Classication of buildings post-Hurricane

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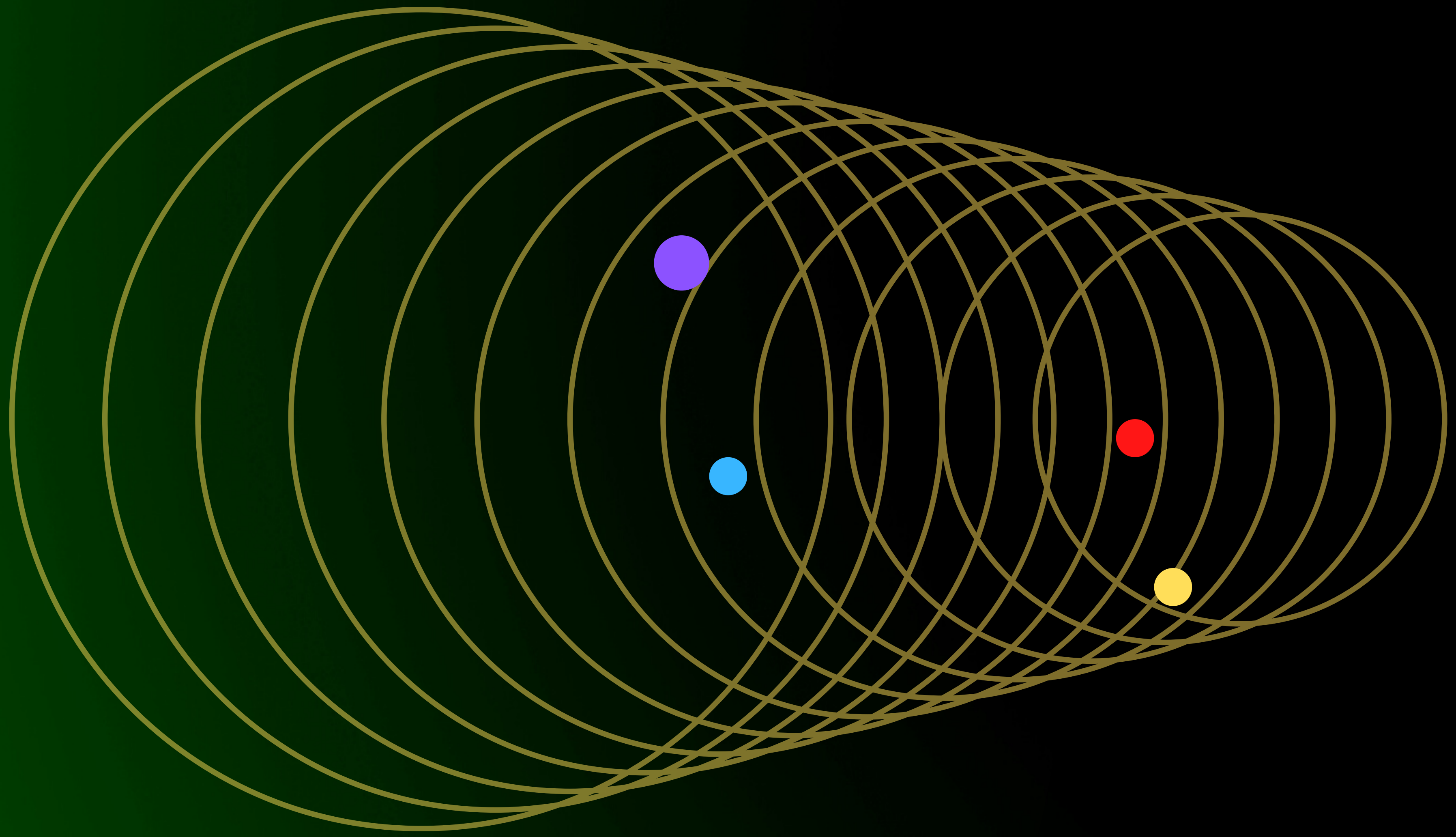
Project Outline

- Problem statement
- Understanding the datasets
- Data Preprocessing
- Building a base model
- Regularizing the base model
- Data visualization
- Testing some SOTA models
- Conclusions and Future scope



Problem Description

- Using ground surveys or drones to manually quantify the number of damaged buildings post the hurricane is a laborious task and time-consuming.
- The objective of this project is to classify the Satellite images as either damaged or undamaged by building a deep-learning model. This saves time & is cost-effective.

