JYOTI NIVAS COLLEGE AUTONOMOUS
POST GRADUATE CENTRE

DEPARTMENT OF MCA

TECH-ON-TOP

E-JOURNAL

ON

RESEARCH PROJECT PROBLEM STATEMENT PART- 2

ISSUE 5, JANUARY 2022

VEHICLE DETECTION AND COUNTING

PROBLEM STATEMENT

The result of the increase in vehicle traffic, many problems have appeared. For example, traffic accidents, traffic congestion, traffic induced air pollution and so on. Traffic congestion has been a significantly challenging problem.

Vehicle detection and counting is important in computing traffic congestion on highways. The main goal Vehicle detection and counting in traffic video project is to develop methodology for automatic vehicle detection and its counting on highways. A system has been developed to detect and count dynamic vehicles efficiently.

METHODOLOGY

1) **Foreground Extraction**
   A background subtraction technique is used to firstly detect pixels that would belong to a moving vehicle. In particular, a background image of the road.

2) **Gray-scale conversion**
   Background image of the road, which contains no vehicle, and the current frame in the video are converted from color (RGB) to gray-scale image. Then, for each pixel (x, y), the gray intensity of the background image is subtracted by that of the current frame.

3) **Establishing the Region of intensity:**
   It is predefine for vehicle counting.

4) **Vehicle Detection**
   In this step, only pixels in the ROI are considered while the others are deleted .Thresholding operation is applied to the difference image to separate foreground pixels from background pixels based on their intensity.
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5) **Vehicle Counting**
   If the vehicle pass from ROI it will detect the vehicle and count the vehicle

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VECHILE NUMBER PLATE RECOGNITION

PROBLEM STATEMENT

Due to the increasing number of vehicles nowadays, the modern city needs to establish the effective and efficient automatic traffic system for the management of the traffic law enforcement. Vehicle Number plate detection and recognition is a key technique in most of traffic related applications in the image processing domain. This can be assisted in the detection of stolen vehicles. The detection of stolen vehicles can be done in an efficient manner by using the Vehicle Number plate detection systems located in the highways.

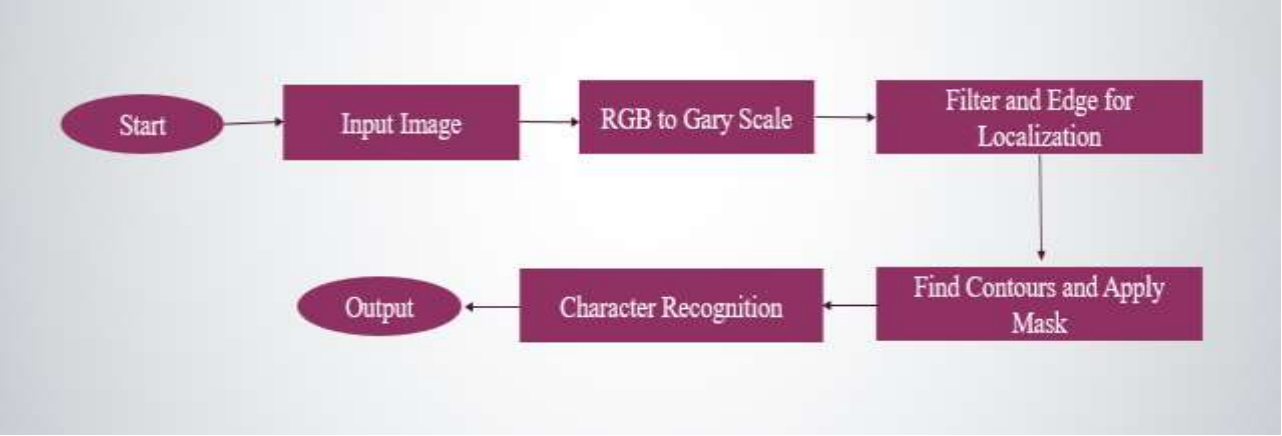
METHODOLOGY

Image Processing:

RGB to Gray Conversion: Color image does not help to identify important edges and other features. Processing of RGB image is complex and it requires more processing time, so first we have to convert colored image to gray scale image.

Bilateral Filtering: To remove noise in the image.

Filter and Edge (Canny Edge) for Localization:



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UNDER WATER IMAGE ENCHACEMENT

PROBLEM STATEMENT

Due to the poor visibility conditions the environment of the world's oceans is still not well explored. For this purpose underwater image enhancement techniques are used, because the earth is an aquatic planet and as the fact about 70% of its surface is covered by water. The underwater image suffers from low contrast and resolution due to poor visibility conditions, hence an object identification become typical task. The processing of underwater image captured is necessary because the quality of underwater images affect and these images leads some serious problems when compared to images from a clearer environment. A lot of noise occurs due to low contrast, poor visibility conditions, absorption of natural light, non uniform lighting and little color variations, and blur effect in the underwater images, because of all these reasons number of methods are there to cure these underwater images.

METHODOLODY

- preprocessing
- Gamma correction
- Dehaze
- Clahe
- Histogram matching.

