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Creating organizing and indexing digital video contents using frame similarity value techniques using hierarchical clustering techniques

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Abstract: Due to various factors across all media, the volume of data created each year is endlessly growing. Videos are one type of media that embeds graphical, signal, auditory, and printed material. The researchers need efficient grouping approaches for the video data, given this enormous amount of information. The attributes of the objects are used to determine similarities like Distance among the frames, pixel value, and any additional common factors that are the essential properties. The main impartial of this effort is to conclude how different clustering techniques work for image segmentation. Here, clustering is defined as a collection of related sources it may be printed documents, photos, auditory and more. Clustering is done to produce valuable results, efficient data storage, and quick retrieval across a range of applications.

Key words: Video Frames, Clustering, Video segmentations, Image comparison, Image hue values, Histogram values.

Introduction:

The rapid increase in multimedia data sets, especially on the web, gets increasing day-by-day support from information technology. This brings a lot amount of digital data sets on the internet. These data sets can be used anywhere with the help of information technology. Various devices are currently supported to access this digital content. The vast attractiveness is emphasized by the websites where users may upload and download videos; a tool for exploring videos would be beneficial in this situation. Numerous approaches for indexing, retrieving, and organizing digital video content have been made in order to handle the massive amount of video content. It is highly anticipated that retrieval techniques using features automatically retrieved from videos will be developed, given the limited manpower available. However, as characteristics only describe physical contents, retrieval methods necessitate an understanding of how to use/integrate features in order to retrieve pertinent movies to a query. This paper focuses on image mining, which analyses images using knowledge extraction techniques to identify intriguing patterns from the underlying data in order to gain such knowledge. In this way, explicit knowledge of video retrieval patterns is extracted. A technique of grouping or allocating object tags to a design that is established under supervision is classification. To distinguish between patterns belonging to various classes, decision boundaries are created. The classifier is trained using the initial segments of the segmented data set. In a particular video domain, a framework for semantic video categorization and indexing was put forth. There is a way for categorizing various video types that makes use of a list of essential frames produced by a succinct video summarizing methodology.

Clustering is a practical method for extracting relevant sources or similar content from the database based on the data relevance. This grouping is done by various techniques, most popularly based on the similarity among the data. The process of grouping the content entails dividing the input sets into uniform chunks created it helps to differentiate one group from another. The distance among this group is always higher. There are various distinctions between video clustering and conventional clustering methods. Pretreatment of the input set, especially the multimedia data sets, is always required. It helps to reduce the processing time and improve search efficiency. Time taken for grouping the objects is one of the most important constraints; it helps the researcher to differentiate how this grouping is done for various types of input files.

Existing System:

1. Existing system focuses on multimedia-based applications only.
2. Information is grouped using manual computations.
3. The process is required high-level skilled and trained people.
4. Techniques work well for image attribute sets.

5. Information extraction was done using either image-based or text-based techniques.

Issues in Existing system:

1. There is no separate tool for analyzing various clustering techniques.
2. High complexity
3. High time consumption for data retrieval

Proposed System

1. Frames are eliminated using the image property.
2. Grid Based, Model-Based, Density-Based, and Hierarchical clustering mechanisms are used for clustering the frames.
3. Clustering formations are done effectively.
4. Proposed technique work with different types of inputs.
5. Times have taken to grouping the source is improved.

Advantages of Proposed Systems

1. Our proposed framework can efficiently analyze the performance of various clustering mechanisms.
2. Reduced Complexity
3. Increased efficiency

Proposed Technique:

Extraction of the objects from the stored database is shown in fig. 1. User-initiated input queries can be in the form of text or images. Here, the user initiated the input through an image-based query. Given input is searched in the trained database set. Information is trained in the following four-step process: First, the input went through preprocessing steps, where unwanted or unnecessary contents were removed from the input set using file handling techniques. After the noise is removed, sets are collected and stored. Using image average frame handling techniques, frames are extracted and stored as a key frame. This key frame is used to retrieve the needed content. For each input image set, the user needs to identify the key frames. This frame value is very similar to key terms in text-based search. By using this key frame, the user can extract the needed content, which will improve the search time and also improve efficiency. After frames are trained using the proposed clustering technique, each clustering user gets different groups of values depending on the input video sets.

