Milestone 2 - Dataset#1 and Confusion matrix

(Parameter setting and reliability test of a sensor system for infant carrier car seat sensing in a car using a dashboard sensor)

Masters of Engineering
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I. METHODOLOGY

A. EXPERIMENT SETUP

The Red-pataya sensor is installed at the parking lot location where the experiment was carried out. The first thing we did was get acquainted with the measurement tools and procedure. For this, we measured and saved the dataset using the installed GUI_V0.23_2021-11-22. Data is collected with baby doll placed in a carrier in the passenger seat, also the reading without baby doll is also noted. The required measurement scans are obtained with baby placed in the scanning bean of the sensor. The scanned data from sensor is then stored with ADC data and header details.

1) Data Collection and description of measurements.

The experimental setup was properly noted, including all position conditions. This can be seen with the photos of the baby doll placed in baby seater as shown in Figure 1 and Figure 2. We varied systematically the lateral/vertical seat position and/or the angle of incidence of the sonic waves on to the baby doll but made sure to keep the incident beam hit the target properly to get accurate data collection.

Figure 1

Figure 2

2) Measurement details of the Baby doll to car seats.

With baby doll to senor distance measurements. (cm)	carriage handle -62 carriage right- 42 carriage left - 42 towards window -27 baby head - 45 carriage middle -32 baby to window - 40
Without baby doll to senor distance measurements (cm)	carriage-30 carriage left - 43 carriage right 43 carriage handle 41 towards window 25

B. Confusion Matrix is created

To accomplish the classification tasks, the algorithms need to be trained. But toward this milestone we need to have a matrix of the total collected data. The initial dataset is used to generate the confusion matrix. We used python libraries to achieve this. PyCharm IDE development tool was used for generating the plot. The *Confusion Matrix* is shown in Figure 3 show between "With Baby" and "Without Baby."

- Label 1 : for Baby doll detection
- Label 0 : for No Baby doll detection

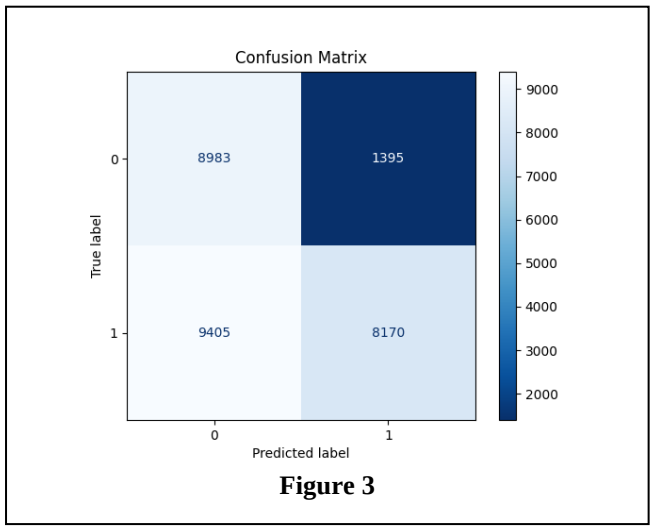

Figure 3

The entire dataset#1 collection can be found in the OneDrive Link - DataSet1

C. The next MileStone

- Converting our ADC sensor data to FFT from all measurements of data set #1.
- We will Create, train, and test an MLP for classifying empty and occupied infant carrier seats.
- Use the FFT data to the MLP and hence achieve a *confusion matrix*.
- This newly trained MLP will be used for further use.

REFERENCES

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[3] https://scikit-learn.org/stable/modules/generated/sklearn.metrics.confusion_matrix.html