

## Dominant Color and Texture Approached for Content Based Video Images Retrieval

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**Abstract :** Content-based retrieval allows finding information by searching its content rather than its attributes. Content-based search and retrieval of video data becomes a challenging and important problem. Every year video content is growing in volume and there are different techniques available to capture, compress, display, store and transmit video while editing and manipulating video based on their content is still a non-trivial activity. Recent advances in multimedia technologies allow the capture and storage of video data with relatively inexpensive computers. However, without appropriate search techniques all these data are hardly usable. Today research is focused on video retrieval. Moreover, content-based video retrieval system requires first of all segment the video stream into separate shots. Video Shot Afterwards features are extracted for video shots representation. And finally, choose a similarity/distance metric and an algorithm that is efficient enough to retrieve query – related videos results. There are two main issues in this process; the first is how to determine the best way for video segmentation and key frame selection. The second is the features used for video representation. Various features can be extracted for this sake including either low or high level features. A key issue is how to bridge the gap between low and high level features. In this paper we presented approach for content based video retrieval based on Dominant color and texture of a video image. We also talk about video Representation, feature extraction from like texture, dominant color and color histogram from video frame.

**Keywords-** Video retrieval, dominant color, Gray level co occurrence matrix. Feature extraction, Key frame extraction, Video representation, and Video segmentation. Image Retrieval, color Histogram

### I. Introduction

Content based video retrieval system has general two stages The first one, the database population stage, performs the following tasks: Video segmentation: Segment the video into constituent shots, Key frame selection: Select one frame or more to represent each shot and Feature extraction: Extract low-level and other features from key frames or their interrelationships in order to represent these frames, hence shots. The second stage, the retrieval subsystem processes the presented query performs similarity matching operations, and finally displays results to the user. [1].

Retrieval of multimedia data is mainly divided into two parts [23].

- Text Based Retrieval
- Content Based Retrieval

Text retrieval is an easy process and it has been used for long time. But it has so many problems like manual text annotations, selecting a text for process. In content based retrieval spatial features like color, shape, texture and the temporal features like motion can be used to retrieve videos.

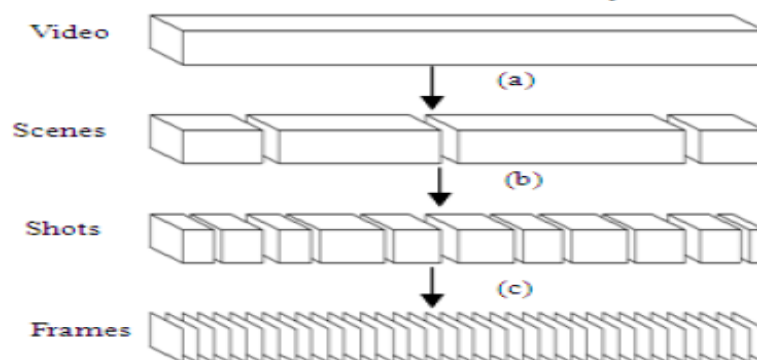


Figure 1: (a) Video into scenes (b) Scenes into shots  
(c) Shots into Frames

Video processing always is performed on frames which are basic block of video. Group of frames captured together is called shot. Few minutes shot may contain hundreds of frames, which makes video large in size. Storing and processing these individual frames are memory and computational expensive. [5]. The Internet forms today's largest source of Information containing a high density of multimedia objects and its content is often semantically related. The identification of relevant media objects in such a vast collection poses a major problem that is studied in the area of multimedia information retrieval. Before the emergence of content-based retrieval, media was annotated with text, allowing the media to be accessed by text-based searching based on the classification of subject or semantics. In typical content-based retrieval systems, the contents of the media in the database are extracted and described by multi-dimensional feature vectors, also called descriptors.[3] Video processing always is performed on frames which are basic block of video. Group of frames captured together is called shot. Few minutes shot may contain hundreds of frames, which makes video large in size. Storing and processing these individual frames are memory and computational expensive [6]. Content based video retrieval is a collection of videos. To begin with, the system splits the video into a sequence of elementary shots and extracts a small number of representative frames from each shot and subsequently calculates frame descriptors depending on the Motion, Edge, Color and Texture features. The motion, edge histogram, color histogram and texture features of the elementary video shots are extracted by employing Fast Fourier transform and L2 norm distance function, Statistical approach The elementary video shots features, extracted using the above approaches, are stored in feature library The color, edge, texture and motion features are extracted for a query video clip and evaluated against the features in the feature library[16].Each video is divided in to scenes and each scene consists of meaning full shots. A shot is defined as one or more frames. Shot represents a continuous action in time or space. A frame has a real world objects in it [2].