Video Preprocessing

Preprocessing is the preliminary process of our proposed framework. Initially, user gives input video for preprocessing. In preprocessing process, the video was converted into number of frames. The converted frames are stored into the database

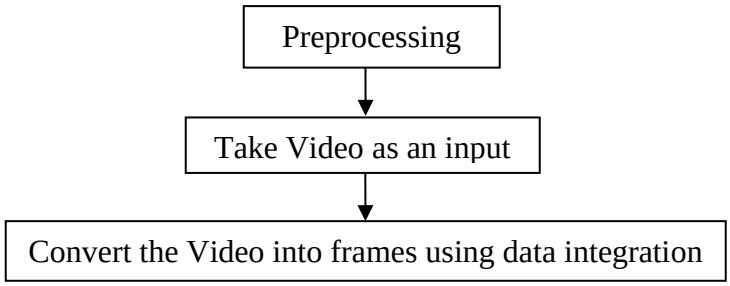

Fig 4. Video preprocessing

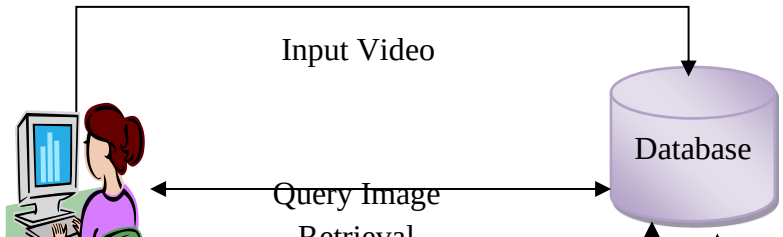

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Fig 1. Proposed Architecture

This process is further explain as a flow chart diagram shown in the fig 2 and fig 3 below.

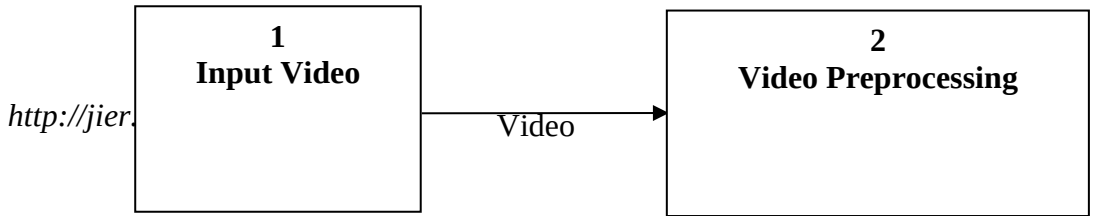


Fig 2. Process Execution - Proposed Technique.

