Accident Detection System

Documentation

Problem Statement:-

- A significant number of people are ignored or forgotten following road accidents in order to avoid unwanted inquiries that may prove fatal to several people.
- As a result of the delay in response time to these accidents, the ambulance or police department is delayed in arriving at the scene..
- In these critical situations every second counts for life.

There is not any concrete step to stop the loss of lives due to such road accidents.

Project Overview:-

- The purpose of our project is to provide citizens with safety alerts as they travel on the highway based on their location, and if an accident occurs, it also provides a help feature that will notify the predetermined individuals.

End Users:-

Public and Police Authorities

- Authorities can use the System to conceal accident areas and divert traffic, reducing traffic congestion caused by accidents**.**

The Purpose of The Project:-

- The purpose of the Road Accident Detection System is to provide citizens with accident alerts as they travel on the highway based on their location.
- If an accident occurs, it also provides a help feature that will notify the concerned authorities.

Modelling:-

- We have used a Single frame CNN Model to implement this solution.
- The Single Frame model is an example of classifying videos by simply aggregating predictions across single frames/images.
- Convolutional neural network is composed of multiple building blocks, such as convolution layers, pooling layers, and fully connected layers, and is designed to automatically and adaptively learn spatial hierarchies of features through a backpropagation algorithm.

1. Read all the frames that were extracted earlier from the training images dataset.
2. Define the architecture of our model.
3. Finally, train the model and save its weights.
4. Evaluate with the test data.
5. Try till you get correct results.

Libraries Used In The Project:-

✔ cv2
✔ Twilio
✔ Numpy
✔ Matplotlib

✔ Tensorflow
✔ Ipython.display
✔ Keras

Data and Processing

Training Dataset:

For the final dataset, we used pictures of accidents involving cars, buses, bikes, etc. that were captured by CCTV cameras placed at street corners. To keep classes balanced, we took an equal amount of negative cases (without an accident).

Processing:

Each video is divided into its constituent frames for independent analysis. Each of these images is composed of a two-dimensional array of pixels, each of which contains information on the RGB colour values. We transform the 3-D RGB colour arrays into grayscale in order to decrease the dimensionality at the individual image level. Additionally, we resize each image to (144, 256) in order to simplify computations on a CPU and effectively reduce the size of each image to a 2-D array of 144x256.

The Algorithm:

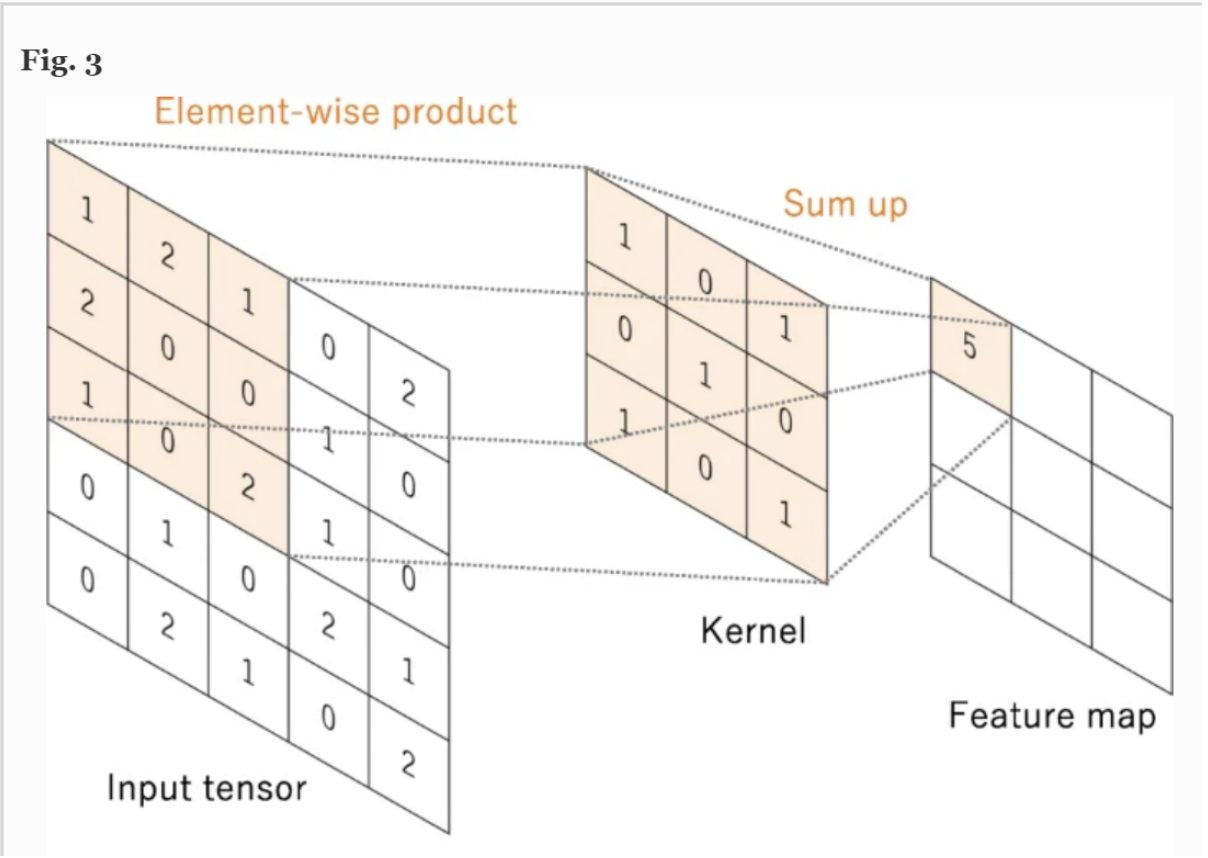
Using a Convolutional Neural network method, the challenging task of categorising video material is taken on.
Each video consists of a collection of discrete, chronologically ordered images.

