Group No: 20

Project Title: Fire and Smoke Detection using Images

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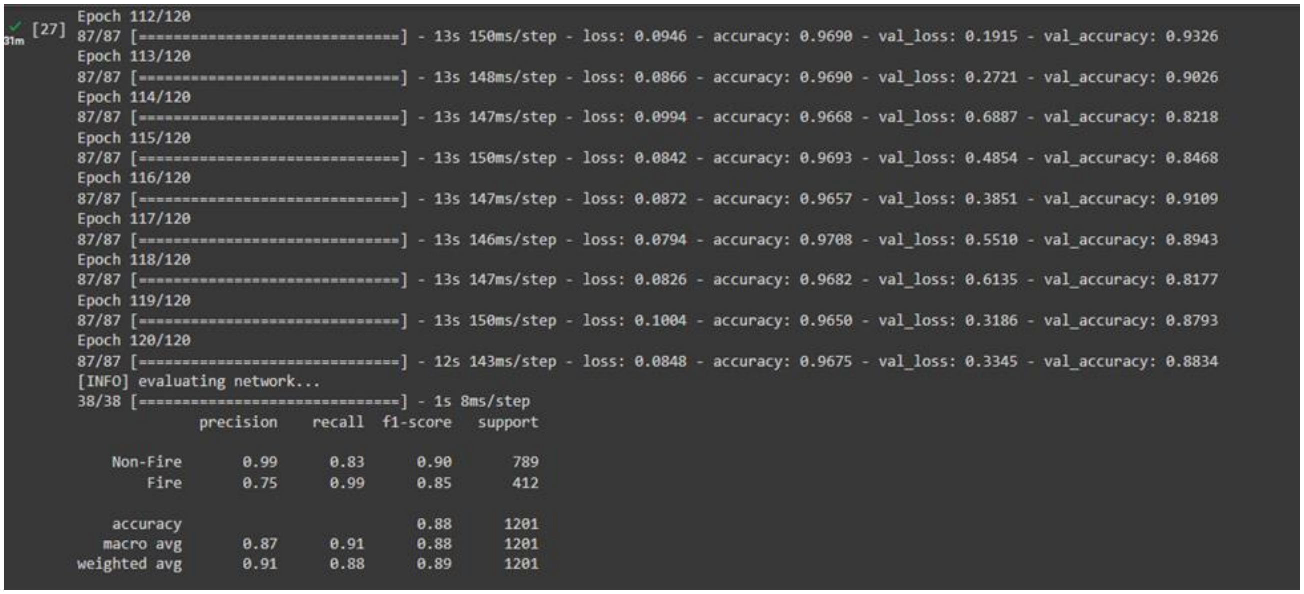
Weekly Progress Report

➢ **Tasks Performed in the week:**

Last week we trained our mode and we adjusted some of the hyperparameters to get the accuracy we wanted, but unfortunately, we didn't get the accuracy we wanted. We still changed and analysed how we can increase the accuracy. Therefore, we cleaned the dataset and pruned the data. We were still changing the learning rate which showed us good and subsequent result

