Univ.AI

Natural Scene Classification for Unmanned Aerial Vehicles (UAVs)

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Motivation and About the Project

In computer vision, scene recognition is one of the challenging research field. We ca recognize the scene and not only classify the scene type but can perform automated tasks such as if we automatically want to record a video of lakes or a specific portion of the scene through unmanned aerial vehicles then we can only perform this through computer vision.

We have chosen this project to classify the natural scenes[1] through the cameras of unmanned aerial vehicle and left any automation as the next part to the project.

We were able to achieve 80% accuracy through different augmentation techniques.

Data and Labels

The dataset have six classes of target variables with 14034 train instances with the dimension of 150*150*3. The dataset is a balanced dataset with the following class quantity.

References

[1].https://www.kaggle.com/datasets/puneet6060/intel-image-classification

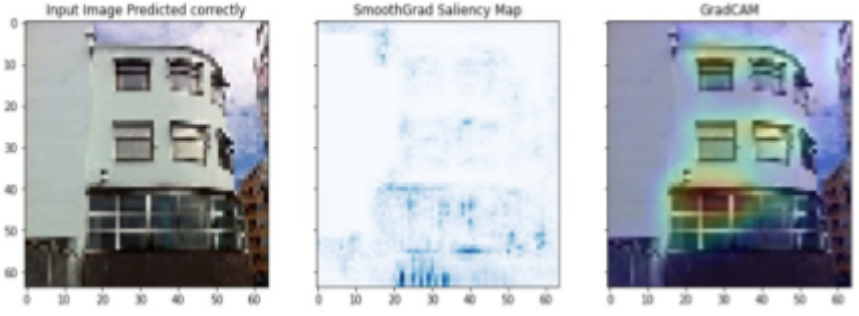
Model

We started from the baseline CNN model with 6 convolutional layers and dropout We have tried and tuned different models with different settings but the best model have the following architecture.

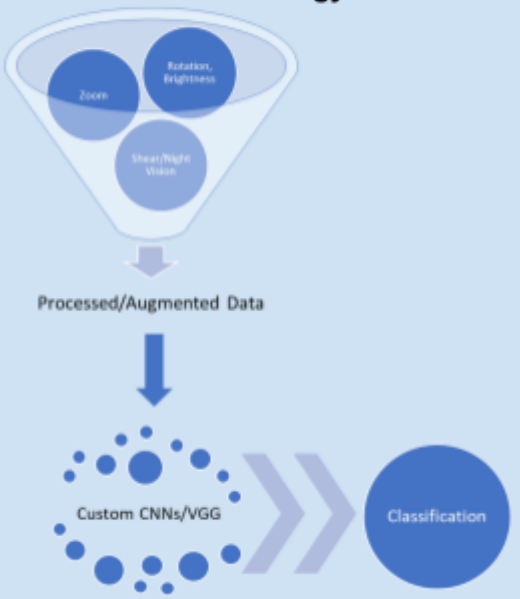
MODEL_1	MODEL_2	MODEL_3
6 Conv2D layers MaxPooling Layers Dropout Layers	8 Conv2D layers BatchNormalization MaxPooling Layers Dropout Layers	Pre-trained VGG Model
Total Parameters 8,808,614	Total Parameters 1,439,974	Total Parameters 15,240,774

Results

	Train Acc.	Test Acc.	Train Loss	Test Loss
Model_1	0.85	0.82	0.40	0.53
Model_2	0.77	0.77	0.59	0.59
Model_3 (VGG)	0.77	0.79	0.59	0.57
Model_1 (On approach 2 data)	0.96	0.74	0.11	1.33



Methodology



Conclusion

We have focused to achieve minimum loss and maximum accuracy as well as avoid overfitting by using Dropout layers and using BatchNormalization for regularisation. We tried 2 approaches, and found that first approach Model_1 is better and giving a good accuracy.

Future Work

Object detection and action automation is the next task in this project with different dataset of objects in the natural/compact scenes.