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Cloud Based Protection for Multimedia Content

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ABSTRACT

There are various techniques that are been implemented for protecting large scale multimedia content. This paper propose one more design for the same. This design influences the cost efficiency, fast development, scalability as well as elasticity when it comes to cloud. This method accommodates the workload on the cloud. There exists different types of multimedia contents such as audio, video in both 2- Dimensional and 3-Dimentsional, images, audio and video clips. The proposed system used to protect the above said content in cloud either it might be public or private depending in the purpose. The proposed system has two important components. One is creating a digital signature of 3D video and the other is distributed matching engine for multimedia objects. This signature method creates more effective and representative signatures for 3D videos which captures the depth of the signals, so as to store it in the cloud by converting them into small signals. The other component, distributed engine achieves high scalability that supports different multimedia objects.The proposed system is deployed to two clouds by considering more than 12,000 videos of 3- dimension and millions of images with high accuracy and scalability. In addition to this, the protection system used by some of the social networking systems are compared to check the efficiency, where 98% of 3D videos are protected using our system

Keywords:- DIMO

I. INTRODUCTION

There are different advancements made in processing, recording the multimedia content. Also, there are many free online hosting websites, which made very easy to duplicate the copyrighted material.Revenue loss occurs due to distribution of copyrighted material on the internet.Illegal content or copies over the internetmakes difficult tofind relevant data on the web as the volume of data increases. This also increases the complexity of identifying the exact copy.

A Novel approach is proposed in this paper to protect the content on the web using cloud infrastructure. The proposed approach protects various content related to multimedia including 2D videos, 3D videos, images, audio and video clips, and songs.

The system can be accessible on public, private or combination of public and private clouds. As the system is based on cloud infrastructure, the design achieves protection of content and the resources acquiring web data. This design is less in cost and it uses computing resources on demand. The design can also support varying amount of multimedia data.

The proposed system consists of multiple components:

i) A crawler to download the multimedia objects from online sites.
ii) Signature method is used to create the finger prints from multimedia objects.
iii) The signatures of original objects are verified with the query objects using Distributed Matching Objects.

The proposed method tested on many sample test data sets by considering sample amazon cloud with different machines. Off- shelf tools are also used for the crawler. This system is a complete running system.

Some of the systems in this system are deployed on Amazon cloud and others are deployed on private cloud. This kind of deployment was used to show the flexibility of the system. This also enables the efficient usage of computing resources. This also minimizes the cost. Even the cost of the cloud varies and the cloud services are available at varying computing resources, even though it provides better performance comparatively. By conducting numerous experiments we confirmed the high accuracy, scalability as well as elasticity of the actual existing system.

This papers provides the information about,

1. Multimedia protection using multi cloud environment.
2. Any kind of multimedia content can be protected by simply varying the computing resources.
3. A method for creating signatures for protecting 3D videos.
4. A new design methodology for matching engine.
5. Can also improve the efficiency by Map reduce programming.

II. RELATED WORK

The predicament of making different variations of multimedia to be protected was the major attracted area from industry as well as academia too. One of the approaches introduced for making the multimedia content is watermarking [10]. In this technique, distinct information is inserted within the content. One more method is used to search the information to verify the authenticity of the content.

The Watermarking method requires the insertion of watermarks in the multimedia objects prior to their release. Along with that, its done before the mechanisms or systems for finding the objects and to verify the availability of perfect watermarks. Thus, the watermark approach is not pleasing for the contents that are released without watermark at the first attempt.

But still, the watermarking approach is well suited for some controlled environments like, distributing the multimedia content on some sites, DVD's.

This approach is not used, where there are more number of videos to be uploaded on websites such as YouTube or nay other private or public websites, social networking sites which plays the videos back to back using any video player. As far as the discussion is concerned, watermarking method is not so effective.

Thus, this paper focuses on other methodology for making the content on multimedia protected, which is based on content-based copy detection.