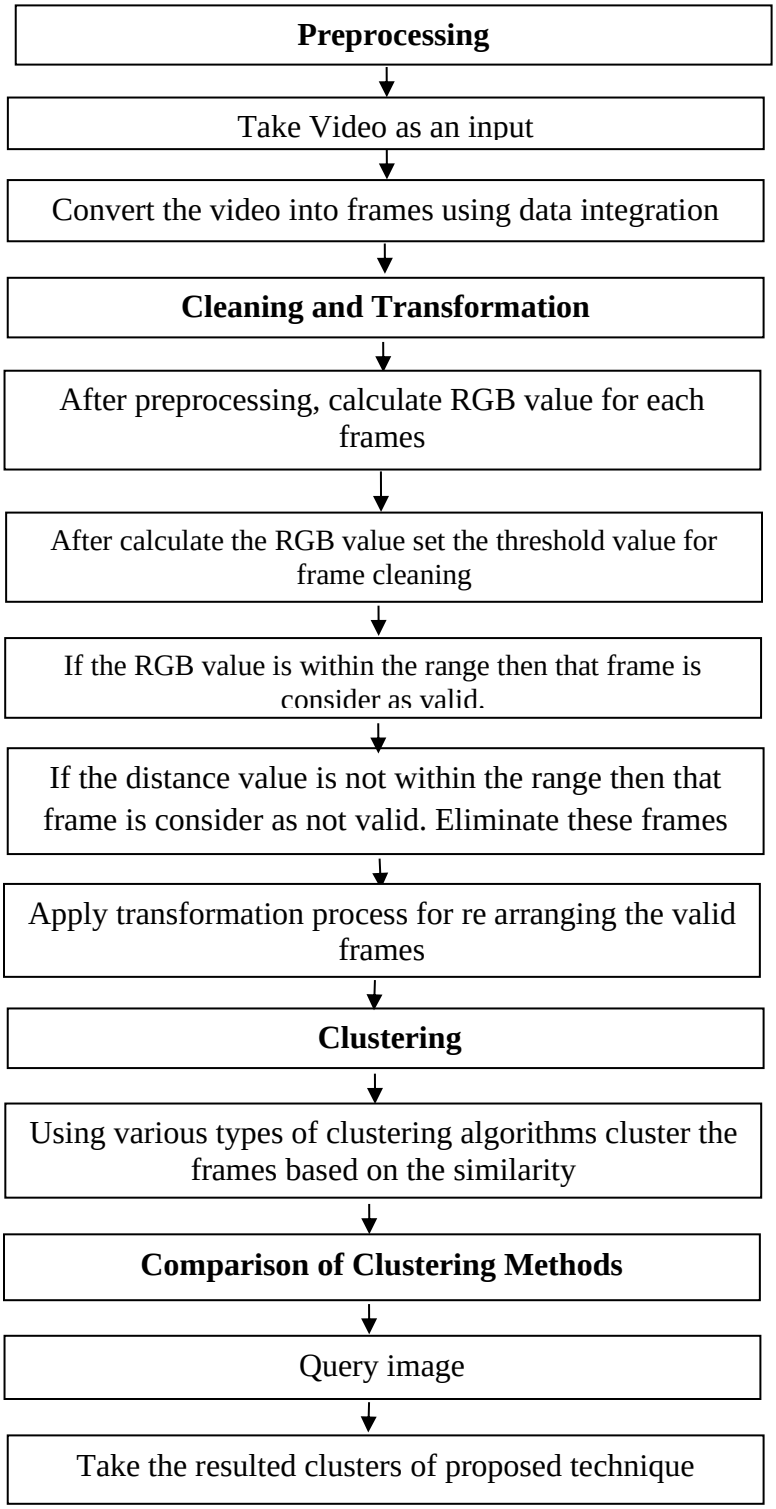


Fig 3. Flow process diagram for extracting the objects.

Fig 5. Input video is converted into static image frames.

Fig 6. Input News video is converted into static image frames.

Video type: Movie

	id	frame	numclus	time
	1	0	35204	3:17:55 PM
	2	1	35175	3:18:01 PM
	3	2	29162	3:18:07 PM
	4	3	29762	3:18:14 PM
	5	4	30475	3:18:20 PM
	6	5	30975	3:18:26 PM
	7	6	31351	3:18:33 PM
	8	7	31867	3:18:39 PM
	9	8	32339	3:18:45 PM
	10	9	32427	3:18:52 PM
	11	10	32482	3:18:58 PM
	12	11	32440	3:19:04 PM
	13	12	32842	3:19:11 PM
	14	13	32964	3:19:17 PM
▶	(AutoNumber)	0		

Table 2. Time taken to convert the video into static frames.

Video type: Cartoon video file

	id	frame	numclus	time
	1	0	3	3:51:44 PM
	2	1	2	3:51:45 PM
	3	2	2	3:51:47 PM
	4	3	3	3:51:48 PM
	5	4	2	3:51:49 PM
	6	5	2	3:51:51 PM
▶	(AutoNumber)	0		

Fig 5. Image loading process

Cleaning and Transformation:

This module describes the details of cleaning and transformation process. After preprocessing, calculate RGB value for each frame in the database. After calculate the RGB value set the threshold value for frame cleaning. If the RGB value is within the range then that frame is consider as valid. If the distance value is not within the range then that frame is consider as not valid. So eliminate these fames. Apply transformation process for re arranging the valid frames.

