ISSN (Online) 2394-6849

International Journal of Engineering Research in Electronics and Communication Engineering (IJERECE)
Vol 4, Issue 3, March 2017

CBIR Based Crack Detection System for Surface Traffic

[1]Dr.Abraham Mathew, [2]Dr.S. Saravanan, [3]Dr. P. Mohanaiah
[1] Associate Professor ,[2] Associate Professor, [3] Professor
N.B.K.R. Institute of Science & Technology :: Vidyanagar, A.P., India

Abstract: **-- Content-based image retrieval (CBIR), also known as Query by Image Content (QBIC) and Content-Based Visual Information Retrieval (CBVIR) is the application of computer vision techniques to the image retrieval problem, that is, the problem of searching for digital images in large databases. The term 'content' in this context might refer to colors, shapes, textures, or any other information that can be derived from the image itself. To retrieve images, users provide the retrieval system with example images. Search results then can be sorted based on their distance to the queried image. The traditional approach of analyzing the condition of a road pavement surface is by manual method. Manual method is time consuming, unreliable, subjective, costly and less efficient. Hence instead of relying the traditional approach, this research proposes a cost effective video based technique which can overcome the drawbacks of the conventional method. Image and video processing have been revolutionized the fields of medicine, space exploration, surveillance, geology, oceanography and it is also a well sought after area, for active research. People will retain only 20% of what they hear and about 30% of what they see, but they remember 50% of what they see and hear, also they will be able to retain as much as 80% of what they see, hear and do simultaneously. This is why multimedia is a powerful tool for various fields. In this research , various hybrid technique is applied to a captured input video to detect the cracks in a road surface.**

Index Terms **— Image, surveillance, multimedia, analyzing, video. Hybrid**

I. INTRODUCTION

The technological revolution in communication and the advancement achieved in different areas, such as signal processing, video processing and computer vision, has revolutionized the world of information systems. The process of extracting the video content can be usually classified into two basic steps such as a)time segmentation stage that allows the identification of meaningful units, like shots, episodes or scenes and b) content analysis stage, which is aiming to characterize regions, objects and movement over each one of the computed video shots. Video cameras of either the solid-state chip or tube type produce analog voltage signals corresponding to the brightness at different points in the image. In the standard definition RS-170 signal convention, the voltage varies over a 0.7-volt range from minimum to maximum brightness. The scan is nominally 525 lines per full frame, with two interlaced 1/60th-second fields combining to make an entire image. Only about 480 of the scan lines are usable, with the remainder lost during vertical retrace. In a typical broadcast television picture, more of these lines are lost due to over scanning, leaving about 400 lines in the actual viewed area. The time duration of each scan line is 62.5 micro seconds (μs), part of which is used for horizontal retrace. This leaves 52 μs for the image data, which must be subdivided into the horizontal spacing of discernible pixels. This research is about to find the scope of using video processing, by hybrid technique, in a specific research problem, which a better option that can minimize the human subjectivity in estimating the destruction of roads.

II. RAW VIDEO

Video is the technology of electronically capturing, recording, processing, storing and reconstructing a sequence of still images, representing scenes in motion. Raw video can be defined as the captured digital video information, before applying the hybrid technique or it is the video which is captured directly using a digital video camera. It is clear that humans generally have no problems recognizing objects in various poses, under different lighting conditions and in the presence of clutter or occlusion, but machines are not so. Applications for digital video are undergoing an explosive growth. This increase is spurred both by the increasing availability of digital video and escalating consumer demand. The availability of digital video has rapidly increased due to developments in low-cost storage media, improved compression techniques, less costly , more sophisticated input modules and higher transmission rates. The visual content of a video shot can be represented by its frames. A video Shot group (Sg) is the intermediate entity between video scenes and video shots, which is composed of several visually similar and temporally adjacent video shots. Thus from top to down, a video has a 4-level hierarchical structure such as Raw Video, Video scenes, Video Shot groups, and

ISSN (Online) 2394-6849

International Journal of Engineering Research in Electronics and Communication Engineering (IJERECE)
Vol 4, Issue 3, March 2017

Video shots. Figure 1.1 shows the 4-level hierarchical structure of a video.