Data Preprocessing & EDA

- Accessed images & visualised damaged & undamaged images from the datasets using imshow in matplotlib
- Also, visualised the number of labels present in each class for each dataset using count plot in seaborn
- Explored the RGB channels for a particular image using cmap parameter
- Generated batches of tensor data with real time data augmentation by using image data generator

Dataset Contents

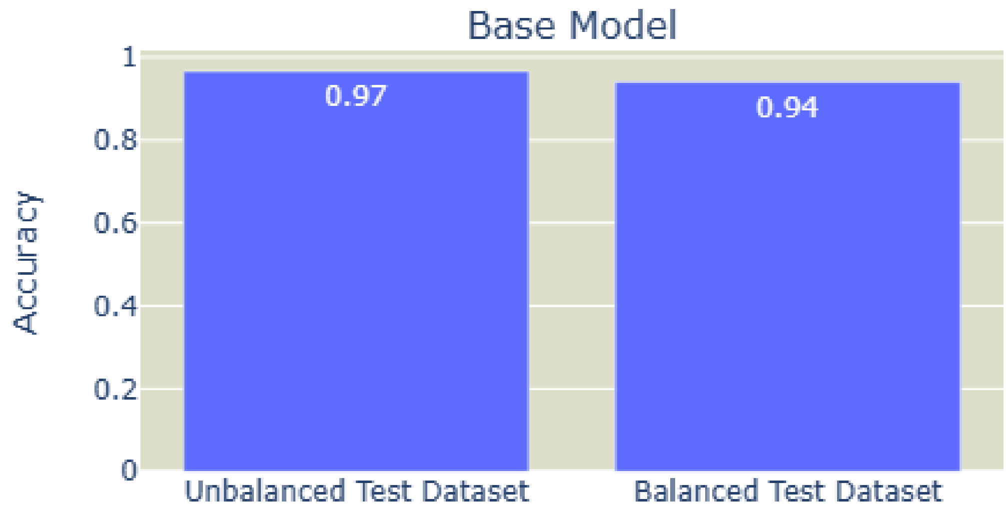
	Class	
Dataset Names	Damaged	Not Damaged
train_another	5000 images	5000 images
validation_another	1000 images	1000 images
test_another(unbalanced)	8000 images	1000 images
test(balanced)	1000 images	1000 images

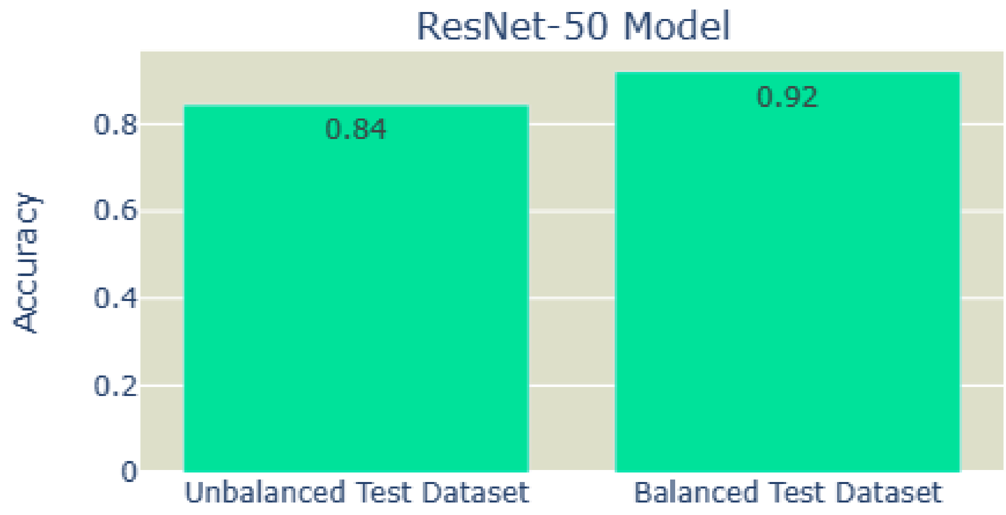
damage vs no_damage :