In this approach, fingerprints are extracted as a part of signature that are extracted from original objects. Signatures can also be created from suspected objects that are downloaded from any of the online websites. Once the signatures are collected from original as well as suspected objects, they are compared or computed for their similarities. There are again different methods to find the similarities between original and suspected objects. They are listed as, spatial, temporal, color and transform domain. Among the available methods, most preferred method is spatial signatures, particularly it is for block based.

2.1 ARCHITECTURE AND OPERATION

The proposed work of multimedia content protection based on cloud is as shown in the below figure.

1. The proposed architecture has multiple components which are hosted on cloud infrastructures.

The figure shows multiple cloud providers that are used by the system. The choice of taking multiple cloud providers is because, some of them are very efficient and also provide cost saving for diverged computing and communication tasks.

For instance, one cloud can provide low cost for bandwidth as well as storage and can be used for downloading and storing the videos temporarily from various online sites, where as the other cloud provider offers better computing nodes at low cost and can be used to manage the distributed index and can perform the detection process.

The proposed system can be deployed and managed by any of the three parties mentioned in the previous section: content owners, hosting sites, or service providers. The proposed system has the following main components, as shown in Fig. 1:

• Distributed Index: Maintains signatures of objects that need to be protected;

• Reference Registration: Creates signatures from objects that content owners are interested in protecting, and inserts them in the distributed index;

• Query Preparation: Creates signatures from objects downloaded from online sites, which are called query signatures. It then uploads these signatures to a common storage;

• Object Matching: Compares query signatures versus reference signatures in the distributed index to find potential copies. It also sends notifications to content owners if copies are found;

• Parallel Crawling: Downloads multimedia objects from various online hosting sites.

The proposed system is designed to handle different types of multimedia objects. The system abstracts the details of different media objects into multi-dimensional signatures. The signature creation and comparison component is media specific, while other parts of the system do not depend on the media type. Our proposed

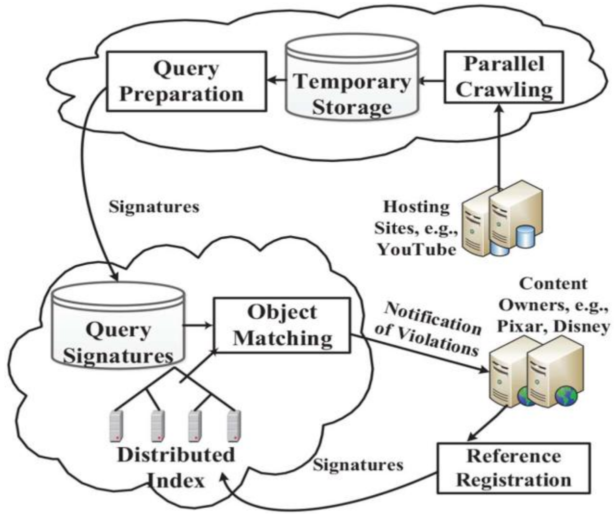


Fig 1. Proposed cloud-based multimedia content protection system.

design supports creating composite signatures that consist of one or more of the following elements:

• Visual signature: Created based on the visual parts in multimedia objects and how they change with time;

• Audio signature: Created based on the audio signals in multimedia objects;

• Depth signature: If multimedia objects are 3-D videos, signatures from their depth signals are created;

• Meta data: Created from information associated with multimedia objects such as their names, tags, descriptions, format types, and IP addresses of their uploaders or downloaders;

II. LITERATURE SURVEY

This paper presents the design and evaluation of DIMO, a distributed system for matching high-dimensional multimedia objects. DIMO provides multimedia applications with the basic function of computing the *K* nearest neighbors on large-scale datasets. It also allows multimedia applications to define application-specific functions to further process the computed nearest neighbors. DIMO presents a novel method for partitioning, searching, and storing high-dimensional datasets on distributed infrastructures that support the MapReduce programming model. We have implemented DIMO and extensively evaluated it on Amazon clusters with number of machines ranging from 8 to 128. We have experimented with large datasets of sizes up to 160 million data points extracted from images, and each point has 128 dimensions. Our experimental results show that DIMO: (i) results in high precision when compared against the ground-truth nearest neighbors, (ii) can elastically utilize varying amounts of computing resources, (iii) does not impose high network overheads, (iv) does not require large main memory even for processing large datasets, and (v) balances the load across the used computing machines. In addition, DIMO outperforms the closest system in the literature by a large margin (up to 20%) in terms of the achieved average precision of the computed nearest neighbors. Furthermore, DIMO requires at least three orders of magnitudes less storage than the other system, and it is more computationally efficient.

