Real Time Mask Detection and Age Prediction

Advanced Machine Learning Project

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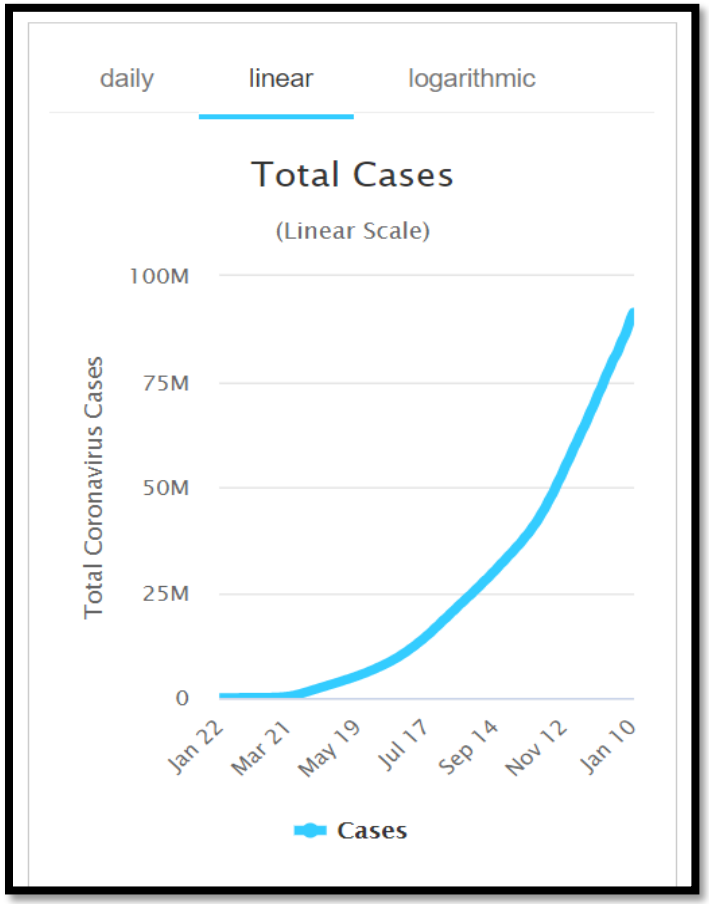
Business Understanding

- Second wave of Covid-19 is harsh
- Wearing mask- an important protection measure
- Mandatory for adults
- Not mandatory for children
- Mask detector to be installed in CCTVs infront of Shops, Hospitals, Doctor Clinics, Companies etc



Source: www.worldometers.info

Data Understanding

Dataset for Mask Detection

- Faces with Masks (4650 Images)
  - Medical Masked Dataset
  - Mask Net
  - Medical Faces
- Faces without Masks (4500 Images)
  - WIDER Face
  - Face Detection Dataset and Benchmark (FDDB)

Dataset for Age Prediction

- UTKFace (total> 20K)
  - Age group: 5-60 years old
  - Used 3360 Images

Data Preparation

Data Prep for Mask Detection

- Images Scaling
- Images Resizing
- Data Augmentation

```
dataset
├──train
│   ├──with_masks
│   └──without_masks
└──valid
    ├──with_masks
    └──without_masks
```

