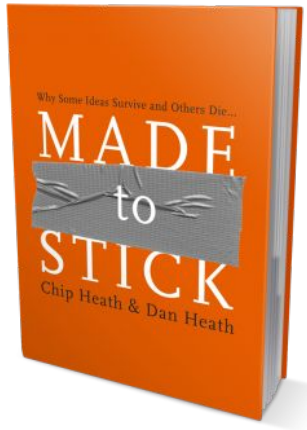
Driver - Sleep Awake?

Arduino Nano 33 BLE Sense

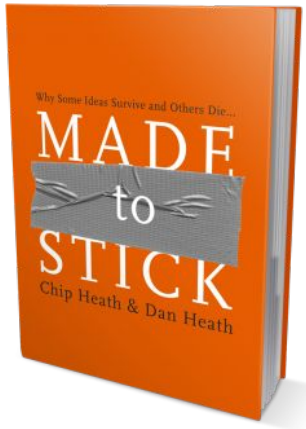
Why?

- Safety of the drivers
- Tracking driver behavior (for family members and employers)
  - Uber drivers
  - Truck drivers
  - Parents, Partners and Kids



Challenges

- Camera Resolution
- Building the Dataset
- Arduino Memory and Model Size
- Using the Bounded Boxes for Object Detection



Neural Network settings

Training settings

Number of training cycles: 20

Learning rate: 0.0005

Data augmentation: ☐

Advanced training settings

Validation set size: 20 %

Split train/validation set on metadata key:

Batch size: 32

Auto-weight classes: ☐

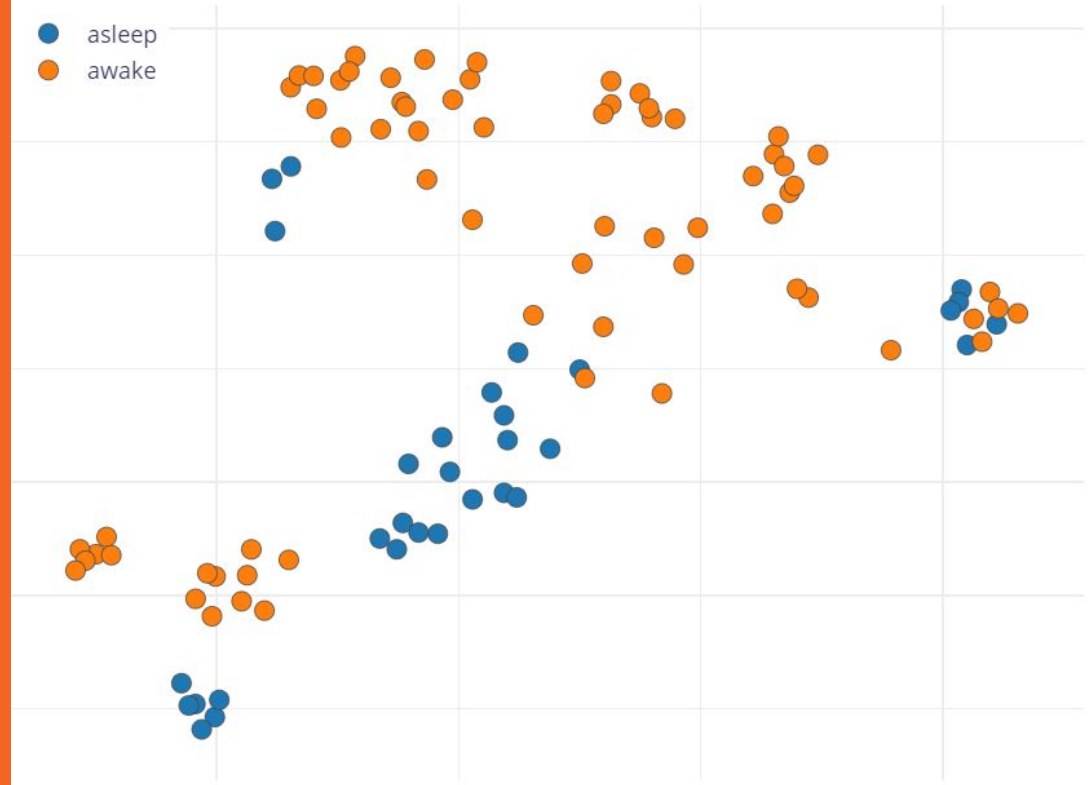
Profile int8 model: ☑

Neural network architecture

Input layer (27,648 features)

