ISSN No:-2456-2165

Content Based Image Retieval Using Faster RCNN

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Abstract:- Content Based Image retrieval is a process of retrieving the images similar to the query image. The most tedious job is retrieving an accurate image for the query image. The collection of images retrieved must be accurate at the same time efficient. The retrieved images are accurate or not can be known only by the direct feedback of the users. The aim of this paper , is to retrieve images similar to the query image by using Faster Region-based Convolutional Neural Networks.Computation of a correlation-based feature matrix is made that comprises of contextual information from the retrieval list which fed into a faster region-based convolutional neural network regression model for evaluating the quality of the retrieved images.

***Keywords*:-** *CBIR, Neural networks, Faster RCNN, image retrieval, image processing.*

I. INTRODUCTION

There is always advancement in the data storage hence acquisition of technologies have enabled the development huge data sets. This creates the necessity of developing information system which efficiently manages the huge datasets. The most commonly used approach for retrieving images is the CBIR – Content Based Image Retrieval. CBIR systems try to retrieve images similar to a user-defined requirement or pattern which can be shape sketch, image example and so on. The purpose of CBIR is to support image retrieval based on features like texture, shape, colour that is determined into feature vectors. The main reward of the CBIR approach is the possibility of an automatic retrieval process, as a replacement for of the keyword-based approach, which usually requires man power and inefficient in the usage of database images. There are number of applications on CBIR such as digital libraries, biodiversity information, crime prevention, fingerprint identification, historical research, and medicine and so on. In content-based image retrieval system the texture and colour feature are extracted this is made into a cluster of feature vectors which are similar in the group. From each group sample images are extracted. In CBIR, each image that is stored in the database has its own unique features which is extracted and compared to the properties of the query image. It involves two steps:

- Feature Extraction
- Matching
- Feature Extraction is the process obtaining the unique feature from the differentiable image.
- Matching step involves in the matching of this unique feature to the query image.

II. LITERATURE SURVEY

- "Xian Wang et al", have developed a framework for a low-level characteristic and high-level characteristic. To tackle the issues in low-level features like Color and high-level features of clothing.
- "Issam El-Naqa et al", a learning machine-based framework to human being perceptual similarity for content-based image retrieval. These are examined on microcalcification which are present in clinical mammograms on the basis of retrieval.
- "Gaurav et al", a fast and logically accurate color segmentation technique is used for strengthening the edge based and region-based segmentation. Besides, a new parametric relevance feedback algorithm is unambiguously utilizing information about non relevant examples.
- "Guo-Dong et al", made use of content-based image retrieval for the constrained similarity measure. The constrained similarity measure takes deliberation of the similarity between images and enhances the retrieval performance.

III. PROPOSED SYSTEM

"Ross Girshick" developed an architecture for the detection of object called as Faster RCNN. The networks like YOLO (You Only Look Once) and SSD (Single shot detector) also makes use of convolutional neural networks.

Faster RCNN is basically a composition of 3 layers.