Data prep for Age Prediction

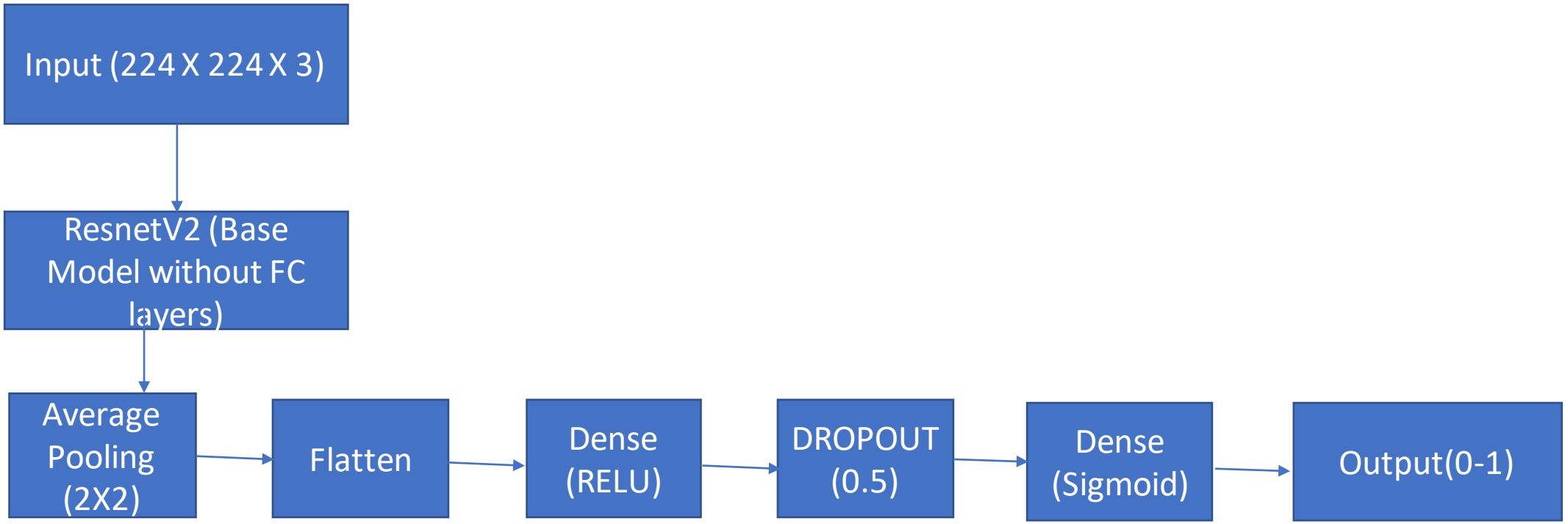
- Extraction of age from Images
- Images Resizing and Scaling
- Data Augmentation

