Pedestrian Safety

Crosswalk detection, Traffic light recognition

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Crosswalk Detection

Identifying road markings

Handling various crosswalk designs

Crosswalk Light Detection

Recognizing traffic signal structures

Interpreting light colors and pattern

Benefits and Applications

Enhanced pedestrian safety

Assistance for visually impaired individuals

Integration with autonomous driving systems

Smart city traffic management

Data collection

We used data from Roboflow

And it contains 3 categorys

- Crosswalks
- red traffic light
- Green traffic light

And it has 1580 images

Link : https://universe.roboflow.com/dkdkd/capstone-for-detection

Dataset examples


DataBase

We chose MongoDB as our database for several reasons:

1. **Free Version Availability:** MongoDB offers a free tier that supports a wide range of functionalities, making it a cost-effective solution for our needs.
2. **Ease of Use:** MongoDB's document-oriented structure allows for flexible and intuitive data modeling, which accelerates development and simplifies data management.
3. **Scalability:** MongoDB provides horizontal scalability, enabling easy management of large datasets and ensuring the database can grow with our project requirements.

Data processing

After collecting the data, we discovered that the data was not properly organized.

The data was organized by separating the images into separate folders for the classes (red signal, green signal, cross-lines) for training, testing, and validation. Then, data augmentation techniques were used, such as dividing the pixels by 255, rotating the images, shifting the range, shearing, zooming in/out, and horizontal flipping. These steps helped organize the data and increase the diversity of the training data.

Build the CNN Model

A Convolutional Neural Network (CNN) is a deep learning model designed for processing images. It uses special layers to automatically learn and identify features like edges and patterns in the images.

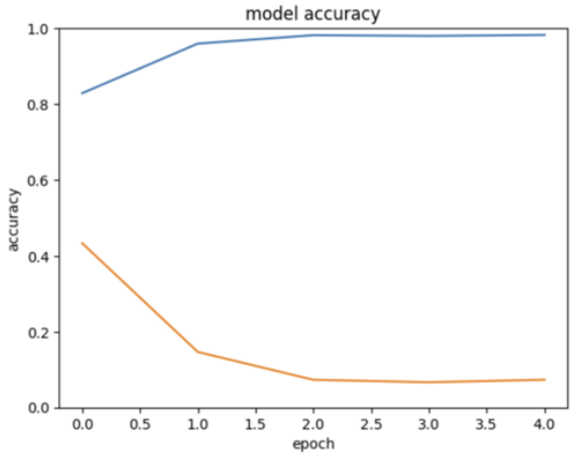
Model Architecture:

- Convolutional layer to learn and extract features.
- Max pooling layer to reduce the dimension of the features.
- Flatten layer to prepare it for the fully connected layers
- Dense layer with ReLU activation to learn complex patterns.
- Dropout layer helps with regularization.
- output layer with softmax activation give us the probabilities of the 3 classes.

Evaluate the model

To evaluate the model we use measurement like accurase , loss, and confusion matrix

And this represent the result on our Train Dataset :



As we can see we have good result and reasonable loos and our epoch result

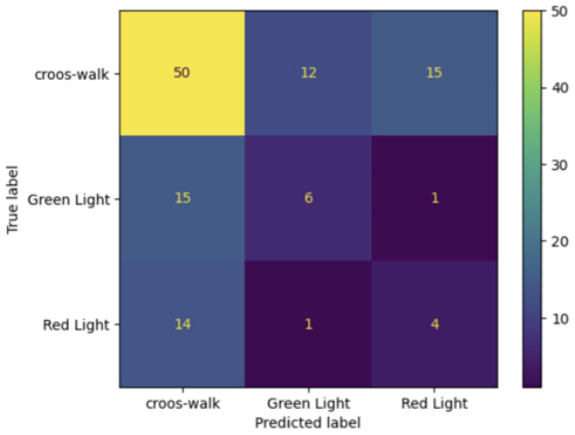
Test :

After we train and fit the model we muser our Test sample and our result was underwhelming we found big drop in accuracy

```
4/4 ━━━━━━━━━━━━━━━━━━━━ 0s 58ms/step
              precision    recall  f1-score   support

           0       0.65      0.66      0.65        77
           1       0.19      0.18      0.19        22
           2       0.28      0.26      0.27        19

    accuracy                           0.51       118
   macro avg       0.37      0.37      0.37       118
weighted avg       0.50      0.51      0.50       118
```



Try number	1	2	3	4	5
Accuracy	0.55	0.51	0.56	0.45	0.48

Average Accuracy Score **0.51**

Name	Task assessment
Abdullah mohammed Altamimi	Implementing and train the CNN model
Saad Alkathiri	Build and initialize the database
Ziyad fahad bin tuwaim	Evaluating the model and plotting
Nawaf Alomeir	Data collection and Data preprocessing