

Architecture :

Model: "sequential"

Layer (type)	Output Shape	Param #
conv2d (Conv2D)	(None, 126, 126, 32)	896
batch_normalization (Batch Normalization)	(None, 126, 126, 32)	128
max_pooling2d (MaxPooling2D)	(None, 63, 63, 32)	0
dropout (Dropout)	(None, 63, 63, 32)	0
conv2d_1 (Conv2D)	(None, 61, 61, 64)	18496
batch_normalization_1 (Batch Normalization)	(None, 61, 61, 64)	256
max_pooling2d_1 (MaxPooling2D)	(None, 30, 30, 64)	0
dropout_1 (Dropout)	(None, 30, 30, 64)	0
conv2d_2 (Conv2D)	(None, 28, 28, 128)	73856
batch_normalization_2 (Batch Normalization)	(None, 28, 28, 128)	512
max_pooling2d_2 (MaxPooling2D)	(None, 14, 14, 128)	0
dropout_2 (Dropout)	(None, 14, 14, 128)	0
flatten (Flatten)	(None, 25088)	0
dense (Dense)	(None, 512)	12845568
batch_normalization_3 (Batch Normalization)	(None, 512)	2048
dropout_3 (Dropout)	(None, 512)	0
dense_1 (Dense)	(None, 1)	513

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Total params: 12,942,273
Trainable params: 12,940,801
Non-trainable params: 1,472

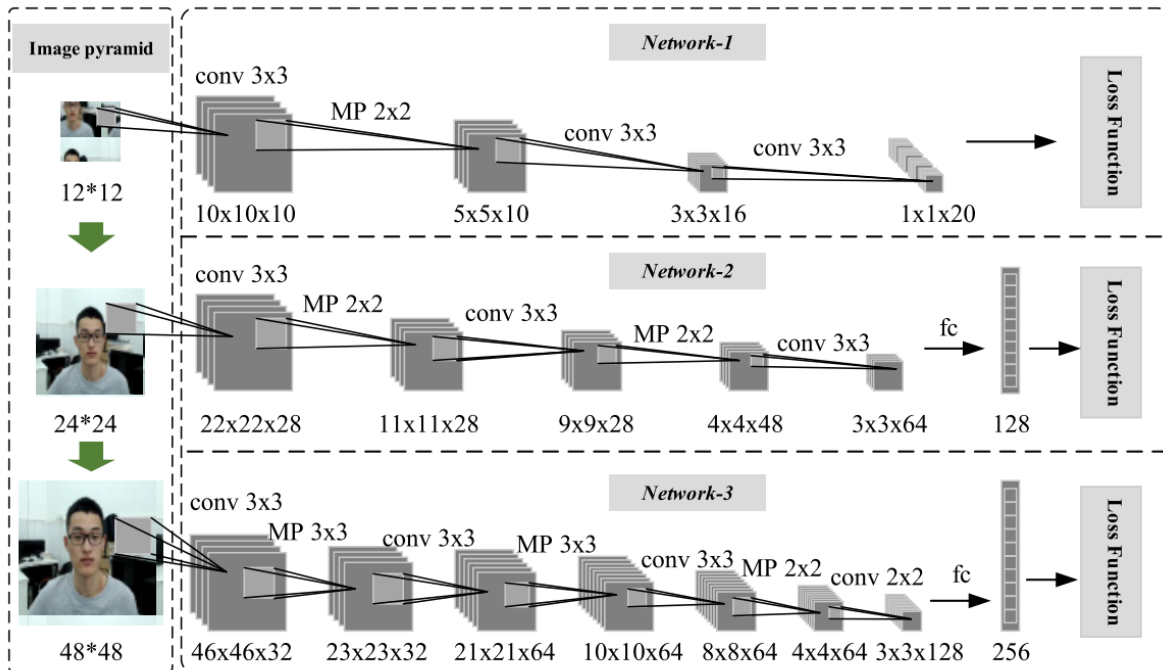


FIGURE 2. The architecture of DCCNN, where “conv” means convolutional layer, “MP” means max pooling layer and “fc” means fully connected layer.

Dataset Details : (Yawn-Eye Dataset)

Dataset contains pictures of people yawning and falling asleep while driving .

It contains **433** images for **Testing** and **2467** for **Training**.

In Total **2900** images.

