

Instructions:

- This project is to be done in groups of 3-4 students per group, with individual reports to be submitted for each student.
- Each student must submit their individual report on Turnitin.
- **Only ONE .html file will be accepted from each student.**
- **Python code must be included, along with the results (images and code outputs), tables and text comments in the report.**

Description of the project

For this project, you are required to design a lightweight deep learning model for the following use-case:

- Fire detection in 2D images

The reference paper for the task is available here:

<https://arxiv.org/abs/1905.11922>

The task for this project is to design a deep learning model which is 'better' than the model proposed in the reference paper above. The definition of 'better' is the following (for this project):

- The designed model must have a lower trainable parameter count than the reference model.
- The values of Accuracy, Precision, and Recall must all be better (higher) than those of the model in the reference paper (obtained for the author's own dataset – which you will also be using for this project).
- You should disregard all results on Foggia's dataset in the reference paper, as you will not be using that dataset for training and testing of your model.

For the training and testing of the model that you will be designing, you **must** use the datasets available here:

<https://tinyurl.com/mw5jm5xh>

S. No.	Task	Marks
1.	Print 5 randomly selected images from the Train dataset, and 5 randomly selected images from the Test dataset, with their corresponding labels. Include the Python code for this as well as all the subsequent steps in this assignment. Clear and detailed commenting on the important portions of the code must also be included for all the code(s) in this entire assignment.	5
2.	Design and implement a lightweight model for fire detection as described above (in the description). Include the appropriately commented Python code in your report. Use the images in the training dataset (obtained from the link provided above) for the training and validation of the model.	30
3.	Present a tabular comparison of the Number of Trainable Parameters, and the Accuracy, Precision, and Recall for your model versus the reference paper's model for the images in the test dataset obtained from the link provided above.	5
4.	Include the inference results of your designed model for 10 'new' images of scenes with fire in them, and 10 images which do not contain fire. These images must be other than the ones in the training and test datasets. <i>Hint:</i> you can go to an internet image search engine to search for, and download, the 10 fire images. For the non-fire images, you can choose any 10 random images from the internet.	10