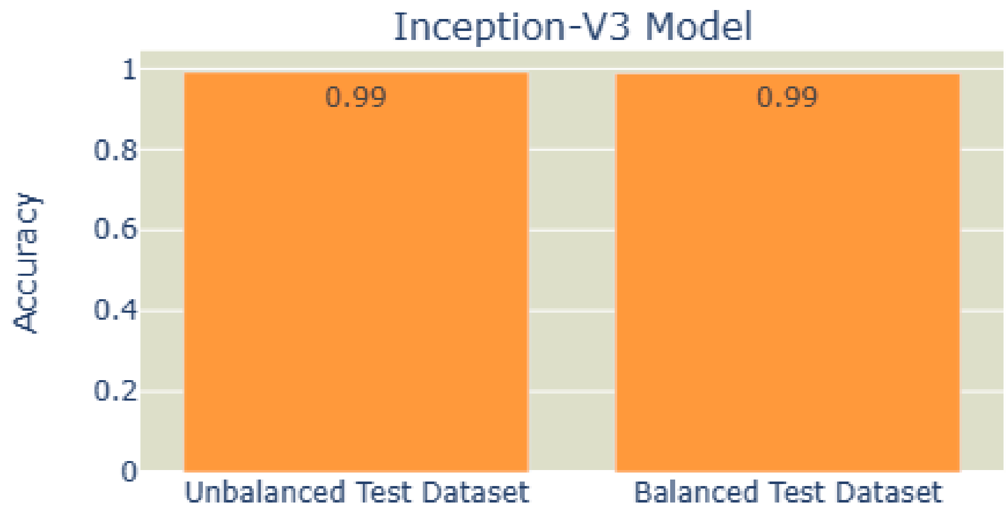
Methodology

- The base model was chosen as an unregularized CNN, which was regularized using Batch Normalization and Dropout layers.
- A few SOTA models were trained using the pre-trained weights on Imagenet dataset.
- Saliency maps, Image occlusion and GradCAM heatmaps were used for visualization.