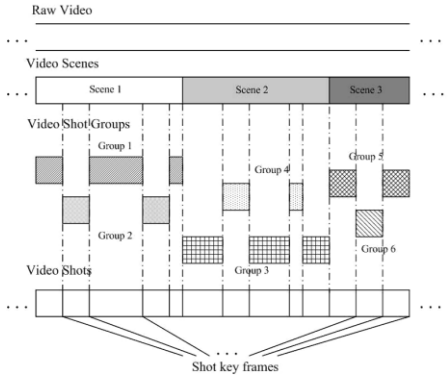

Figure 1.1 Structure of a video

III. TRADITIONAL METHOD

In any country, roads are among the most important public assets. Even though the need for road maintenance is widely recognized, it is still not getting adequately done. Road improvements bring immediate and sometimes dramatic benefits to road users. Certain such benefits may be listed as, fast access to hospitals, schools, and markets, improved comfort, speed, safety and lower vehicle operating costs. For the above mentioned benefits to be sustained, there should be periodic maintenance of road in a systematic and efficient way. Surface transport is the widely accepted and more frequently used mode of transport system in India. The dependence in percentage for various modes of transport system in India, is explained in Figure1.2. The major share in surface transport is by road and greater attention must be given for proper maintenance of roads in the country. The dependence in percentage, on various surface transport system in India, is explained in Figure 1.5.

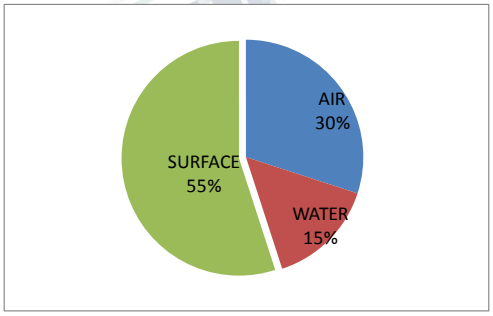

Figure 1.2 Statistics of various modes of transport in India

Surface transport is further divided as road traffic and rail traffic. In India the percentage of road traffic is more than the rail traffic. A comparison chart in percentage showing the users in road and rail traffic is explained in Figure 1.3. Road accidents are tragedies, which involve high human suffering and it it imposes a huge socio economic cost in terms of untimely deaths, injuries and loss of potential income .

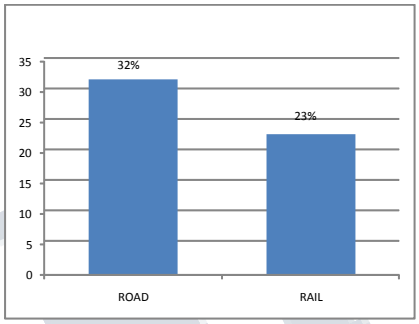

Figure 1.3 Comparison chart

The ramifications of road accidents can be colossal and its negative impact is felt not only on individuals, their health and welfare, but also on the economy. Expansion in the road network, surge in motorization and a rising population of a country contribute towards increasing numbers of road accidents, accident injuries and road accident fatalities. Between 1970 and 2012, the number of road accidents in India, is increased by 4.3 times accompanied with 9.5 times increase in road accidents fatalities and 7.3 times increase in the number of persons injured. Consequently, road safety has become an issue of national concern.

IV. VARIOUS SURFACE CRACKS

Various surface distresses are classified as listed below, which are measured by their severity, and quantified for extent.

