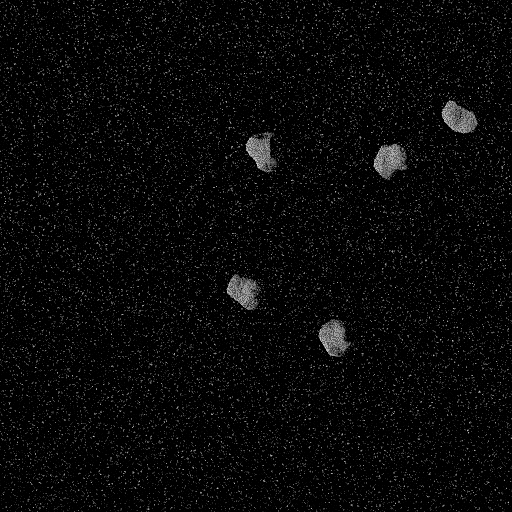
**Introduction**

You’ve successfully fixed the crisis and have taken off, phew! 🚀

But hey, what is that?! You’re encountering a large belt of space debris! You must use the tools of object detection to box this debris so you can safely take your rover to Mars.

[Click here to check out the starter kit](https://www.aicrowd.com/showcase/baseline-space-debris-detection).



**💾 Dataset**

The given dataset contains images of space with space debris. The images are of size 256\*256 in **jpg** format. The bounding boxes are in bboxes with the columns as **ImageId** and **bboxes0**  containing list in [xmin, xmax, ymin, ymax] format.

A sample row :

|  |  |
| --- | --- |
| ImageID | bboxes |
| 0 | [[34, 65, 69, 98], [144, 172, 266, 295], [382, 409, 248, 278], [383, 411, 438, 466]] |

The boxes will be in the string but to convert them into a python list, you can simply use literal\_eval function from ast python library!

**📁 Files**

Following files are available in the resources section:

* [train.zip](http://train.zip/) - (20000 samples) This zip file contains space with debris images, with images name corresponding to ImageID column of train.csv
* train.csv - (20000 samples) This csv file contains the ImageID column corresponding to [train.zip](http://train.zip/) and bboxes the column contains bounding boxes in a list.
* [val.zip](http://val.zip/) - (2000 samples) This zip file contains space with debris images, with images name corresponding to ImageID column of val.csv
* val.csv - (2000 samples) This csv file contains the ImageID column corresponding to [val.zip](http://val.zip/) and bboxes the column contains bounding boxes in a list.
* [test.zip](http://test.zip/) - (5000 samples) This zip file contains space with debris images which will be used to evaluate the performance of the model.

**🚀 Submission**

* Prepare a CSV containing ImageID column corresponding to [test.zip](http://test.zip/) and bboxes column as bounding boxes. Note that the bboxes column should contain another element in every bounding box list containing scores. Something like below:-

|  |  |
| --- | --- |
| ImageID | bboxes |
| 0 | [[34, 65, 69, 98, 0.98], [144, 172, 266, 295, 0.8], [382, 409, 248, 278, 0.55], [383, 411, 438, 466, 0.23]] |

* The name of the above file should be submission.csv.
* Sample submission format available at sample\_submission.csv in the resources section.

**Make your first submission**[**here**](https://www.aicrowd.com/challenges/ai-blitz-7/problems/debris-detection/submissions/new)**!!**

**🖊 Evaluation Criteria**

During the evaluation, Average Precision (AP) @[ IoU=0.50:0.50 | area=medium | maxDets=100 ] will be used to test the efficiency of the model.

**🔗 Links**

* 💪 Challenge Page: [https://www.aicrowd.com/challenges/d](https://www.aicrowd.com/challenges/spacedebris)[ebris-detection](https://www.aicrowd.com/challenges/ai-blitz-7/problems/debris-detection)

**Solution:**

I have used retinanet object detection model with focal loss to solve this problem.

The pytorch implementation of retinanet from the below repo is used.

<https://github.com/yhenon/pytorch-retinanet.git>

The model is trained for 5 epochs and the loss is as follows:

Epoch: 4 | Iteration: 9999 | Classification loss: 0.00799 | Regression loss: 0.13684 | Running loss: 0.17121

Evaluating dataset

mAP:

debris: 0.996936510767745

Precision: 0.9176758409785932

Recall: 0.9970760233918129

The model is trained for 20000 train images and 2000 validation images. The test is performed with 5000 images and the leaderboard score (0.990) is shown below.