DISADVANTAGES

1) Cannot achieve better index generation.

2) Distributed Kd-Trees for retrieval from very large image collections

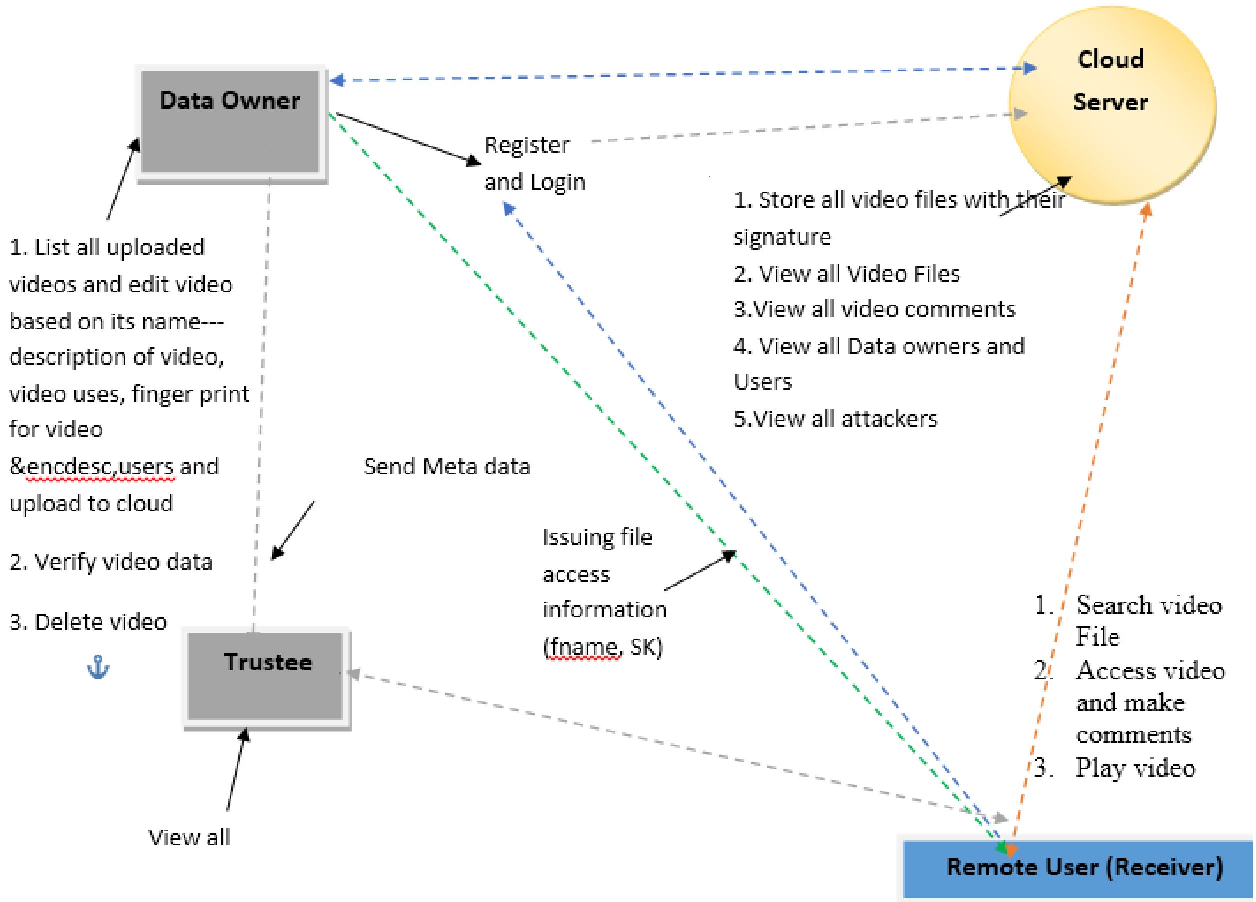
Distributed Kd-Trees is a method for building image retrieval systems that can handle hundreds of millions of images. It is based on dividing the Kd-Tree into a “root subtree” that resides on a root machine, and several “leaf subtrees”, each residing on a leaf machine. The root machine handles incoming queries and farms out feature matching to an appropriate small subset of the leaf machines. Our implementation employs the MapReduce architecture to efficiently build and distribute the Kd-Tree for millions of images. It can run on thousands of machines, and provides orders of magnitude more throughput than the state-of-the-art, with better recognition performance. We show experiments with up to 100 million images running on 2048 machines, with run time of a fraction of a second for each query image.