ISSN No:-2456-2165

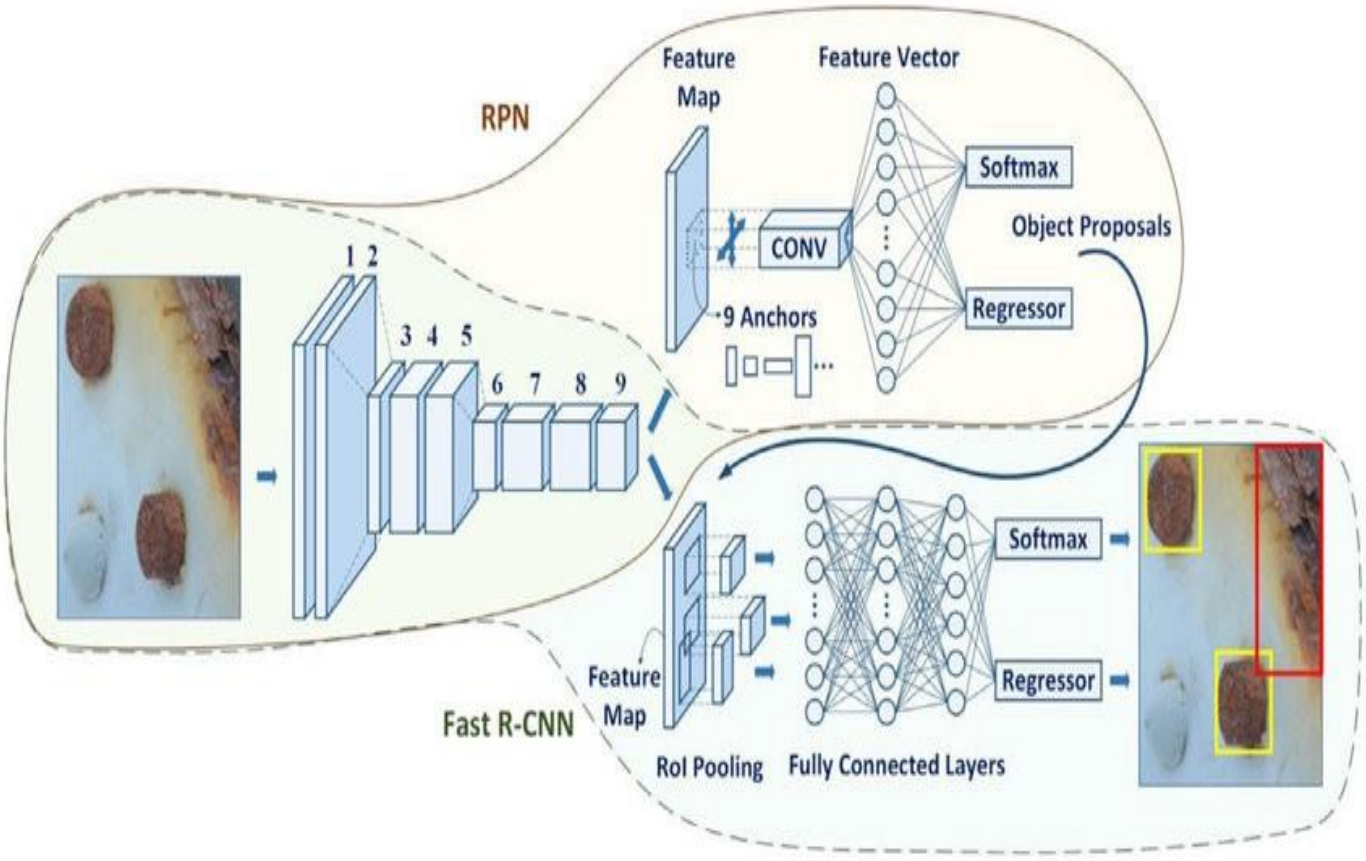

Fig 1:- Composition of Faster RCNN

These layers are trained to extract the unique features of image which helps in differentiating with other images. The first component of the network is the convolutional layer, second is pooling layer and the last layer is the fully connected or another extended layer.

- *PART 1: Convolutional layer*

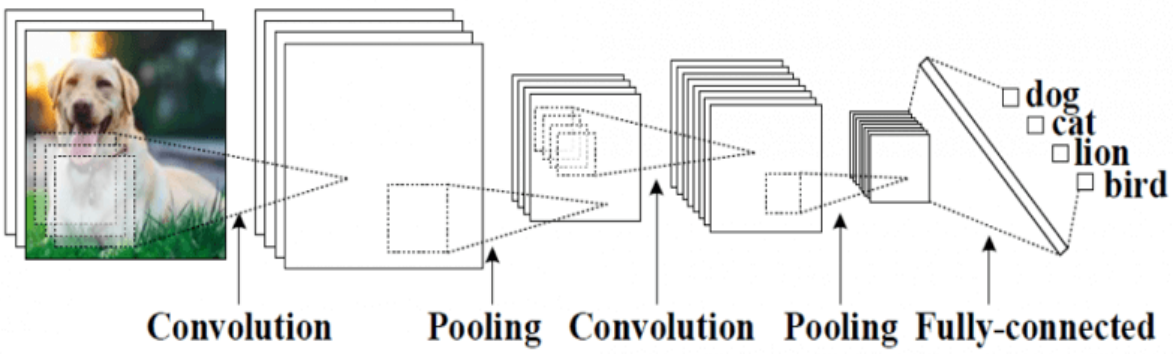

Fig 2:- Convolutional layer

Computation of convolution is made by feature map which is a two-dimensional matrix developed when a filter is sliding along the input image.

