Conv2D

BatchNormalization

Fire Module *

MaxPooling

ReLU

SoftMax

Training Dataset

Testing Dataset

Dataset

Augmentation
Dataset

Pre-processing
dataset

SSD

Dlip

Haar

SqueezeNet model

Training
model

Yawning   Non-Yawning   Close Eyes   Open Eyes

Testing model

Conv2D 1x1

Squeeze
Phase

BatchNormalizatio

ReLU

Conv2D

Conv2D

Concatenat

Expansion
Phase

Microstructure of the Fire *

Input Driving Videos

Region on Interest

Extracted Frames

MAR

Dlib

640x480

> 35

Yawn Distance

Drowsy

Not Drowsy

Data Split

Initialize Deep Learning Model (CNN, CNN+RNN)

Images Resizing

64x64

70%   15%   15%

Model Execution

Hyperparameter Tuning

Testing

Training

Normalization

Flip   Shear   Zoom

Data Augmentation

Drowsiness Detection using CNN

Not Drowsy

Drowsy

Model Evaluation

- Accuracy
- Precision
- Recall
- F1 Score

FIGURE 1.2: *Basic architecture of drowsiness detection*