## II. Video Reprazentation

Video sequence contain large amount of information. Video segmentation is first step towards the content based video search aiming to segment moving objects in video sequences [1]. Video sequences are rich in information, large in storage requirements, and have a time dimension. Thus it is extremely useful to have effective video representation and abstraction tools so that video content can be represented compactly.[5] Compact representation of video allows the user to see the main video contents quickly without going through the video sequentially. Fig. 2 shows video is divided into no of shot, and shot contain number of frame.

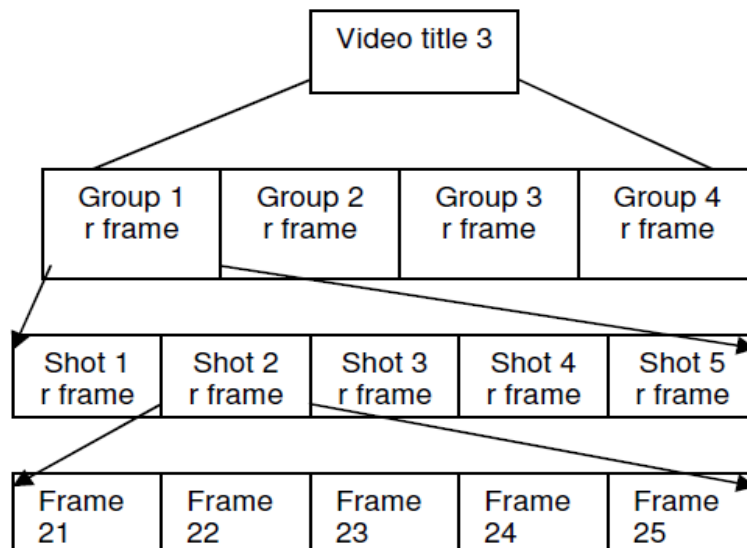


Figure 2: Video Representation

## III. Proposed Method

Only simple features of image information cannot get comprehensive description of image content. We consider the color and texture features combining not only be able to express more image information, but also to describe image from the different aspects for more detailed information in order to obtain better search results. The proposed method is based on dominant color and texture features and Histogram of an image. Video Retrieval algorithm is as follows:

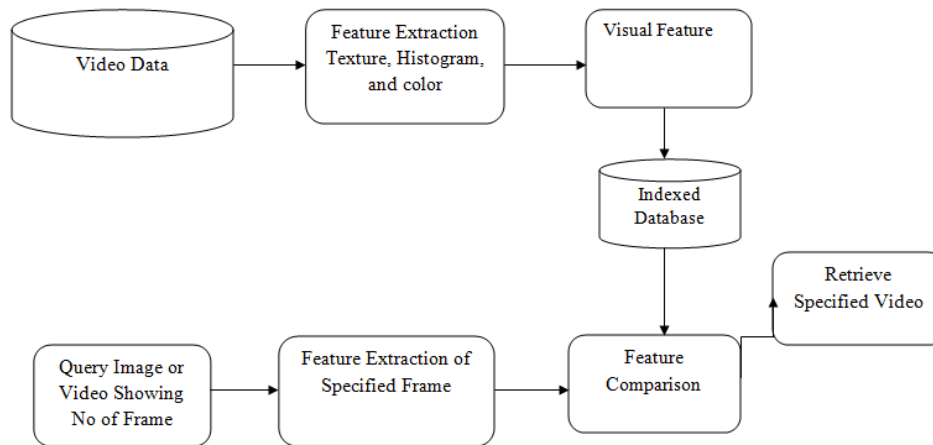


Figure 3: Block Diagram of Proposed Video Retrieval System

- Step 1:** First divide the video into no of image or frame
- Step2:** Uniformly divide each image in the database and the target image into 16-coarse partitions as shown in Fig.1.
- Step3:** For each partition, the Centroid of each partition is selected as its dominant color.
- Step4:** Obtain texture features (Energy, Contrast, Entropy and inverse difference) Gray Level Co-Occurrence Matrix (GLCM).
- Step 5:** Extract Feature from colour histogram for Efficient Video retrieval
- Step5:** construct a combined feature vector for color and texture and Color Histogram
- Step6:** Find the distances between feature vector of query Video and the feature vectors of target Video using weighted and normalized Euclidean distance.
- Step7:** Sort the Euclidean distances by comparing the query video and database video
- Step8:** Retrieve most similar Video with minimum Distance from Video data.