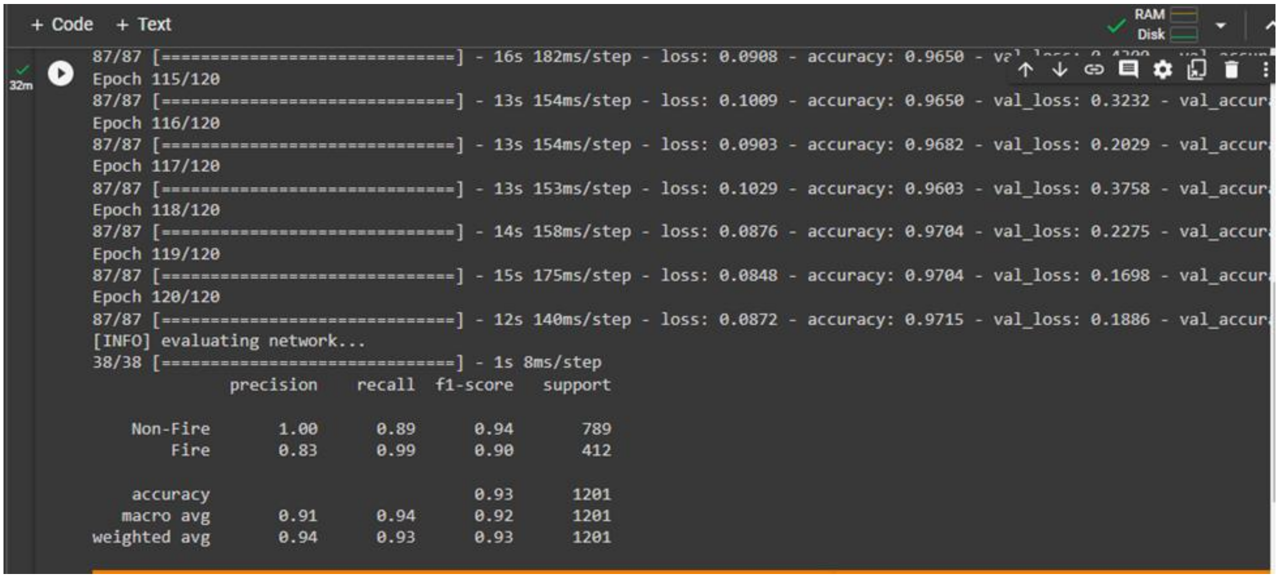


```
Epoch 112/120
87/87 [==============================] - 13s 150ms/step - loss: 0.0946 - accuracy: 0.9690 - val_loss: 0.1915 - val_accuracy: 0.9326
Epoch 113/120
87/87 [==============================] - 13s 148ms/step - loss: 0.0866 - accuracy: 0.9690 - val_loss: 0.2721 - val_accuracy: 0.9026
Epoch 114/120
87/87 [==============================] - 13s 147ms/step - loss: 0.0994 - accuracy: 0.9668 - val_loss: 0.6887 - val_accuracy: 0.8218
Epoch 115/120
87/87 [==============================] - 13s 150ms/step - loss: 0.0842 - accuracy: 0.9693 - val_loss: 0.4854 - val_accuracy: 0.8468
Epoch 116/120
87/87 [==============================] - 13s 147ms/step - loss: 0.0872 - accuracy: 0.9657 - val_loss: 0.3851 - val_accuracy: 0.9109
Epoch 117/120
87/87 [==============================] - 13s 146ms/step - loss: 0.0794 - accuracy: 0.9708 - val_loss: 0.5510 - val_accuracy: 0.8943
Epoch 118/120
87/87 [==============================] - 13s 147ms/step - loss: 0.0826 - accuracy: 0.9682 - val_loss: 0.6135 - val_accuracy: 0.8177
Epoch 119/120
87/87 [==============================] - 13s 150ms/step - loss: 0.1004 - accuracy: 0.9650 - val_loss: 0.3186 - val_accuracy: 0.8793
Epoch 120/120
87/87 [==============================] - 12s 143ms/step - loss: 0.0848 - accuracy: 0.9675 - val_loss: 0.3345 - val_accuracy: 0.8834
[INFO] evaluating network...
38/38 [==============================] - 1s 8ms/step
              precision    recall  f1-score   support

    Non-Fire       0.99      0.83      0.90       789
        Fire       0.75      0.99      0.85       412

    accuracy                           0.88      1201
   macro avg       0.87      0.91      0.88      1201
weighted avg       0.91      0.88      0.89      1201
```

So, after working more on data we changed the learning rate to 1e-1. And we can see it shows us a better accuracy than what we were getting previously.



```
87/87 [==============================] - 16s 182ms/step - loss: 0.0908 - accuracy: 0.9650 - va
Epoch 115/120
87/87 [==============================] - 13s 154ms/step - loss: 0.1009 - accuracy: 0.9650 - val_loss: 0.3232 - val_accur
Epoch 116/120
87/87 [==============================] - 13s 154ms/step - loss: 0.0903 - accuracy: 0.9682 - val_loss: 0.2029 - val_accur
Epoch 117/120
87/87 [==============================] - 13s 153ms/step - loss: 0.1029 - accuracy: 0.9603 - val_loss: 0.3758 - val_accur
Epoch 118/120
87/87 [==============================] - 14s 158ms/step - loss: 0.0876 - accuracy: 0.9704 - val_loss: 0.2275 - val_accur
Epoch 119/120
87/87 [==============================] - 15s 175ms/step - loss: 0.0848 - accuracy: 0.9704 - val_loss: 0.1698 - val_accur
Epoch 120/120
87/87 [==============================] - 12s 140ms/step - loss: 0.0872 - accuracy: 0.9715 - val_loss: 0.1886 - val_accur
[INFO] evaluating network...
38/38 [==============================] - 1s 8ms/step
              precision    recall  f1-score   support

    Non-Fire       1.00      0.89      0.94       789
        Fire       0.83      0.99      0.90       412

    accuracy                           0.93      1201
   macro avg       0.91      0.94      0.92      1201
weighted avg       0.94      0.93      0.93      1201
```

And this is the result when the learning rate to 1e-2. Which shows better accuracy.

➢ **Outcome of the task performed:**

This week, we made progress by training the model. We cleaned and pruned the dataset which was then easy for the model to process. We manipulated the hyperparameter for the better accuracy. Learning rate is a crucial hyperparameter in machine learning algorithms, particularly in gradient descent-based optimization algorithms used in deep learning. It determines the step size at which the algorithm updates the model's parameters during training. A suitable learning rate can help the algorithm converge to the optimal solution quickly and efficiently, while an inappropriate learning rate can lead to slow convergence, divergence or unstable behaviour.

➢ **Tasks to be performed in the upcoming week:**

- We will try to create and yolo (you only look once) model which is an object detection algorithm