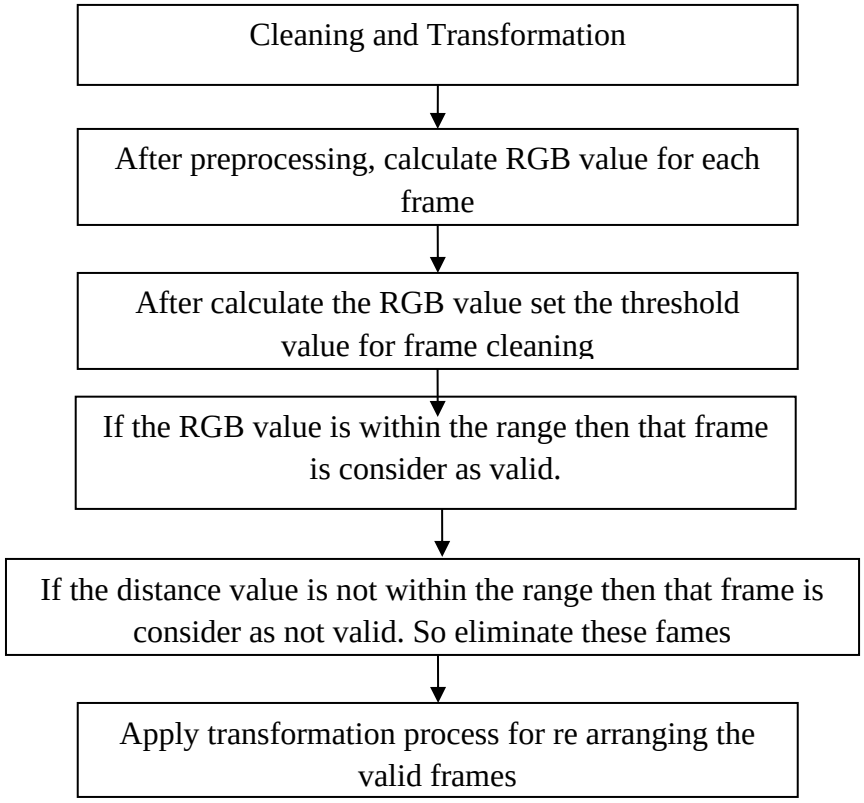


Fig 7. Video cleaning and transformation process

Duplicate elimination:

Table 3 Various video file and duplicate frame removal

Video name	Number of Input frames	Number of output frames	Duplicate frames removed
Cartoon	7	5	2
Graphics	16	10	6
Meeting	15	14	1
Globe	15	13	2
Song	15	14	1

Clustering

Data are organized into classes or clusters by the process of clustering, which results in items that are highly similar to one another but significantly different from those in other clusters. Regardless of their shapes, clusters should be able to be identified by a competent clustering method. The segmented frames in this process are done using the proposed clustering method. The retrieved key frames are clustered using different kinds of clustering techniques.

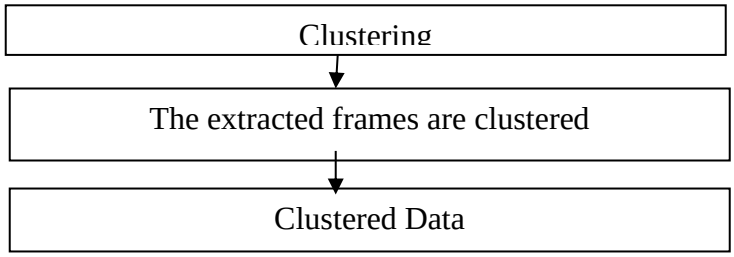


Fig 8. Image frame clustering process.

S.No	Video	Frames	Cluster	Sec
1	1	1	14	1
2	1	2	14	1
3	1	3	14	0
4	1	4	14	1
5	1	5	14	0
6	1	6	14	1
7	1	7	14	0
8	1	8	14	1
9	1	9	14	0
10	1	10	14	1
11	1	11	14	0
12	1	12	14	1
13	1	13	14	0
14	2	1	14	0
15	2	2	14	0
16	2	3	14	1
17	2	4	14	0
18	2	5	14	0
19	2	6	14	0

Table 4. Proposed clustering formation

Comparison of Clustering Methods

This module describes the details of image retrieval process or comparison of clustering mechanisms. Initially, the user inserts a query image. The query image was compared with proposed grid based clustered data and other clustering mechanisms.