#### IV. Feature Extractions

##### 4.1 Color Feature Representation

In general, color is one of the most dominant and distinguishable low-level visual features in describing video image.[7] Many CBIR systems employ color to retrieve images In theory, it will lead to minimum error by extracting color feature for retrieval using real color image directly, but the problem is that the computation cost and storage required will expand rapidly In fact, for a given color video image, the number of actual colors only occupies a small proportion of the total number of colors in the whole color space, and further observation shows that some dominant colors cover a majority of pixels[8]

##### 4.2 Extraction of dominant color of an image:

The procedure to extract dominant color of an image is as follows: According to number of experiments, the selection of color space is not a critical issue for Dominant colour descriptor extraction. Therefore, for simplicity and without loss of generality, the RGB colour space is used[17].Firstly, the RGB color space is uniformly divided into 8 coarse partitions, as shown in Fig.1 colors located on the same partitioned block, they are assumed to be similar. After the above coarse partition, the centroid of each partition (“color Bin” in MPEG-7) is selected as its quantized color.

Let  $X=(X_R, X_G, X_B)$  represent color components of a pixel with color components Red, Green, and Blue, and  $C_i$  be the quantized color for partition  $i$  [17,18]The average value of color distribution for each partition center can be calculated by

$$\bar{X}_i = \frac{\sum_{X \in c_i} X}{\sum_{X \in c_i} 1} \tag{1}$$

After the average values are obtained, each quantized color can be determined by using

$$C_i = (\bar{X}_i^R, \bar{X}_i^G, \bar{X}_i^B) (1 \leq i \leq 8) \tag{2}$$

In this way, the dominant colors of a video image will be obtained.

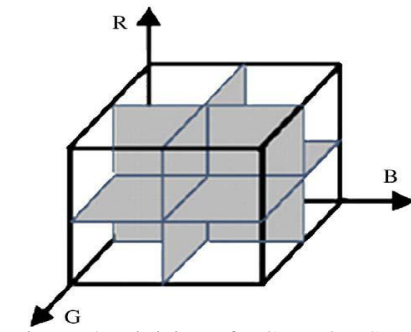


Figure 4: Division of RGB color Space

### 4.3 Texture feature

Texture feature extraction based on GLCM:

GLCM creates a matrix with the directions and distances between pixels, and then extracts meaningful statistics from the matrix as texture features. In this paper, we propose a texture representation for image retrieval based on GLCM. GLCM [16, 17] is created in four directions with the distance between pixels as one. Texture features are extracted from the statistics of this matrix. Four GLCM texture features are commonly used which are in following manner:

$$P(i, j | d, \theta) = \frac{P(i, j | d, \theta)}{\sum_i \sum_j P(i, j | d, \theta)} \quad (3)$$

GLCM [17, 18] is composed of the probability value, it is defined by  $P(i, j | d, \theta)$ , GLCM expresses the texture feature according the correlation of the couple pixels gray-level value at different positions. It quantification ally describes the texture feature. In this paper, four texture features are considered. [14] They include energy, contrast, entropy, inverse difference.

$$\text{Energy } E = \sum_x \sum_y P(x, y)^2 \quad (4)$$

It is a texture measure of gray-scale image represents homogeneity changing, reflecting the distribution of image gray-scale uniformity of weight and texture. Contrast is the main diagonal near the moment of inertia, which measures how the values of the matrix are distributed and number of images of local changes reflecting the image clarity and texture of shadow depth. Large Contrast represents deeper texture.

$$\text{Contrast } I = \sum \sum (x-y)^2 P(x, y) \quad (5)$$

Contrast is the main diagonal near the moment of inertia, which measure the value of the matrix is distributed and images of local changes in number, reflecting the image clarity and texture of shadow depth. Contrast is large means texture is deeper.

$$\text{Entropy } S = - \sum_x \sum_y p(x, y) \log_2 p(x, y) \quad (6)$$

Entropy measures randomness in the image texture. Entropy is minimum when the co-occurrence matrix for all values is equal. On the other hand, if the value of co-occurrence matrix is very uneven, its value is greater. Therefore, the maximum entropy implied by the image gray distribution is random.

$$\text{Inverse Difference } H = \sum_x \sum_y \frac{1}{1+(x-y)^2} p(x, y) \quad (7)$$

It measures number of local changes in image texture. Its value in large is illustrated that image texture between the different regions of the lack of change and partial very evenly. Here  $p(x, y)$  is the gray-level value at the Coordinate  $(x, y)$ .

