

Group No: 20

Project Title: Fire and Smoke Detection using Images

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Weekly Progress Report

➤ Tasks Performed in the week:

This week We trained our model CNN using Keras. Before jumping directly to model we manually inspected the generated learning rate plot, i.e., the optimal learning rate we determined by analysing the plot.

For training the data, we load and pre-process the image just as in training, make predictions and grab the highest probability label, Annotate the label in the top corner of the image, Save the output image to disk.

In the model that we created we changed the learning rates and epochs quite a few times to see the effect it had on the result.

```
Epoch 44/50
89/89 [=====] - 11s 124ms/step - loss: 0.1838 - accuracy: 0.9303 - val_loss: 0.6949 - val_accuracy: 0.9303
Epoch 45/50
89/89 [=====] - 12s 135ms/step - loss: 0.1948 - accuracy: 0.9246 - val_loss: 0.6949 - val_accuracy: 0.9303
Epoch 46/50
89/89 [=====] - 13s 141ms/step - loss: 0.1800 - accuracy: 0.9306 - val_loss: 0.4794 - val_accuracy: 0.9306
Epoch 47/50
89/89 [=====] - 12s 138ms/step - loss: 0.1579 - accuracy: 0.9342 - val_loss: 0.9370 - val_accuracy: 0.9342
Epoch 48/50
89/89 [=====] - 12s 134ms/step - loss: 0.1870 - accuracy: 0.9306 - val_loss: 0.5391 - val_accuracy: 0.9306
Epoch 49/50
89/89 [=====] - 14s 154ms/step - loss: 0.1599 - accuracy: 0.9387 - val_loss: 0.3086 - val_accuracy: 0.9387
Epoch 50/50
89/89 [=====] - 12s 137ms/step - loss: 0.1795 - accuracy: 0.9359 - val_loss: 0.5782 - val_accuracy: 0.9359
[INFO] evaluating network...
39/39 [=====] - 0s 7ms/step
precision    recall  f1-score   support

   Non-Fire      0.97      0.69      0.80       791
     Fire      0.63      0.96      0.76       440

 accuracy      0.80      0.82      0.78      1231
  macro avg      0.80      0.82      0.78      1231
 weighted avg      0.85      0.78      0.79      1231
```

Here We tried to train our model using 50 epochs, it can be seen it is not much accurate right now.

```
[ ] Epoch 114/120
89/89 [=====] - 16s 177ms/step - loss: 0.1087 - accuracy: 0.9623 - val_loss: 0.7872 - val_accuracy: 0.9623
Epoch 115/120
89/89 [=====] - 16s 176ms/step - loss: 0.1113 - accuracy: 0.9581 - val_loss: 0.7843 - val_accuracy: 0.9581
Epoch 116/120
89/89 [=====] - 13s 152ms/step - loss: 0.1100 - accuracy: 0.9606 - val_loss: 0.4588 - val_accuracy: 0.9606
Epoch 117/120
89/89 [=====] - 13s 147ms/step - loss: 0.1005 - accuracy: 0.9641 - val_loss: 0.3053 - val_accuracy: 0.9641
Epoch 118/120
89/89 [=====] - 16s 182ms/step - loss: 0.1040 - accuracy: 0.9620 - val_loss: 0.5112 - val_accuracy: 0.9620
Epoch 119/120
89/89 [=====] - 14s 153ms/step - loss: 0.1148 - accuracy: 0.9556 - val_loss: 0.6043 - val_accuracy: 0.9556
Epoch 120/120
89/89 [=====] - 13s 149ms/step - loss: 0.1253 - accuracy: 0.9556 - val_loss: 0.4167 - val_accuracy: 0.9556
[INFO] evaluating network...
39/39 [=====] - 1s 9ms/step
precision    recall  f1-score   support

   Non-Fire      0.99      0.75      0.85       791
     Fire      0.68      0.98      0.81       440

 accuracy      0.84      0.87      0.83      1231
  macro avg      0.84      0.87      0.83      1231
 weighted avg      0.88      0.83      0.84      1231
```

Here We changed the epoch number to 120, and the change can be seen in the accuracy.

Here We kept the epoch same but we changed the learning rate to see the effect it has on the result.

```
Epoch 115/120
87/87 [=====] - 13s 144ms/step - loss: 0.0795 - accuracy: 0.9679 - val_loss: 0.4799 - val_accu
Epoch 116/120
87/87 [=====] - 14s 160ms/step - loss: 0.0753 - accuracy: 0.9722 - val_loss: 0.3565 - val_accu
Epoch 117/120
87/87 [=====] - 12s 135ms/step - loss: 0.0988 - accuracy: 0.9628 - val_loss: 0.2820 - val_accu
Epoch 118/120
87/87 [=====] - 12s 134ms/step - loss: 0.0795 - accuracy: 0.9693 - val_loss: 0.2235 - val_accu
Epoch 119/120
87/87 [=====] - 13s 145ms/step - loss: 0.0864 - accuracy: 0.9664 - val_loss: 0.6546 - val_accu
Epoch 120/120
87/87 [=====] - 14s 159ms/step - loss: 0.0938 - accuracy: 0.9664 - val_loss: 0.2803 - val_accu
[INFO] evaluating network...
38/38 [=====] - 0s 8ms/step
      precision    recall  f1-score   support

 Non-Fire      0.99      0.70      0.82       789
   Fire      0.63      0.99      0.77       412

 accuracy          0.80          1201
 macro avg      0.81      0.85      0.80       1201
 weighted avg   0.87      0.80      0.81       1201
```

➤ Outcome of the task performed:

This week, we made progress by training the model. There are many parameters on which the accuracy depends, including the learning rate, epoch, and loss function. We recorded the time taken to train the model, as well as any changes made to the hardware or software to improve training speed. We also discussed the next steps for improving the model's accuracy, such as fine-tuning, data augmentation, or adjusting hyperparameters, which can provide us with better accuracy.

➤ Tasks to be performed in the upcoming week:

- We won't settle for this accuracy we'll try to augment the data which can help us to improve the accuracy