The analysis of the matching findings is followed by the return of the detection results. Based on the results, better clustering mechanism could be identified.

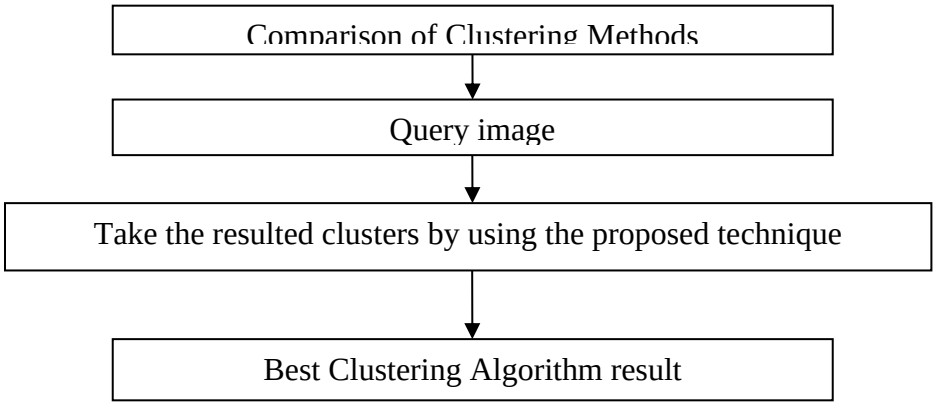


Fig 9. Comparison of various clustering process

Fig 10. Frame upload process.

