recall	f1-score	support
desert	0.22	0.16	0.19	85
mountains	0.21	0.15	0.18	98
sea	0.21	0.15	0.18	112
sunset	0.21	0.19	0.20	83
trees	0.31	0.29	0.30	115
micro avg	0.24	0.19	0.21	493
macro avg	0.23	0.19	0.21	493
weighted avg	0.23	0.19	0.21	493
samples avg	0.24	0.19	0.21	493

CNN Classifier

	precision	recall	f1-score	support
desert	0.88	0.71	0.78	85
mountains	0.74	0.80	0.76	98
sea	0.77	0.44	0.56	112
sunset	0.92	0.81	0.86	83
trees	0.83	0.75	0.79	115
micro avg	0.82	0.69	0.75	493
macro avg	0.83	0.70	0.75	493
weighted avg	0.82	0.69	0.74	493
samples avg	0.85	0.73	0.74	493

CNN Image Classification | Comparing with ResNet50 TL Classifier

ResNet50 Transfer Learning Classifier

	precision	recall	f1-score	support
desert	0.73	0.55	0.63	85
mountains	0.70	0.48	0.57	98
sea	0.63	0.30	0.41	112
sunset	0.91	0.72	0.81	83
trees	0.81	0.69	0.74	115
micro avg	0.77	0.54	0.63	493
macro avg	0.76	0.55	0.63	493
weighted avg	0.75	0.54	0.62	493
samples avg	0.82	0.56	0.57	493

CNN Classifier

	precision	recall	f1-score	support
desert	0.88	0.71	0.78	85
mountains	0.74	0.80	0.76	98
sea	0.77	0.44	0.56	112
sunset	0.92	0.81	0.86	83
trees	0.83	0.75	0.79	115
micro avg	0.82	0.69	0.75	493
macro avg	0.83	0.70	0.75	493
weighted avg	0.82	0.69	0.74	493
samples avg	0.85	0.73	0.74	493



Thank you!

Questions?