26_1_3_20170119193113828.jpg

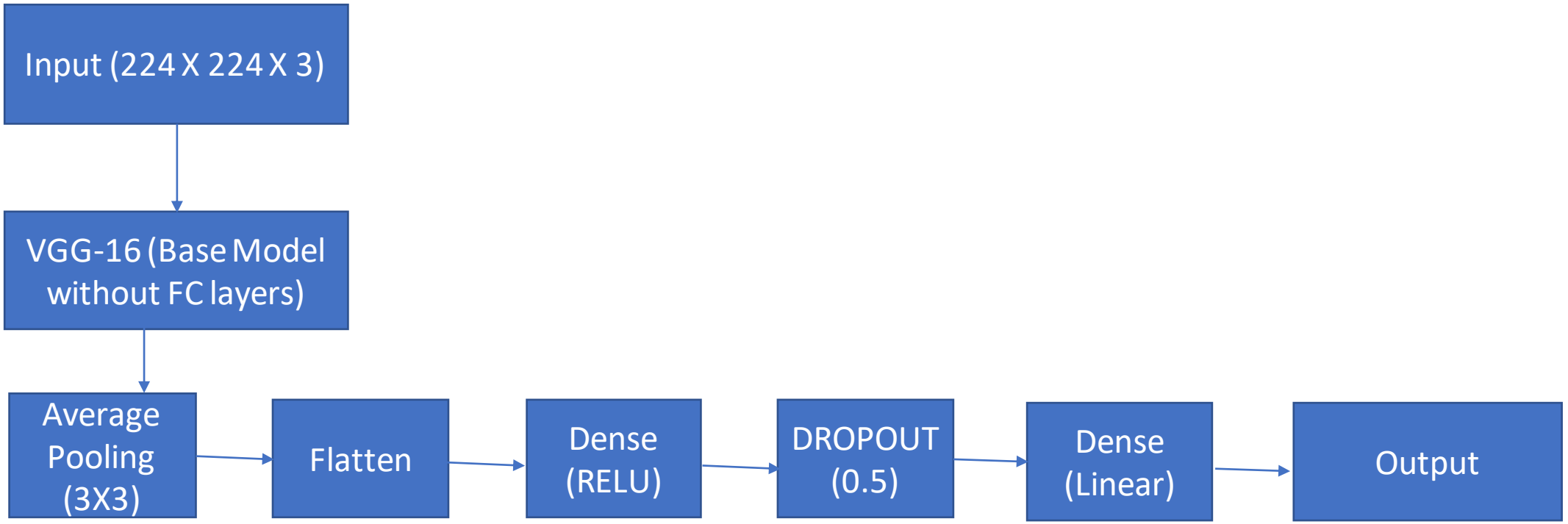
26_0_4_20170117172722652.jpg

Modelling

Process Flow Diagram for Mask Detection Model



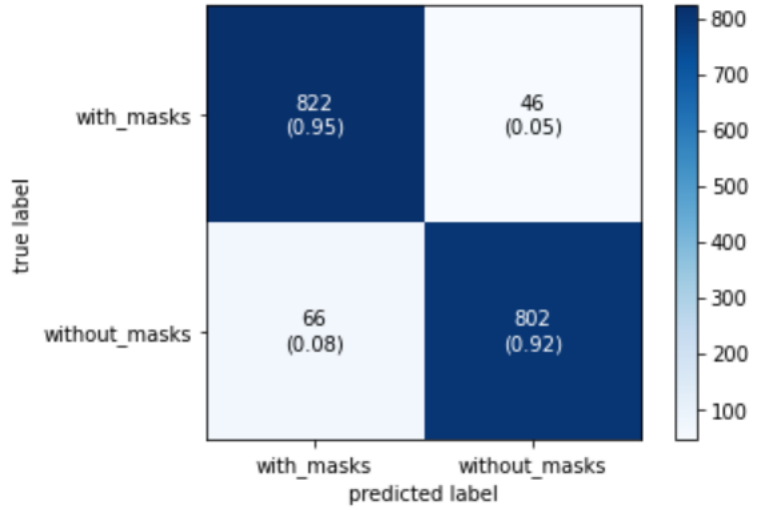
Process Flow Diagram for Age Prediction Model



Evaluation

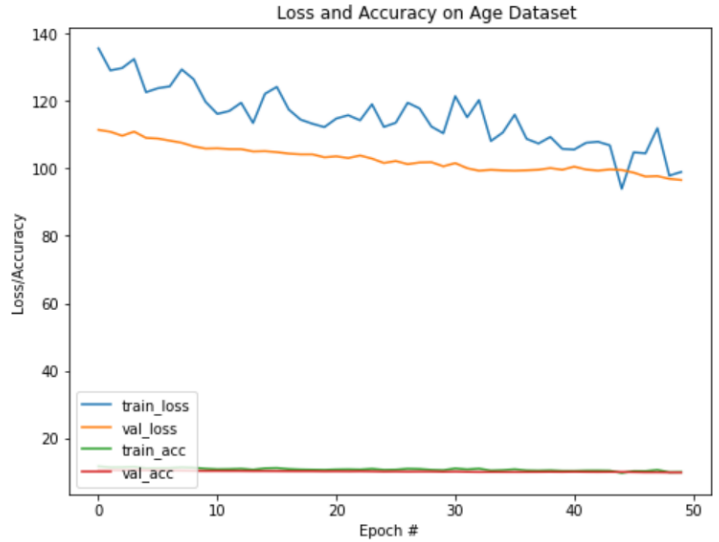
Mask Detection Model

	precision	recall	f1-score	support
without_masks	0.93	0.95	0.94	868
with_masks	0.95	0.92	0.93	868
accuracy			0.94	1736
macro avg	0.94	0.94	0.94	1736
weighted avg	0.94	0.94	0.94	1736