- Transverse Cracks
- Longitudinal Cracks
- Alligator Cracks
- Patching/Potholes

V. PROPOSED WORK

In this research , various hybrid technique is applied to a captured input video to detect the cracks in a road surface . The traditional approach of analyzing the condition of a pavement surface is by manual method. Manual method is time consuming, unreliable, subjective,

ISSN (Online) 2394-6849

International Journal of Engineering Research in Electronics and Communication Engineering (IJERECE)
Vol 4, Issue 3, March 2017

costly and less efficient. Hence for instead of relying the traditional approach, this research is proposing a cost effective video based technique which can overcome the drawbacks of the conventional method. Here the raw data is collected by using an in-expensive and omnipresent equipment mounted on passenger vehicle, which is effectively used for video acquisition. Developing a reliable and precise imaging system, for the assessment of pavement distress is a challenging problem because of the presence of different types of distresses, noises, complex texture and color of the pavement surface. The proposed method for crack detection is mainly having three steps. First, the original pavement image will be divided into local grids and the directional texture and shape features are extracted. In the second step, an SVM, classifier is utilized as a pattern classifier and sub images were classified as cracks or non cracks. Finally, a post processing step which includes segmentation and fake crack elimination, is adopted for the final result. Pothole is a type of disruption on the surface of a road, where a portion of the road material has been broken away and leaving a hole. Patching is an area of pavement surface that has been removed and replaced with patching material or an area of pavement surface where additional patching material is applied. Patching encompasses partial or full lane width as shown in Figure4.1(a). Most of the potholes are formed due to fatigue of the road surface. When fatigue fractures develop, they typically interlock in a pattern known as crocodile cracking. The chunks of pavement between fatigue cracks are worked loose and may eventually be picked out of the surface thus forming a pothole as shown in Figure4.1(b) . The formation of potholes is exacerbated by low temperatures, as water expands when it freezes and puts greater stress on an already cracked pavement or road.

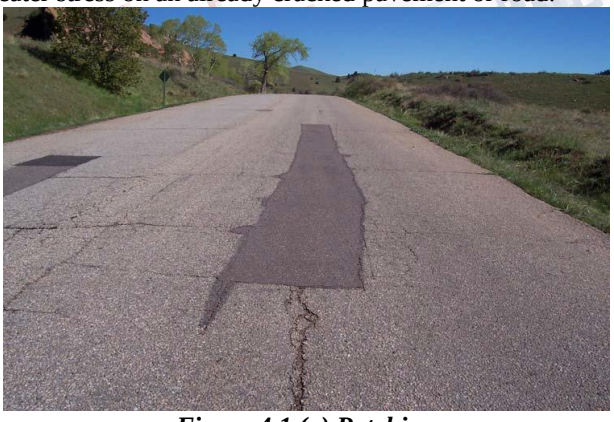

Figure 4.1 (a) Patching

Figure 4.1 (b) Pothole

The proposed method for identifying potholes, is explained in Figure 4.8. Frames are extracted from the captured video and using Content Based Image Retrieval (CBIR), where an image will be used as the query. Here the query image will be the pot hole which is to be separated from the video frames.

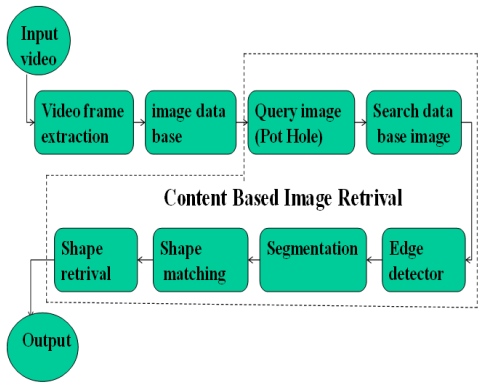

Figure 4.8.

2.1Content Based Image Retrieval

Content-based image retrieval (CBIR), also known as Query by Image Content (QBIC) and Content-Based Visual Information Retrieval (CBVIR) is the application of computer vision techniques to the image retrieval problem, that is, the problem of searching for digital images in large databases. "Content-based" means that the search will analyze the actual contents of the image rather than the metadata such as keywords, tags, and descriptions associated with the image. The term 'content' in this context might refer to colors, shapes, textures, or any other information that can be derived from the image itself. CBIR is desirable because most web based image search engines rely purely on metadata and this produces a lot of garbage in the results. The process of entering the keywords, manually for images in a large database can be inefficient, expensive and may not

ISSN (Online) 2394-6849

International Journal of Engineering Research in Electronics and Communication Engineering (IJERECE)
Vol 4, Issue 3, March 2017

capture every keyword that describes the image. The feature vectors of the images in the database form a feature database. To retrieve images, users provide the retrieval system with example images or sketched figures. The system then changes these examples into its internal representation of feature vectors. In this approach instead of being manually annotated by textual keywords, images would be indexed using their own visual contents. The various stages of content based image retrieval system is explained in the Figure 4.9. The similarities and distances between the feature vectors of the query example or sketch and those of the images in the database are calculated, and retrieval is performed with the aid of an indexing scheme.