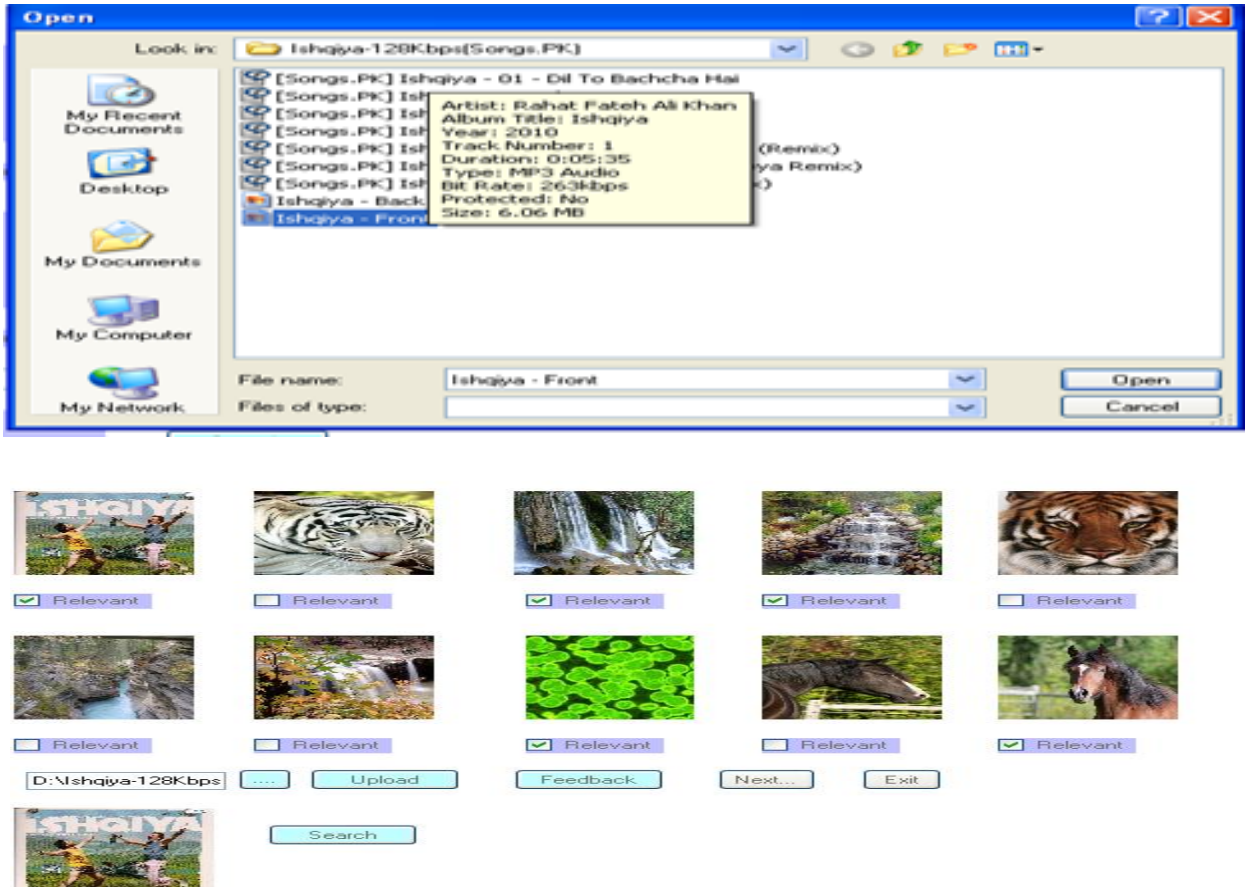


Fig 11. Uploaded images

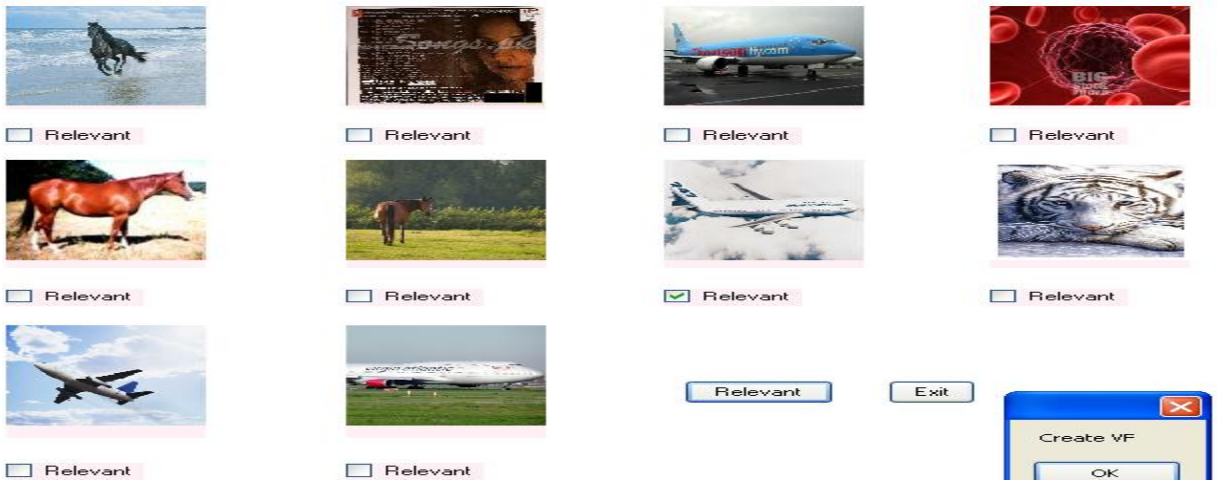


Fig 12.User input query and extracted relevant images from the stored database.

Fig 13. Image searching process.