Spatial signatures weakness is the lack of resilience against large geometric transformations.

Spider: A system for finding 3D video copies

This article presents a novel content-based copy detection system for 3D videos. The system creates compact and robust depth and visual signatures from the 3D videos. Then, signature of a query video is compared against an indexed database of reference videos' signatures. The system returns a score, using both spatial and temporal characteristics of videos, indicating whether the query video matches any video in the reference video database, and in case of matching, which portion of the reference video matches the query video. Analysis shows that the system is efficient, both computationally and storage-wise. The system can be used, for example, by video content owners, video hosting sites, and third-party companies to find illegally copied 3D videos. We implemented Spider, a complete realization of the proposed system, and conducted rigorous experiments on it. Our experimental results show that the proposed system can achieve high accuracy in terms of precision and recall even if the 3D videos are subjected to several transformations at the same time. For example, the proposed system yields 100% precision and recall when copied videos are parts of original videos, and more than 90% precision and recall when copied videos are subjected to different individual transformations. It may not be effective for the rapidly increasing online videos, especially those uploaded to sites such as YouTube and played back by any video player.

ARCHITECTURE DIAGRAM



PRIMARY INVESTIGATION

The first and foremost strategy for development of a project starts from the thought of designing a mail enabled platform for a small firm in which it is easy and convenient of sending and receiving messages, there is a search engine ,address book and also including some entertaining games. When it is approved by the organization and our project guide the first activity, ie. preliminary investigation begins. The activity has three parts:

REQUEST CLARIFICATION

After the approval of the request to the organization and project guide, with an investigation being considered, the project request must be examined to determine precisely what the system requires. Here our project is basically meant for users within the company whose systems can be interconnected by the Local Area Network(LAN). In today's busy schedule man need everything should be provided in a readymade manner. So taking into consideration of the vastly use of the net in day to day life, the corresponding development of the portal came into existence.

IV. FEASIBILITY ANALYSIS

An important outcome of preliminary investigation is the determination that the system request is feasible. This is possible only if it is feasible within limited resource and time. The different feasibilities that have to be analyzed are

Operational Feasibility

Operational Feasibility deals with the study of prospects of the system to be developed. This system operationally eliminates all the tensions of the Admin and helps him in effectively tracking the project progress. This kind of automation will surely reduce the time and energy, which previously consumed in manual work. Based on the study, the system is proved to be operationally feasible.

Economic Feasibility

Economic Feasibility or Cost-benefit is an assessment of the economic justification for a computer based project. As hardware was installed from the beginning & for lots of purposes thus the cost on project of hardware is low. Since the system is a network based, any number of employees connected to the LAN within that organization can use this tool from at anytime. The Virtual Private Network is to be developed using the existing resources of the organization. So the project is economically feasible.

Technical Feasibility

According to Roger S. Pressman, Technical Feasibility is the assessment of the technical resources of the organization. The organization needs IBM compatible machines with a graphical web browser connected to the Internet and Intranet. The system is developed for platform Independent environment. Java Server Pages, JavaScript, HTML, SQL server and WebLogic Server are used to develop the system. The technical feasibility has been carried out. The system is technically feasible for development and can be developed with the existing facility.