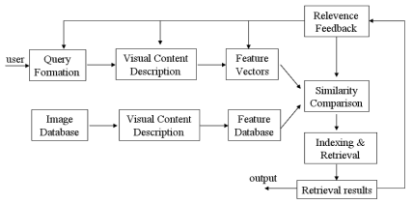

Figure 4.13 Image data base

VI. RESULT

Here for separating only the pothole images from the image data base, keep the image of a pothole as the query image as shown in Figure 4.14 and the retrieved out put from the database is shown in Figure 4.15.

Figure 4.14 Query image

Figure 4.15 Retrieved image

Content-based image retrieval, is an efficient method to perform a search over a database of images, where an image is the query. The input video image of the damaged road will be first converted into frames, and after this conversion, a data base is created as shown in Figure 4.13. Unlike traditional keyword-based searching, the data base image will be searched by some notion of its visual similarity to the query. This method is faster to various conventional methods. A database's usefulness is not only limited by its size, but also by its ability to perform its queries quickly for interactive applications. In addition to speed, the ability of a recognition or retrieval system to perform accurate visual similarity searching is important

REFERENCES

[1] Public watermarking for images," IEEE Trans. Image Process., vol. 10, no. 5, pp. 767-782, May 2001

[2] Abbasi-Dezfouli M. and Freeman T.G. "Patch matching in stereo-images based on shape ISPRS", International Archives of Photogrammetry and Remote Sensing, Vol. 30, No. 3/1, pp.1-8, 1994

[3] Abdaheer M.S. and Khan E. "Making a Long Video Short: Dynamic Video Synopsis". IEEE Computer Society Conference on Computer Vision and Pattern Recognition (CVPR'06), pp. 272-275, 2009.

[4] Abhayaratne G.C.K. "Scalable near-lossless image coding", J. Electronic Imaging, Vol. 15, No. 4, 2006. Ahonen T., Hadid, A. and Pietikainen M. "Face description with local binary patterns Applications to face recognition," IEEE Trans. Pattern Anal. Mach. Intell., Vol. 28, no.12, pp. 2037-2041, 2006.

[5] Aigeltinger E.H., Craig K.R. and DeHoff R.T. "Experimental determination of pavement cracks using photo metric properties", J. Microscopy, Vol. 95, pp. 69-81, 2010.

[6] Anderson J.R. "Segmentation method for three-dimensional visualization of microscopic objects images with a confocal laser scanning microscope", J. Electronic Imaging, Vol. 15, No. 4, 2005

[7] Andrew Kingston and Imants Svalbe, "Shadow removal technique for crack detection by radon transform for n×n images", Image and Vision Computing, Vol. 25, No. 10, pp. 1620-1630, 2007.

[8] Anthony Lobay, David A. Forsyth " Contourlet coefficient analysis for Shape from Texture" International Journal of Computer Vision, Vol. 67, No. 1, pp. 71-91, 2006.

[9] Arce G.R., Paredes J.L. and Mullan J. "Nonlinear flitering for image analysis and enhancement in Handbook of Image and Video Processing (A. Bovic, ed.)", Academic Press, San Diego, 2000

[10] Arthur L. da Cunha, Jianping Zhou and Minh N. Do "The Nonsubsampled Contourlet Transform: Theory, Design, and Applications", IEEE Transactions On Image Processing, Vol. 15, No. 10, pp. 3089-3101, 2006. Bajcsy R. and Lieberman L. "Texture Gradient as a Depth Cue", 2015