Underwater image will be taken as the input for preprocessing the median filters is applied to remove noise from an image and after noise remove the gamma method is applied for the image to improving the brightness of dimmed images and later for this image dehazing method is applied for remove haze and darkness to get better visual quality. And contrast and brightness of dehaze image is recovered by using clahe method. Finally histogram matching is applied to generate an output image that is based upon the shape of specific histogram.

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OBJECT DETECTION USING CNN

PROBLEM STATEMENT

- In recent years, autonomous/self-driving cars have drawn much interest as a topic of research. For a car to be a truly autonomous, it must make sense of the environment through which it is driving. The autonomous car must be able identify and keep track of objects.
- The goal of the research is to identify the objects around the autonomous vehicle to aid in safe navigation of the autonomous vehicle even in difficult weather conditions such as fog, rain, dust and snow. It focuses on training the autonomous vehicles to detect objects in such conditions when the vision might be poor.

METHODOLOGY

- The approach of using Image Segmentation using neural networks is often referred to as Image Recognition. It uses AI to automatically process and identify the components of an image like objects, faces, text, hand-written text etc.
- Convolutional Neural Networks are specifically used for this process because of their design to identify and process high-definition image data.
- The CNN based models in Deep Neural Networks are used in video and image processing. Filters or kernels are the building blocks of CNN. By using conventional operations kernels extract relevant and correct features from the input data.

CONVOLUTIONAL NEURAL NETWORK

Neural networks are the inspiration of human brain. The nodes of the neural network represent the neurons of the human brain. These nodes are grouped into layers and when a stimulus occurs in the nodes, a process takes place. Deep learning is a branch of Artificial Intelligence which involves algorithms that perform like human brain. Deep Neural Networks analyse and predict a solution for the problems.

Convolutional Neural Network (CNN) is a type of deep neural network which is concerned with image and video processing mostly. CNN is used to process image to extract the essential features and make predictions. Convolutional layer is the main part of CNN. Convolutions are performed to obtain essential high level features of the image. Convolution is an operation performed by applying a block of filter over an input image to obtain feature map as output.

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IDENTIFICATION OF ONLINE FAKE CONTENT

PROBLEM STATEMENT

Over the recent years, the growth of online social media has greatly facilitated the way people communicate with each other. Users of online social media share information, connect with other people and stay informed about trending events. However, much recent information appearing on social media is dubious and, in some cases, intended to mislead. Such content is often called fake news. Large amounts of online fake news has the potential to cause serious problems in society.

ENSEMBLE LEARNERS

We proposed using existing ensemble techniques along with textual characteristics as feature input to improve the overall accuracy for the purpose of classification between a truthful and a false article. Ensemble learners tend to have higher accuracies, as more than one model is trained using a particular technique to reduce the overall error rate and improve the performance of the model. A classification algorithm can be trained on a particular dataset with a unique set of parameters that can produce a decision boundary which fits the data to some extent. The outcome of that particular algorithm depends not only on the parameters that were provided to train the model, but also on the type of training data. If the training data contains less variance or uniform data, then the model might overfit and produce biased results over unseen data. Therefore, approaches like cross validation are used to minimize the risk of overfitting. A number of models can be trained on different set of parameters to create multiple decision boundaries on randomly chosen data points as training data. Hence, using ensemble learning techniques, these problems can be addressed and mitigated by training multiple algorithms, and their results can be combined for near optimum outcome.

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SEMANTIC SIMILARITY FOR AUTOMATIC PAPER EVALUATION

PROBLEM STATEMENT

A challenging process arises in the evaluation of students' answer scripts. Evaluation is even difficult when the number of answer scripts is more in number as it will require a lot of effort from evaluators. The Automatic descriptive answer evaluation system makes evaluation much faster and easier because evaluating manually requires concentration and lots of patience. Automatic evaluation is effective in such cases.

The evaluation involves the assessment of answer scripts documents submitted by the students. The comparison to be made is between the submitted answer script and the key answer script. In the automatic evaluation process, an area involved is semantic similarity search, to find how accurate is the keywords, text, and meaning in students' submitted documents to the key answer scripts.

METHEDOLOGY

Semantic Similarity also called semantic textual similarity is an area in Natural Language Processing (NLP), which uses a defined metric to measure the relationship between texts or documents. The goal is a program capable of interpreting the context of documents, as well as the contextual nuances of the language within them.

The problem of Semantic similarity is been approached in many different ways. The most straightforward and effective approaches that we came across is to encode sentences with Transformer, a powerful model to encode sentences to get their embeddings, and then use cosine similarity, a similarity metric to calculate the similarity scores. Based on the similarity score, it is possible to determine if two texts have similar or more different meanings.

SentenceTransformers, a library is used, which will provide a method for calculating dense vector representations for texts. SentenceTransformers come with a variety of pretrained models that are fine tuned for specific tasks. The stsb-roberta-large model, uses ROBERTA-large as a base model, perfomes the best when used along with mean pooling for semantic similarity.

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