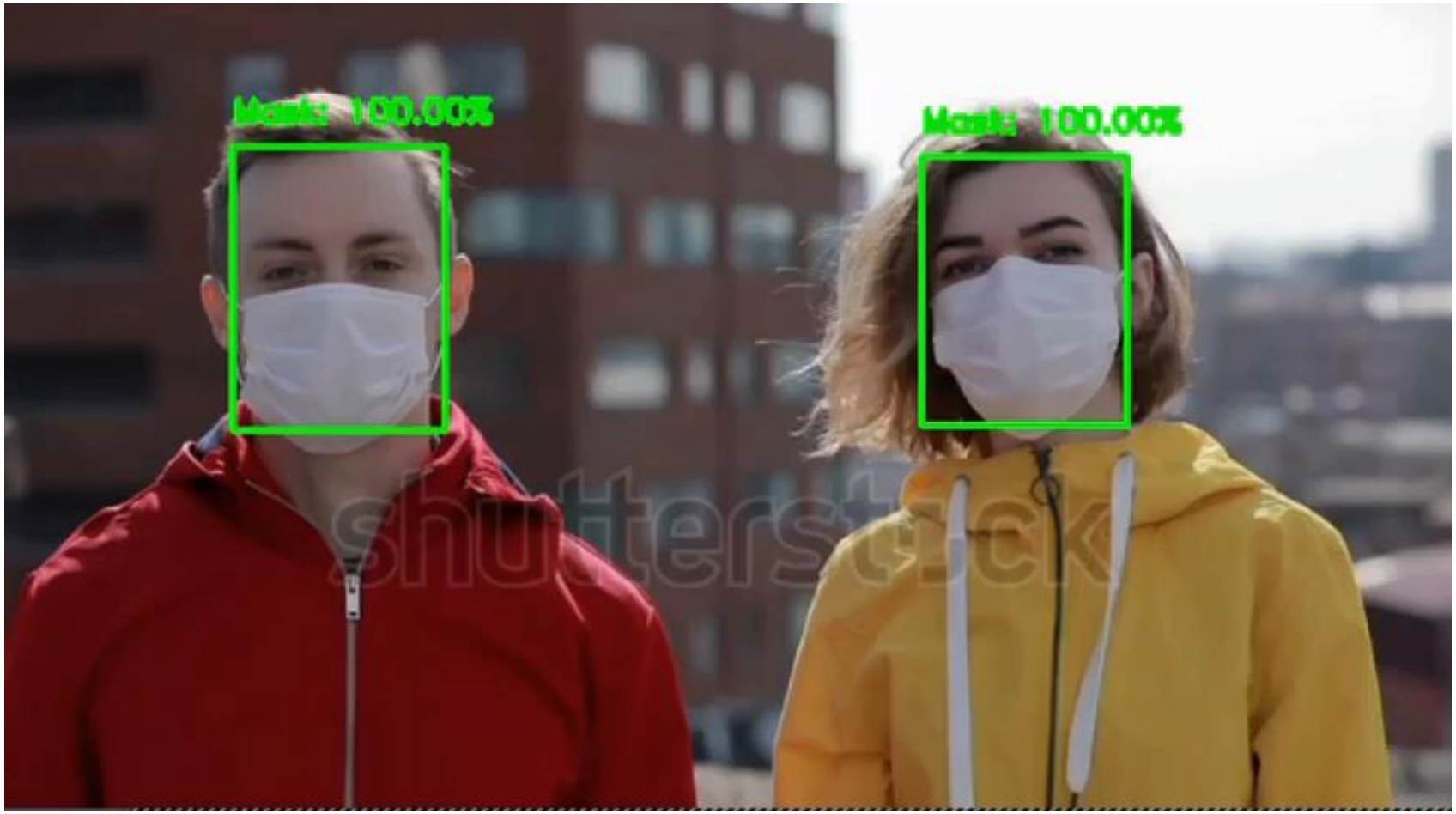
Age Prediction Model

Metrics	Training	Test
Loss	101.30	96.55
RMSE	10.05	9.82
MAE	8.12	8.02



Deployment

- On Jetson Nano

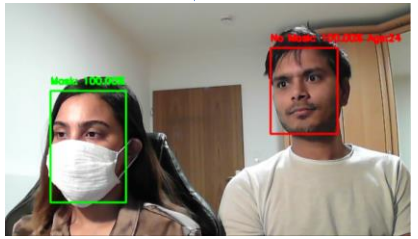


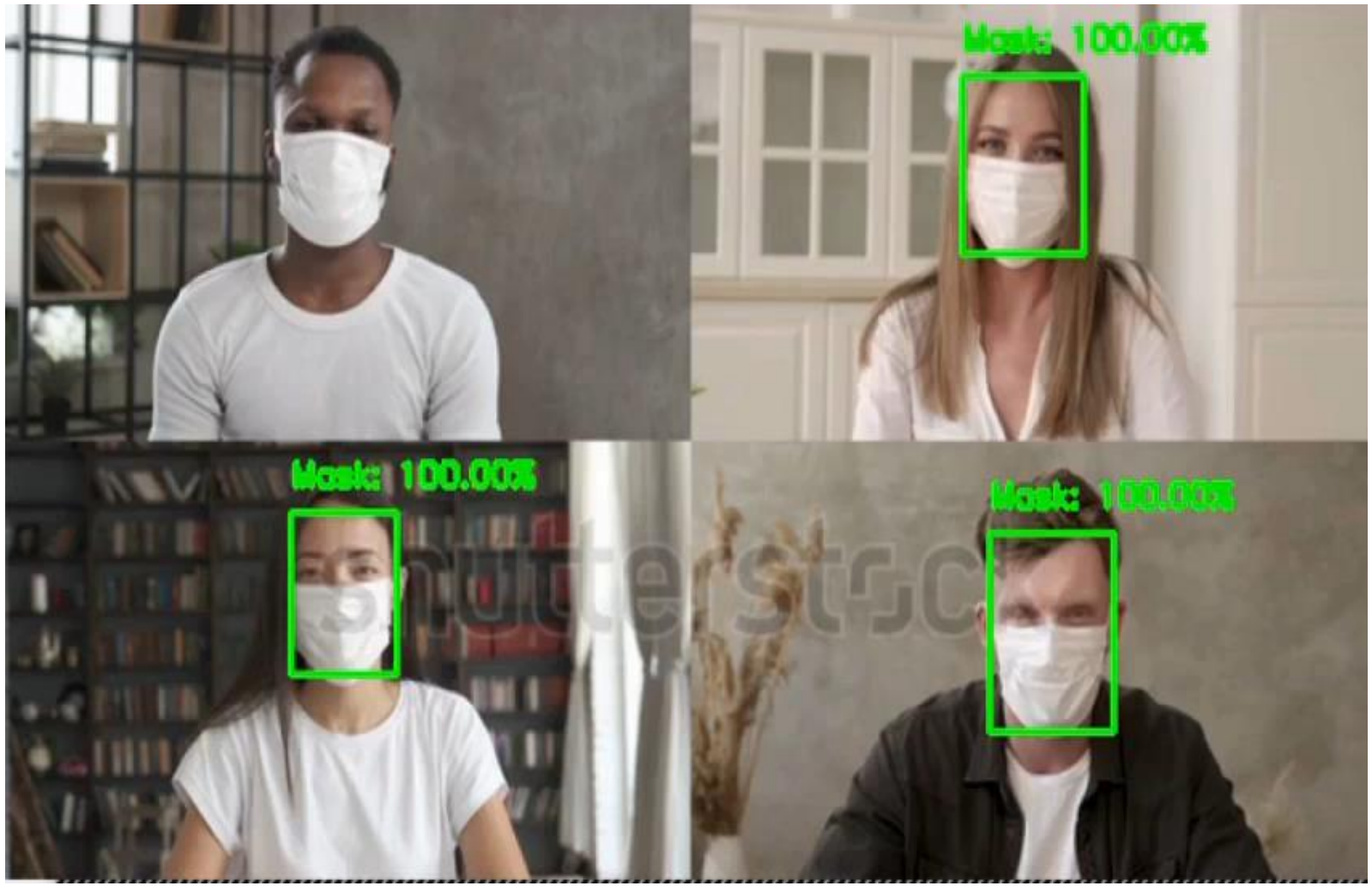
Face Detection Model (Caffe Model)

Mask Detection Model

Prob(not mask>mask)

Age Prediction Model




Mask: 100.00%
Mask: 100.00%
Mask: 100.00%

Conclusion

- Mask detection model work well with precision and recall of 94 %
- Age prediction model work okay with RMSE of 9.8 and loss of 96.55.
- Scope of improvement in both models especially age prediction

Future Work

- Train on large dataset
- Use of Classification approach than regression for age prediction
- Try different base models with different pretrained weights
- Try different hyperparameters
- To improve speed of video capture
- Use of different pretrained face detection model (Haar cascades, dlib frontal face detector, MTCNN) or build one.

Questions?