Artificial Intelligence AI2002

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SOP Compliance System

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- Abstract:

It can be implemented in schools, offices, restaurants and other places which will help maintain SOPs without any sort of human dependency
Furthermore models that are trained for other rules to be followed, can be incorporated in the system

- Introduction:

The Project uses Computer Vision to monitor the surrounding and help the authorities maintain order in following SOPS and notifying them over any violation.

- Methodology:
  - Dataset:

    Dataset can be imported through a dataset folder through which the images can be trained or tested through different models. We have used an Augmented Dataset for this project.

  - Trainings:

    Training is done on 70% of the dataset and Validation is done on the 30% of the dataset.

training.ipynb

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```
Epoch 1/19
----------
train Loss: 0.1210 Acc:0.9475

test Loss: 0.0123 Acc:0.9948

Epoch 2/19
----------
train Loss: 0.1058 Acc:0.9513

test Loss: 0.0008 Acc:1.0000

Epoch 3/19
----------
train Loss: 0.0985 Acc:0.9559

test Loss: 0.2546 Acc:0.9278

Epoch 4/19
----------
train Loss: 0.1002 Acc:0.9574

test Loss: 0.0011 Acc:1.0000

Epoch 5/19
----------
train Loss: 0.0621 Acc:0.9711
```

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```
[29] train Loss: 0.0699 Acc:0.9635

     test Loss: 0.0020 Acc:1.0000

     Epoch 16/19
     ----------
     train Loss: 0.0630 Acc:0.9673

     test Loss: 0.0108 Acc:0.9948

     Epoch 17/19
     ----------
     train Loss: 0.0557 Acc:0.9703

     test Loss: 0.0055 Acc:0.9948

     Epoch 18/19
     ----------
     train Loss: 0.0758 Acc:0.9582

     test Loss: 0.0091 Acc:0.9948

     Epoch 19/19
     ----------
     train Loss: 0.0706 Acc:0.9688

     test Loss: 0.0118 Acc:0.9948

     Training complete in 9.000000m 17s
     Best val acc: 1.000000
```

Executing (15s) Cell > mount() > _mount() > expect() > expect_list() > expect_loop()

training.ipynb

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```
[23] out = torchvision.utils.make_grid(inputs)

     /usr/local/lib/python3.7/dist-packages/torch/utils/data/dataloader.py:490: UserWarning: This DataLoader will create 4 worker processes in total. Our suggested ma
       cpuset_checked))

[24] imshow(out, title=[class_names[x] for x in classes])
```

['without_mask', 'without_mask', 'without_mask', 'with_mask', 'with_mask', 'without_mask', 'with_mask', 'without_mask', 'without_mask', 'with_mask', 'without_mask', 'with_mask', 'with_mask', 'with_mask', 'without_mask', 'without_mask']

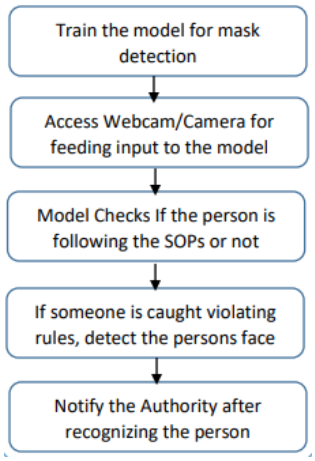
- Face Mask Detection:

  For detecting Face Masks we have used Resnet which is a neural network made of residual blocks. It works by skipping layers and makes it easy to detect objects.

- Face Detection and Recognition:

  For detecting faces of the people who are not wearing any face masks, we are using convolutional neural network (CNN) which are made of Convolutional layers. After detecting the face, the system will recognize the person too.

- Methodology:



- Result:

  The system detects if the person is wearing a mask or not. If he/she is wearing a mask it shows “with_mask”. If not the “without_mask” tag is shown on the system, and the person is given some time to wear a mask. If the person still not wears a mask, the persons face is detected and recognized with the given images of people and are sent an email to wear a mask. The authorities are also notified the person is not wearing the mask. After sometime the mask detection system is back on and the cycle goes on once again.

- Conclusion:

  Face Mask and Other SOPs are part of our daily lives now. Another wave of Covid-19 is expected this year, our system with the help of Deep Learning has made it easy to surveillance over people for responsibly wearing mask.