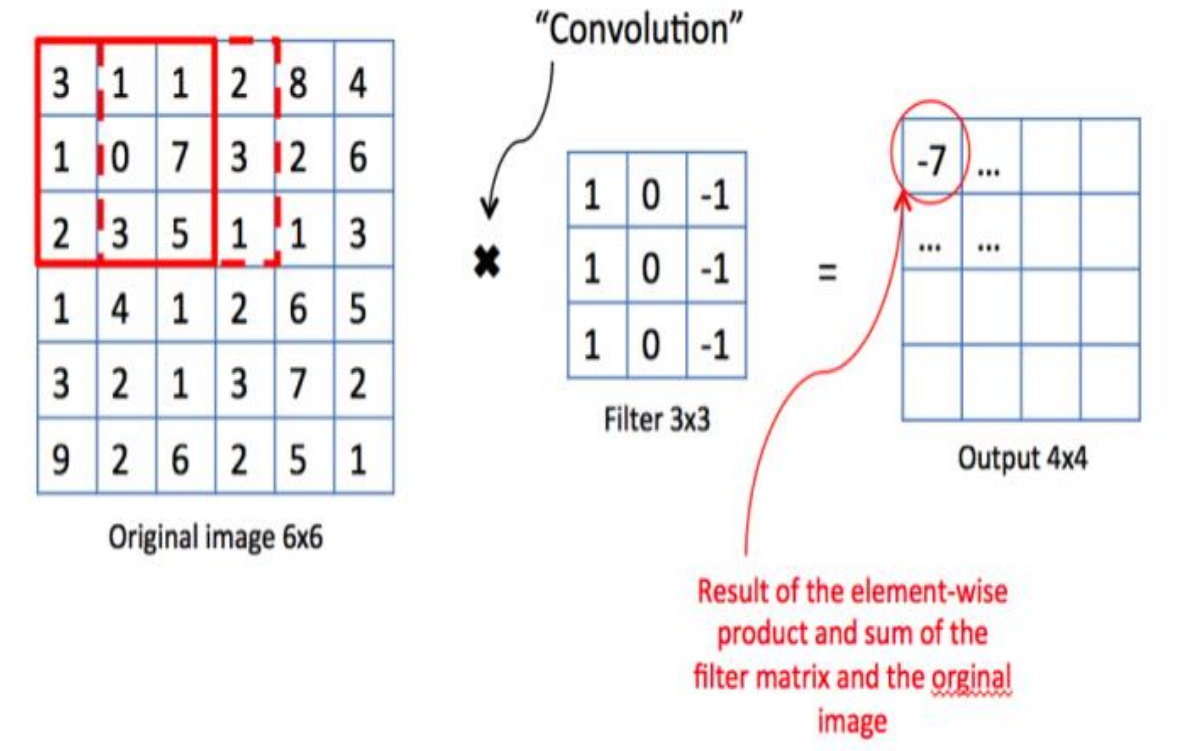

Fig 3:- Two-dimension matrix

The pooling layer helps in eliminating the least pixel values in the feature map. This helps in the elimination of features which are least valued and also helps the fully connected layer to classify the features of the image.

➢ *Part 2: Region Proposal Network (RPN)*

Region Proposal Network is small neural network which contains a classifier and regressor used to examine the bound boxes is the proposal for the presence of object. This network slides over the output of the convolutional neural network i.e., the feature map.

➢ *Part 3: Classes and Bounding Boxes prediction*

The output of RPN which is the regions proposed by this layer with predicted objects classes i.e., classification and bounding boxes examined by regression is fed as input to the fully connected layer.

The Algorithm of Faster RCNN is:

- An image is taken as input and fed to the convolutional neural network layer which produces feature map as an output.
- These feature maps fed to Regional proposal network which gives object proposals as output along with their object values.
- These object proposals decreased into similar size of proposals by the Region of Interest (RoI) pooling layer.
- A SoftMax layer and a linear regression layer is present at the top of fully connected layer which helps in classification. As the proposals are sent to the fully connected layer it gives bounding boxes of objects.

IV. CONCLUSION

The Regional Proposal Network helps the network to run much faster compared to the other networks because of this network Faster RCNN is differentiated from other networks. As this network developed the extinction of Selective search algorithm. The predicted time of the image retrieval is 0.2 seconds. Compared to CNN, RCNN and Fast RCNN this Faster RCNN assess the images at first glance of the query image.

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