Convolution:-

Convolution is a specialized type of linear operation used for feature extraction, where a small array of numbers, called a kernel, is applied across the input, which is an array of numbers, called a tensor. An element-wise product between each element of the kernel and the input tensor is calculated at each location of the tensor and summed

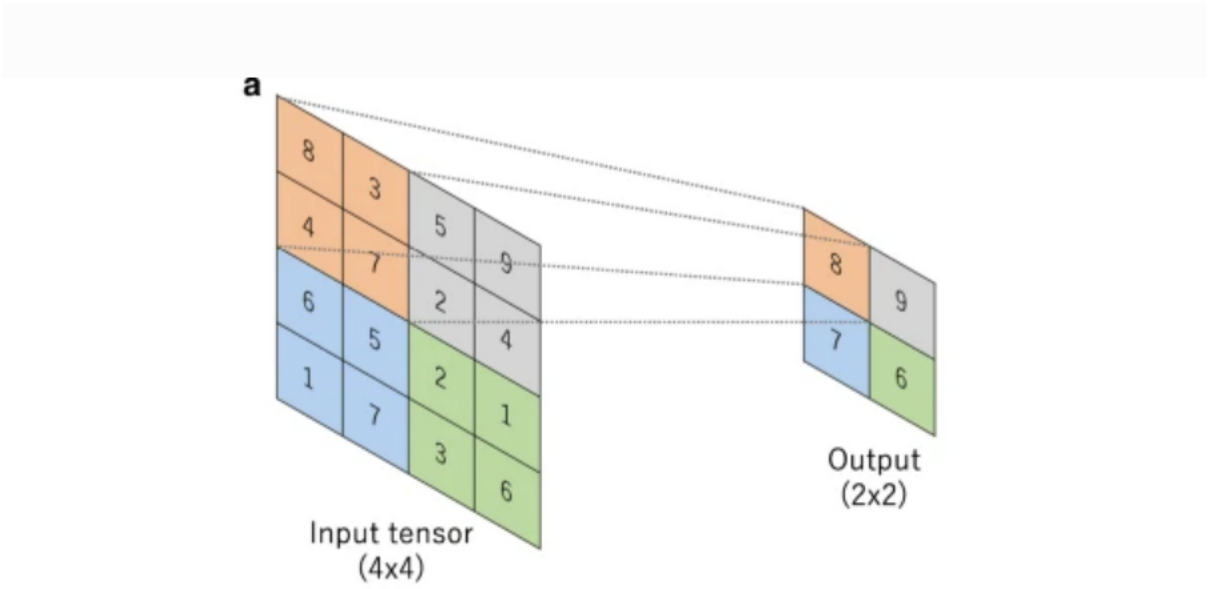
to obtain the output value in the corresponding position of the output tensor, called a feature map

Fig. 3



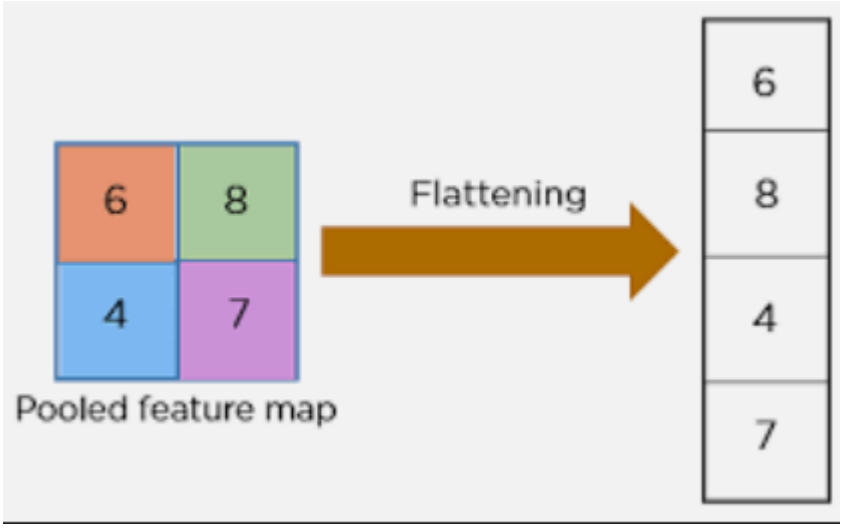
Max pooling:-

➢ The most popular form of pooling operation is max pooling, which extracts patches from the input feature maps, outputs the maximum value in each patch, and discards all the other values . A max pooling with a filter of size 2 × 2 with a stride of 2 is commonly used in practice



Flattening :-

- ➢ It is converting the data into a 1-dimensional array for inputting it to the next layer. We flatten the output of the convolutional layers to create a single long feature vector. And it is connected to the final classification model, which is called a fully-connected layer.

