Estimating Firebrand Properties from Multiple Video Cameras

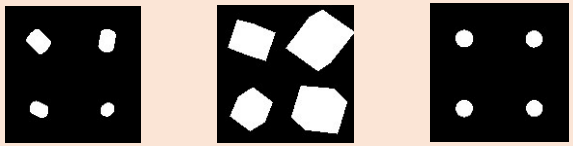
Team Falcons – Chandra Prakash, Mohan Kudipudi, Rashmi Deshpande, Rashmi Anchan

Univ.AI

Motivation and About the Project

To protect communities from firebrand ignition. We use CNN networks to find properties of Firebrands. We estimate the shape of the firebrand, it's length, width and height, the orientation of the firebrand and it's volume.

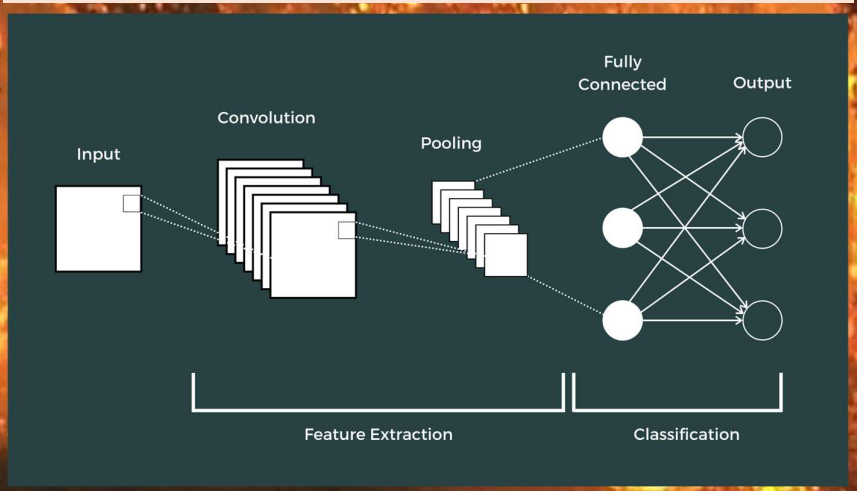
Data and Label



Cylindrical Cubical Spherical

Primarily 3 shapes of firebrands are present. Labels for length, width, height and camera orientation for each image.

Model



We trained two types of models:

- sigmoid activation in final layer for classification task.
- linear activation in last layer for regression task.

Conclusion

- Predicted properties of firebrands using CNN models.
- Improved the predictions by adding more layers and using early stopping.
- The accuracy for firebrand shape classification task increased from 91.86% to 96.74%
- The MSE errors for predicting the Length, Width and Height were also reduced.

Future Work

- Split the images to 4 images & check the accuracy.
- Try transfer learning
- Auto-encoders to make better predictions.

Results

Model name	Test Loss	Test Accuracy
Baseline Model	0.37	0.86
Improved Model	0.16	0.94
Fine-tuned VGG16 Model	0.09	0.96
Fine-tuned ResNet50 Model	0.29	0.91
Fine-tuned MobileNet Model	0.21	0.96
Fine-tuned DenseNet Model	0.12	0.96

True Values for random sample

obj_shape	cyl
L	30
W	50
H	50
a	37
b	338
c	17
volume	235500
surfacearea	31400

Name: 101, dtype: object

Predictions from Model B

obj_shape	cyl
L	38.517593
W	44.293007
H	44.526943
a	151.702225
b	144.921661
c	147.904465
volume	238532
surfacearea	24837

Name: 101, dtype: object