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# SYS6016: Codeathon 3

## Identify Whether a Person is Wearing a Face Mask or Not

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ML Model based on manually-reconstructed AlexNet model with an SGD optimizer. Training was performed with early stopping, achieving an accuracy of 99.1% on masks vs. no masks. The model was trained against Ashish Jangra's 'Face Mask 12K Image Dataset' available on Kaggle at https://www.kaggle.com/ashishjangra27/face-mask-12k-images-dataset. This model consisted of a test set comprised of 483 mask vs. 509 no mask images, and a training set comprised of 5000 mask vs. 5000 no mask images. Augmentation was previously applied.

```
model.compile(loss='categorical_crossentropy', optimizer=tf.optimizers.SGD(lr=0.01), metrics=['accuracy'])
model.summary()
```

```
Model: "sequential"
_________________________________________________________________
Layer (type)                 Output Shape              Param #
=================================================================
conv2d (Conv2D)              (None, 30, 30, 96)        34944
_________________________________________________________________
batch_normalization (BatchNo (None, 30, 30, 96)        384
_________________________________________________________________
max_pooling2d (MaxPooling2D) (None, 14, 14, 96)        0
_________________________________________________________________
conv2d_1 (Conv2D)            (None, 14, 14, 256)       614656
_________________________________________________________________
batch_normalization_1 (Batch (None, 14, 14, 256)       1024
_________________________________________________________________
max_pooling2d_1 (MaxPooling2 (None, 6, 6, 256)         0
_________________________________________________________________
conv2d_2 (Conv2D)            (None, 6, 6, 384)         885120
_________________________________________________________________
batch_normalization_2 (Batch (None, 6, 6, 384)         1536
_________________________________________________________________
conv2d_3 (Conv2D)            (None, 6, 6, 384)         147840
_________________________________________________________________
batch_normalization_3 (Batch (None, 6, 6, 384)         1536
_________________________________________________________________
conv2d_4 (Conv2D)            (None, 6, 6, 256)         98560
_________________________________________________________________
batch_normalization_4 (Batch (None, 6, 6, 256)         1024
_________________________________________________________________
max_pooling2d_2 (MaxPooling2 (None, 2, 2, 256)         0
_________________________________________________________________
flatten (Flatten)            (None, 1024)              0
_________________________________________________________________
dense (Dense)                (None, 4096)              4198400
_________________________________________________________________
dropout (Dropout)            (None, 4096)              0
_________________________________________________________________
dense_1 (Dense)              (None, 4096)              16781312
_________________________________________________________________
dropout_1 (Dropout)          (None, 4096)              0
_________________________________________________________________
dense_2 (Dense)              (None, 2)                 8194
=================================================================
Total params: 22,774,530
Trainable params: 22,771,778
Non-trainable params: 2,752
_________________________________________________________________
```

Fig. 1 --- Manually-Built AlexNet Model Used in this Study

References:

[1] “Welcome to Streamlit — Streamlit 0.81.0 Documentation.” Streamlit, docs.streamlit.io/en/stable. Accessed 30 Apr. 2021.

[2] Jangra, Ashish. “Face Mask ~12K Images Dataset.” Kaggle, 26 May 2020, www.kaggle.com/ashishjangra27/face-mask-12k-images-dataset.

[3] Bourke, David. “Mrdbourke/Cs329s-Ml-Deployment-Tutorial.” GitHub, 2021, github.com/mrdbourke/cs329s-ml-deployment-tutorial.

[4] Alake, Richmond. “Implementing AlexNet CNN Architecture Using TensorFlow 2.0 and Keras.” Medium,14 Aug. 2020, towardsdatascience.com/implementing-alexnet-cnn-architecture-using-tensorflow-2-0-and-keras-2113e090ad98

[5] Verdhan, Vaibhav. Computer Vision Using Deep Learning: Neural Network Architectures with Python and Keras.1st ed., Apress, 2021.

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Predict

Prediction: no_mask, Confidence: 0.945

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