This is a multilabel classification problem. You are given a set of images which are present in a folder named “images”. There are four attributes and each image can have multiple attributes. The annotation is available in labels.txt and the format of the file is as follows.

| **Image Name** | **Attr1** | **Attr2** | **Attr3** | **Attr4** |
| --- | --- | --- | --- | --- |
| image\_0.jpg | 1 | NA | 0 | 1 |
| image\_1.jpg | NA | 0 | 0 | 0 |
| image\_2.jpg | 1 | 1 | 0 | 0 |
| image\_3.jpg | 1 | 1 | 0 | 0 |
| image\_4.jpg | 1 | 1 | 0 | 0 |

“1” implies that a particular attribute is present for the image and “0” signifies the absence of that attribute. You may also notice that some fields are tagged “NA” which means that information about the corresponding attribute in that image is not available.

You need to write a deep learning based python code which can train a multilabel classification algorithm for this dataset. So deliverables are:

1. Training code which takes in the images and labels as input and produces a deep -model file containing weights.
2. Loss curve plot with loss in y axis and iteration number in x axis for training images. Ylabel and xlabel for the axes should be “training\_loss” and “iteration\_number” respectively. Title of the plot should be “Aimonk\_multilabel\_problem”.
3. Inference code which takes in an image as input and prints the list of attributes present in that image.

You need to take care of the following details.

1. You can use any deep learning framework for the task. But it would be great(not mandatory) if it is implemented in PyTorch or TensorFlow.
2. I suggest you use one of the established architectures like resnet/inception/mobilenet etc and do not write the architecture from scratch. You can refer to the code for any of the standard architectures available in the framework you are working on.
3. Please do not train from scratch. You need to write the code for fine tuning on top of ImageNet trained weights.
4. You should not ignore the image for which information is missing about an attribute(the rows having “NA” values). So you need to devise a way to handle these.
5. Dataset is skewed/imbalanced, i.e., there could be a huge difference in the number of images for each attribute. So your code should take care of this problem. If you are not able to tackle this problem in the stipulated time, please write your thoughts/techniques in the README file.
6. Also list out other pre-processing, augmentions, thoughts etc which you think can help the problem and couldn't be implemented due to time constraint.
7. Extra weightage will be given for cleanliness and modularity of the program. But I would highly recommend that you should first try to solve the problem and then focus on these things only if there is enough time left.

**Files required for the project are in the following gdrive folder**

[Multilabel](https://drive.google.com/drive/u/0/folders/1ZAShdBc1dsDaYanVLQTASUOZbXbViSTU)