MobileNetV1 96x96 0.25 (no final dense layer, 0.1 dropout)

Feature explorer



Model

Model version: Quantized (int8)

Last training performance (validation set)

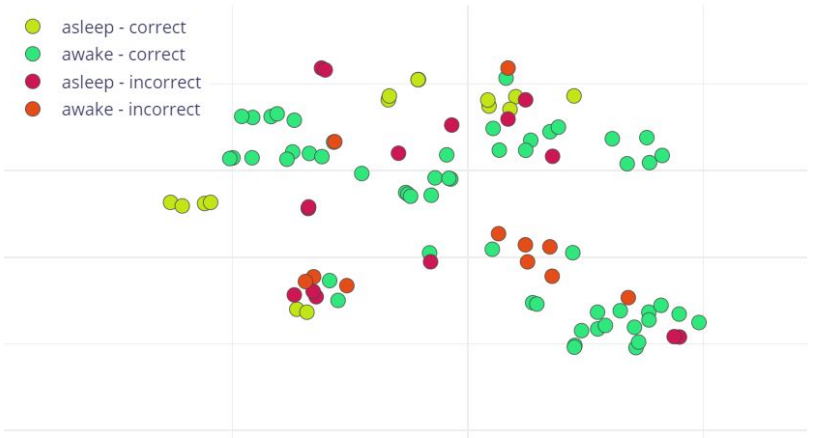
ACCURACY
75.0%

LOSS
0.59

Confusion matrix (validation set)

	ASLEEP	AWAKE
ASLEEP	50%	50%
AWAKE	18.8%	81.3%
F1 SCORE	0.44	0.84

Data explorer (full training set)

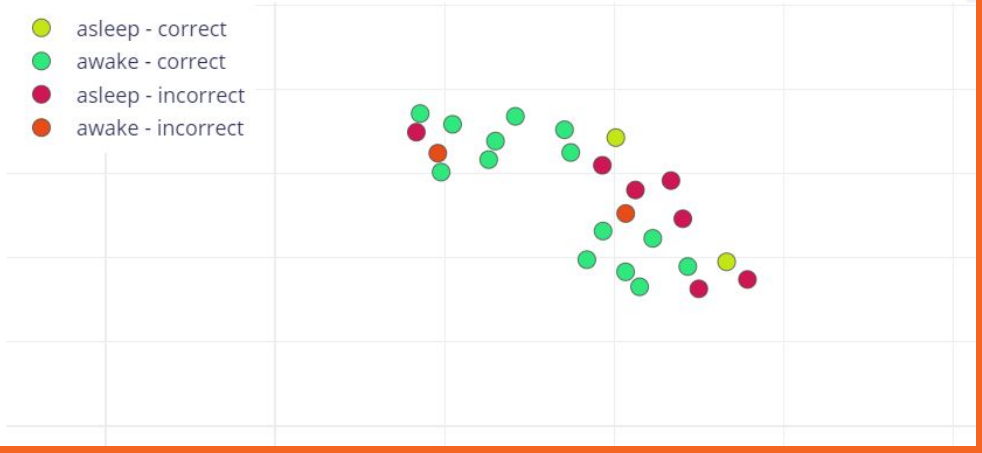


Model testing results

ACCURACY
64.00%

	ASLEEP	AWAKE	UNCERTAIN
ASLEEP	22.2%	44.4%	33.3%
AWAKE	12.5%	87.5%	0%
F1 SCORE	0.31	0.82	

Feature explorer



```
Starting inferencing in 2 seconds...
Taking photo...
Predictions (DSP: 13 ms., Classification: 786 ms., Anomaly: 0 ms.):
    asleep: 0.29688
    awake: 0.70312
 BLUE
```

```
Starting inferencing in 2 seconds...
Taking photo...
Predictions (DSP: 13 ms., Classification: 786 ms., Anomaly: 0 ms.):
    asleep: 0.43359
    awake: 0.56641
RED
```

Future Goals

- Use Bounding Boxes
- Clean Dataset
- Better Quality Camera
- Optimize the Model
- Include a Buzzer
- Include an Accelerometer
- Call the driver
- Connect to Wifi and contact a family member