Training is classified into :

- Closed (617 images)
- No_Yawn (616 images)
- Open (617 images)
- Yawn (617 images)

Testing is classified into :

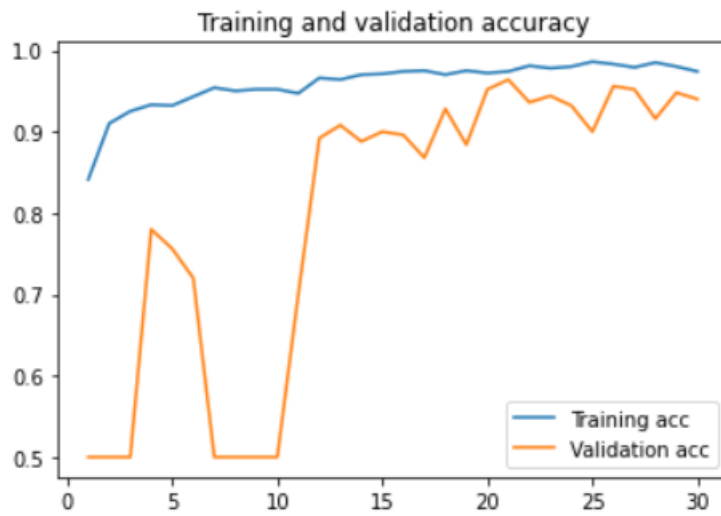
- Closed (109 images)
- No_Yawn (109 images)
- Open (109 images)
- Yawn (106 images)

We only use 2 directories of each (Closed,Open).

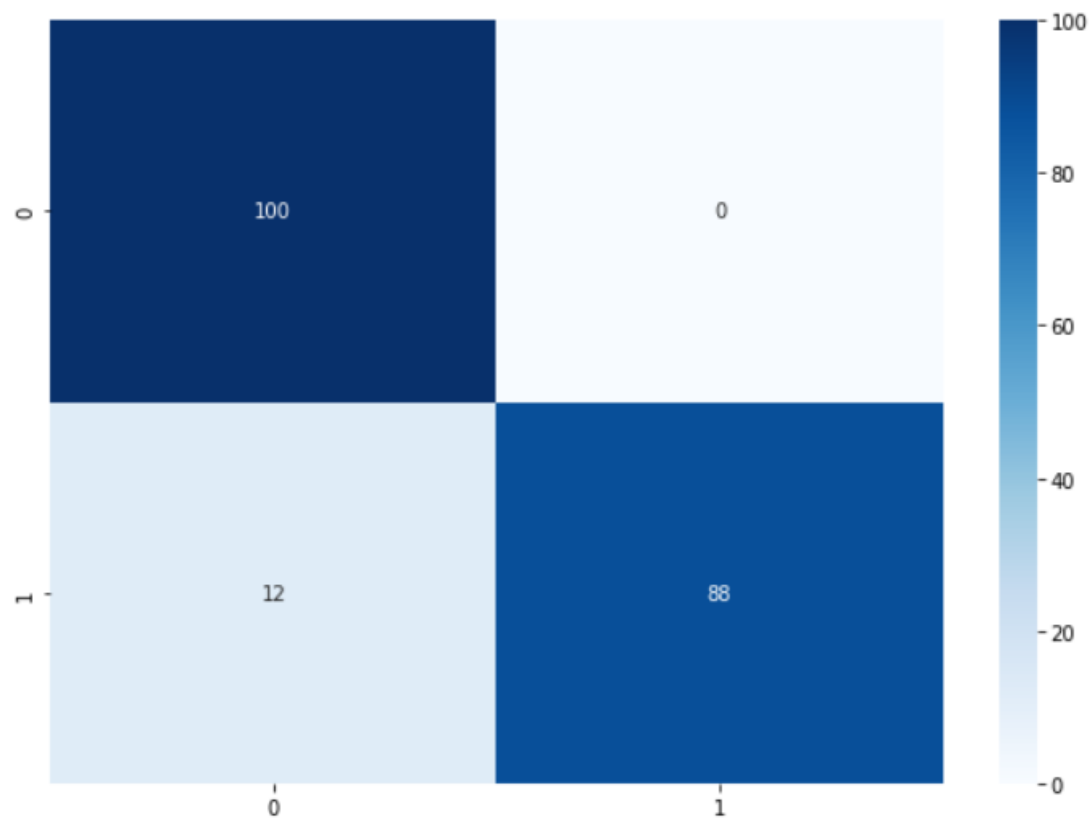
Implementation Details :

- In this model we only used eyes **not** yawn to detect if the drivers are asleep or no .
- We used image data generator because the dataset is small.
- We split our dataset into 85% Training and 15% Testing and split the training into 80% Training and 20% validation.
- The Dataset of 1452 images were split into the training set (1252 images).

Result and Visualization :



Convolution Matrix :



Precision & Recall & Score :

	precision	recall	f1-score	support
close	0.89	1.00	0.94	100
open	1.00	0.88	0.94	100
accuracy			0.94	200
macro avg	0.95	0.94	0.94	200
weighted avg	0.95	0.94	0.94	200