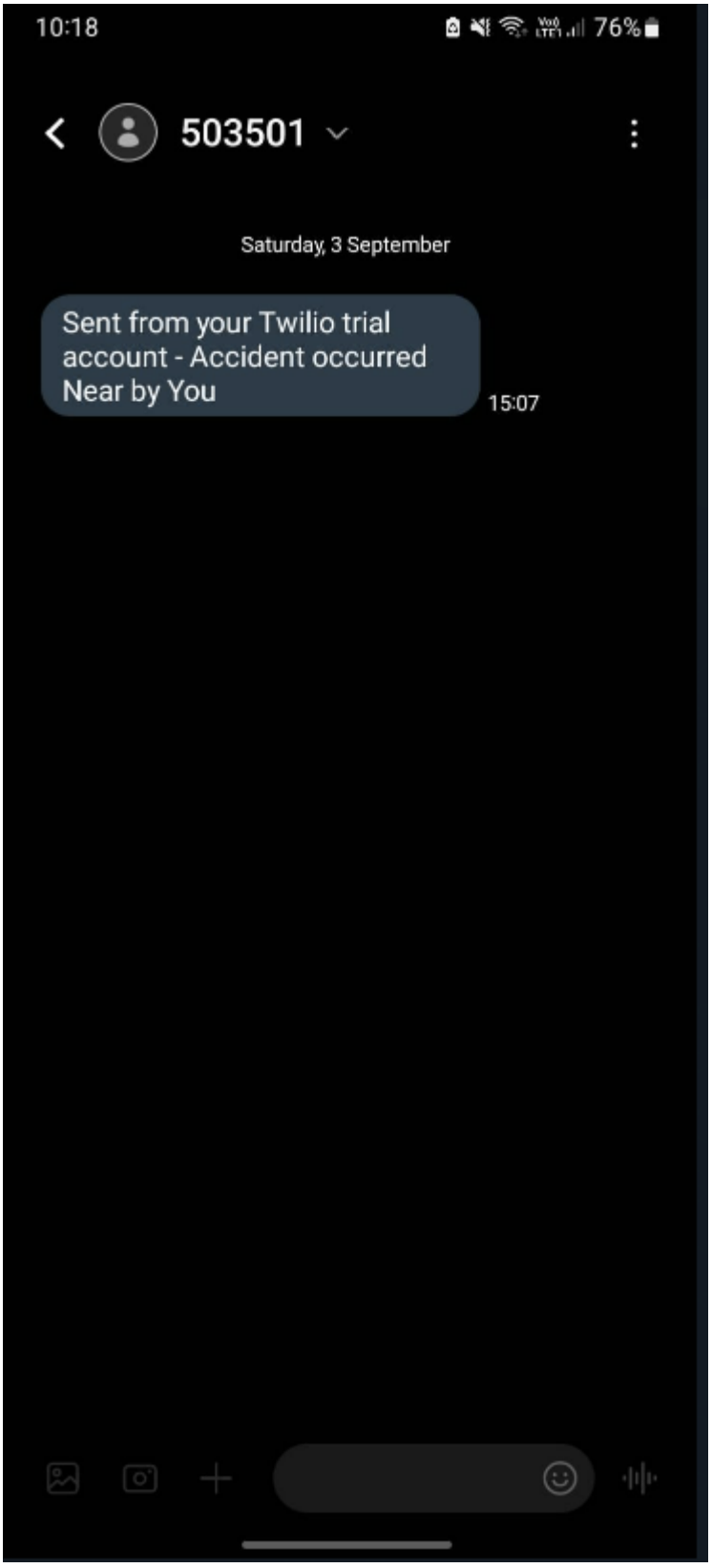


Dense:-

- ➢ The dense layer's neuron in a model receives output from every neuron of its preceding layer, where neurons of the dense layer perform matrix-vector multiplication

Twilio:-

- Twilio is a customer engagement platform used by hundreds of thousands of businesses and more than ten million developers worldwide to build unique, personalized experiences for their customers.
- By creating an account twilio official Website We have used our SID,Auth token to create a Client and used our twilio number to send Require messages.


10:18
76%
503501
Saturday, 3 September
Sent from your Twilio trial account - Accident occurred Near by You
15:07

Results:-

- The result of this project is to detect the occurrence of an accident intelligently using CCTV cameras and inform the previously stored numbers of its location.
- So that the ambulance or the nearby police department may provide immediate assistance**.**

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