The texture features are computed for an image when  $d=1$  and  $\theta=0^\circ, 45^\circ, 90^\circ, 135^\circ$ . In each direction four texture features are calculated. [17] They are used as texture feature descriptor. Combined feature vector of Color and texture, Histogram is formulated.

Fig.4 shows the feature extraction from feature like dominant color, texture and histogram of an image, which are stored in xls db file. Gray level concurrence matrix returns four values Energy, Contrast, Entropy and Inverse Difference. After getting all feature extract stored in database and will be use as similarity measure between query video feature and feature stored in xls file.

	IA	IB	IC	ID	IE	IF	IG	IH	II	IJ	IK	IL	IM	IN	IO	IP	IQ	IR	IS	IT
60	422	445	416	317	390	377	406	460	526	692	519	524	478	398	401	279	433	238	2	121
61	419	479	435	335	364	365	456	489	580	626	548	486	532	394	371	275	422	240	2	126
62	428	572	1064	841	581	376	317	308	184	172	200	151	221	222	193	667	455	303	2	131
63	2	0	0	1	1	4	4	9	12	8	8	13	5	2	48	92	12	6	2	136
64	2020	1282	1353	987	727	626	681	518	507	598	441	392	307	361	348	320	366	318	2	141
65	266	11	0	0	0	0	3	5	7	6	20	10	7	4	38	18	16	24	2	146
66	245	327	225	261	228	158	296	267	203	110	52	48	48	58	70	95	133	113	2	151
67	28	48	27	2	1	4	9	12	12	7	12	3	2	8	72	36	42	32	2	156
68	75	31	3	4	9	11	7	12	8	12	7	7	5	6	19	35	36	30	2	161
69	2570	2476	2612	2561	2594	2882	2781	2954	2825	2739	2844	2986	3100	3309	4000	3386	3029	3066	3	1
70	3293	3144	3115	2954	2946	3061	3002	2688	2562	2577	2464	2595	2829	2812	2886	2858	2117	1924	3	11
71	1451	1375	1302	1468	1228	1219	1389	1191	1196	1271	1136	1165	1116	1054	974	902	926	791	3	21
72	2092	2071	2096	2154	2251	2189	2137	2269	2447	2494	2389	2337	1915	1588	1460	1283	1186	1053	3	31
73	2562	2544	2461	2363	2451	2369	2362	2438	2325	2239	2266	2198	2105	2163	2182	2461	2478	2489	3	41
74	1962	1842	1895	1825	1897	1851	1893	1870	1894	1930	1996	1935	1981	2011	2122	2128	2215	2190	3	51
75	1758	1831	1890	1847	1769	1747	1716	1780	1962	1957	1844	1878	1833	1983	1900	2101	2159	2237	3	61
76	2751	2681	2610	2548	2498	2585	2614	2452	2496	2581	2453	2576	2572	2613	2721	2657	2685	2720	3	71
77	729	721	704	746	726	756	777	661	711	676	587	563	567	545	573	498	505	492	3	81
78	3225	2787	3292	3239	2551	4061	3961	3100	4516	2569	2803	3933	4367	5285	3288	3910	2654	4554	3	91
79	3098	3088	3104	3356	2945	2968	3203	3099	3080	3049	3341	3088	3084	3298	3327	3506	3602	3822	3	101
80	1537	1537	1677	1566	1658	1600	1587	1562	1587	1564	1538	1559	1664	1594	1635	1614	1652	1765	3	111
81	728	781	715	770	762	749	675	610	654	600	603	597	571	541	572	588	573	531	3	121
82	2823	2864	3118	2930	2821	3082	2821	3224	3040	3812	2980	3349	3511	3164	3352	3970	3546	3680	3	131
83	2157	2403	2490	2464	2411	2303	2185	2113	1954	1946	1815	1693	1624	1578	1590	1483	1438	1449	3	141
84	1383	1336	1403	1396	1389	1276	1376	1348	1373	1439	1359	1334	1326	1298	1367	1413	1357	1336	3	151

Figure 4: Feature Extractions from Video Frame

### V. Conclusion

Content-based retrieval of visual information is an emerging area of research which has been in limelight amongst the researchers and experimenters. Video retrieval system is useful for video editing, video archiving, and interactive video and multimedia information systems. This paper presented the video representation in terms of shot and shot is divided into number of frame, feature selection, Extraction of feature like texture, color and Histogram of video image the proposed content based video retrieval system. We also provide screen shot of features calculated from texture, color, and histogram of video image using Matlab.

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