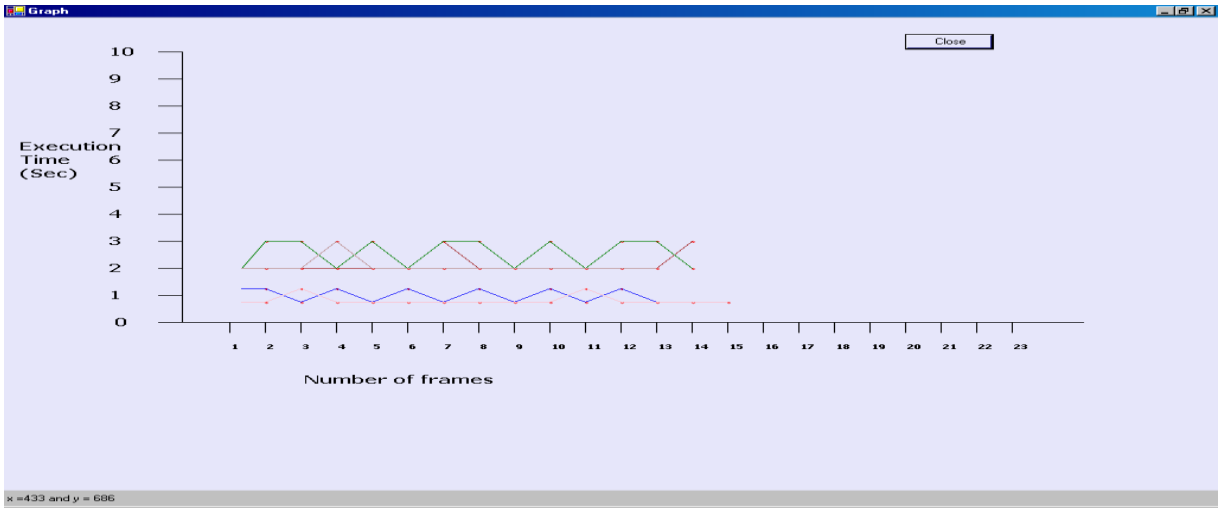
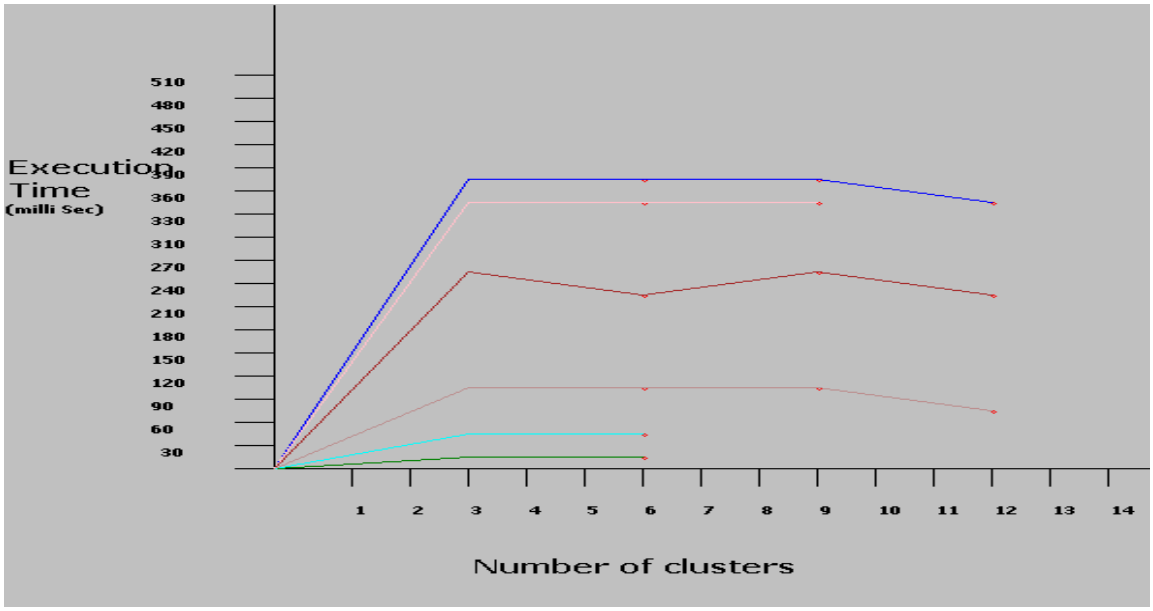


Fig 14. Execution process time graph frames Vs time



Green - Graphics
Cyan- globe (animated)
Red - cartoon
Brown- news
Blue- song

Fig 15. Execution process time graph of various inputs

Conclusion and future enhancement

Based on the investigation, we developed a framework that uses RGB values to represent video frames. The first step in extracting the number of frames from a video is to use the image pixel color value for each structure. The retrieved structures are then grouped, spending different grouping techniques. When a researcher submits an input request, all relevant clusters are searched for the related image. We can determine the superior performance cluster based on the outcome.

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