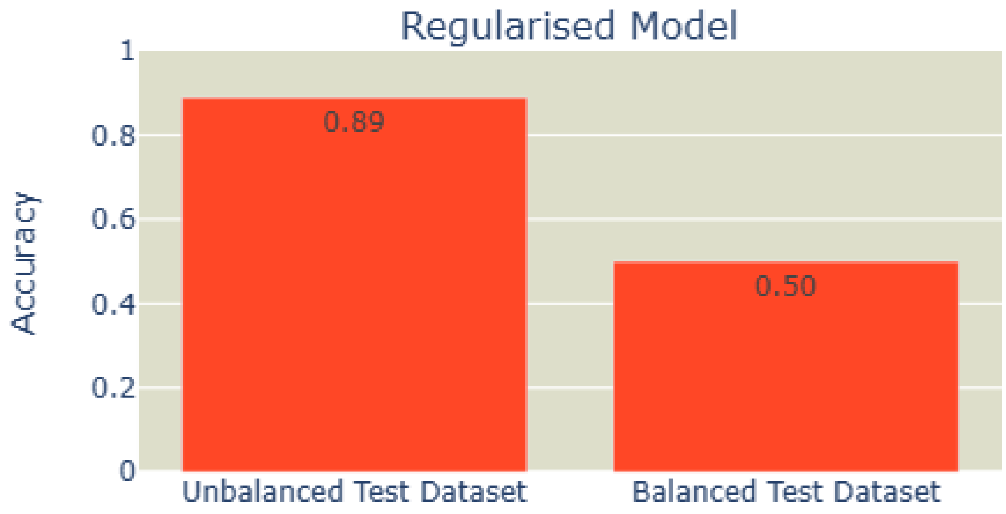
Results

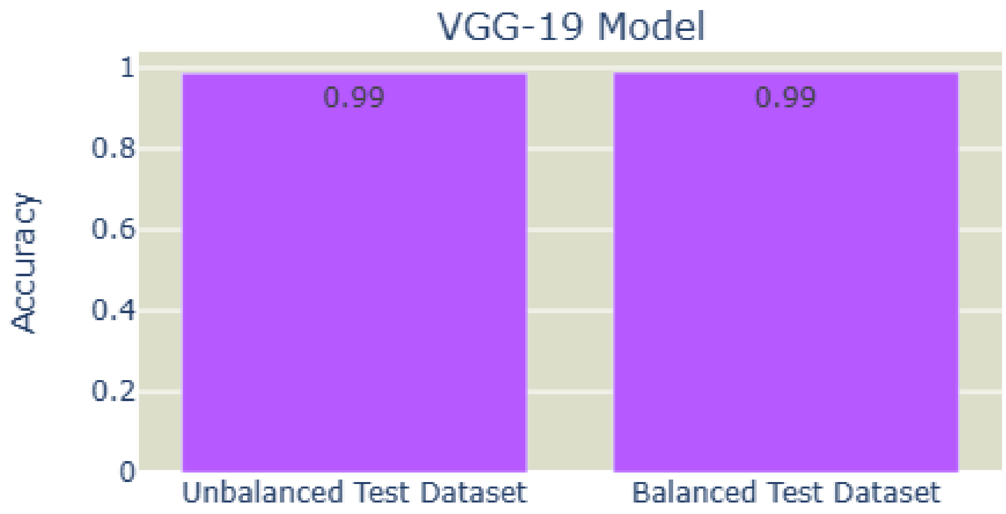


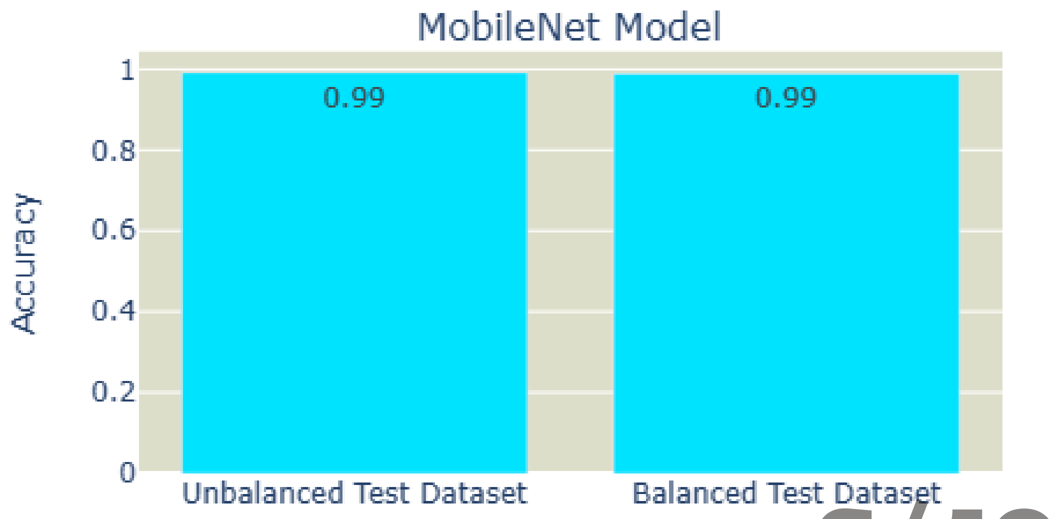




- Based on the plots shown above, we can infer that the base model itself gives good accuracy.
- The SOTA models Inception, VGG-19 and Mobilenet performed extremely well on both, the balanced and unbalanced test datasets.

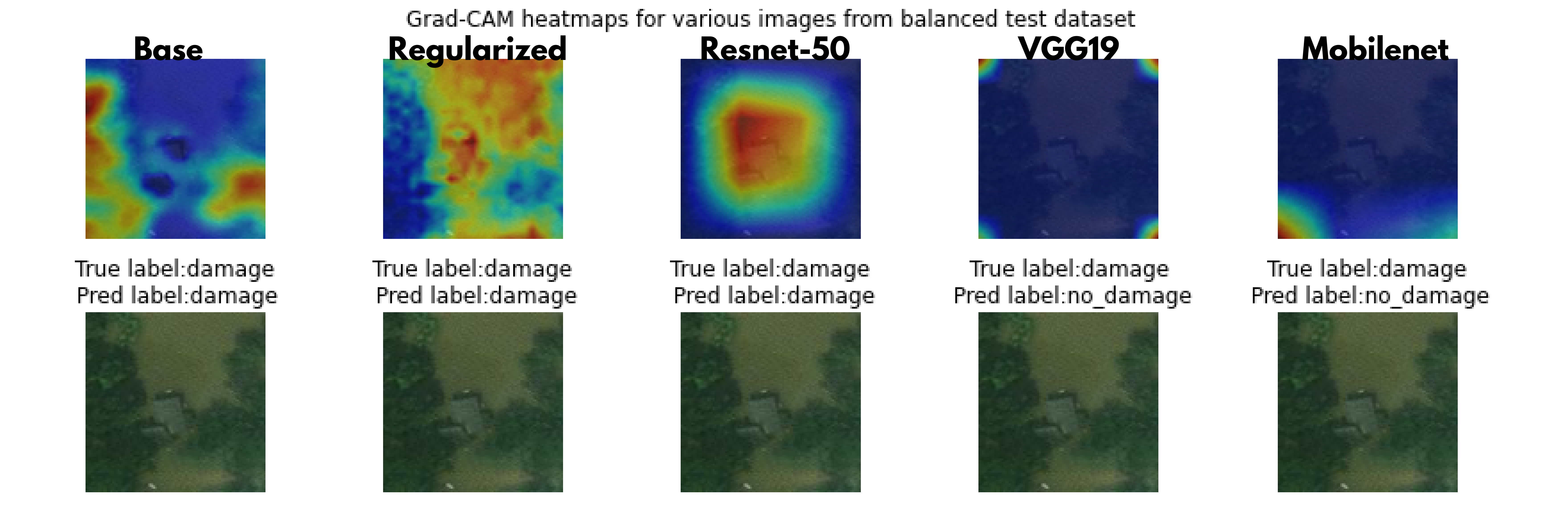






Results

- Among all these models, Resnet-50 learns the features of the below image most accurately and predicts correctly as well.



Conclusions

- We can infer that VGG-19, Mobilenet and Inception-V3 models give the best accuracy scores.
- Pretrained weights of ImageNet helped us achieve better classification accuracy test datasets.
- The saliency maps and GradCAM heatmaps captured the features of the images quite accurately in most of the models.

Future Scope

- We can further take more problem-specific data to train the model and get even better accuracy scores.

- As a matter of future research, we can work on building up more efficient model architecture for predictions comparable to SOTA models.

THANK YOU!