4.1 REQUEST APPROVAL

Not all request projects are desirable or feasible. Some organization receives so many project requests from client users that only few of them are pursued. However, those projects that are both feasible and desirable should be put into schedule. After a project request is approved, it cost, priority, completion time and personnel requirement is estimated and used to determine where to add it to any project list. Truly speaking, the approval of those above factors, development works can be launched.

4.2. SYSTEM DESIGN AND DEVELOPMENT

INPUT DESIGN

Input Design plays a vital role in the life cycle of software development, it requires very careful attention of developers. The input design is to feed data to the application as accurate as possible. So inputs are supposed to be designed effectively so that the errors occurring while feeding are minimized. According to Software Engineering Concepts, the input forms or screens are designed to provide to have a validation control over the input limit, range and other related validations.

This system has input screens in almost all the modules. Error messages are developed to alert the user whenever he commits some mistakes and guides him in the right way so that invalid entries are not made. Let us see deeply about this under module design. Input design is the process of converting the user created input into a computer-based format. The goal of the input design is to make the data entry logical and free from errors. The error is in the input are controlled by the input design. The application has been developed in user-friendly manner. The forms have been designed in such a way during the processing the cursor is placed in the position where must be entered. The user is also provided with in an option to select an appropriate input from various alternatives related to the field in certain cases. Validations are required for each data entered. Whenever a user enters an erroneous data, error message is displayed and the user can move on to the subsequent pages after completing all the entries in the current page.

OUTPUT DESIGN

The Output from the computer is required to mainly create an efficient method of communication within the company primarily among the project leader and his team members, in other words, the administrator and the clients. The output of VPN is the system which allows the project leader to manage his clients in terms of creating new clients and assigning new projects to them, maintaining a record of the project validity and providing folder level access to each client on the user side depending on the projects allotted to him. After completion of a project, a new project may be assigned to the client. User authentication procedures are maintained at the initial stages itself. A new user may be created by the administrator himself or a user can himself register as a new user but the task of assigning projects and validating a new user rests with the administrator only.

The application starts running when it is executed for the first time. The server has to be started and then the internet explorer in used as the browser. The project will run on the local area network so the server machine will serve as the administrator while the other connected systems can act as the clients. The developed system is highly user friendly and can be easily understood by anyone using it even for the first time.

V. CONCLUSION

The copyrighted multimedia objects uploaded in the social media or through social websites, online hosting sites such as YouTube can result in significant loss of revenues for content creators. Systems needed to find illegal copies of multimedia objects are complex and large scale. In this paper, we presented a new design for multimedia content protection systems using multi-cloud infrastructures. The proposed system supports different multimedia content types and it can be deployed on private and/or public clouds. Two key components of the proposed system are presented. The first one is a new method for creating signatures of 3-D videos. Our method constructs coarse-grained disparity maps using stereo correspondence for a sparse set of points in the image. Thus, it captures the depth signal of the 3-D video, without explicitly computing the exact depth map, which is computationally expensive. Our experiments showed that the proposed 3-D signature produces high accuracy in terms of both precision and recall and it is robust to many video transformations including new ones that are specific to 3-D videos such as synthesizing new views. The second key component in our system is the distributed index, which is used to match

Multimedia objects characterized by high dimensions. The distributed index is implemented using the MapReduce framework and our experiments showed that it can elastically utilize varying amount of computing resources and it produces high accuracy. The experiments also showed that it outperforms the closest system in the literature in terms of accuracy and computational efficiency. In addition, we evaluated the whole content protection system with more than 11,000 3-D videos and the results showed the scalability and accuracy of the proposed system. Finally, we compared our system against the Content ID system used by YouTube. Our results showed that: (i) there is a need for designing robust signatures for 3-D videos since the current system used by the leading company in the industry fails to detect most modified 3-D copies, and (ii) our proposed 3-D signature method can fill this gap, because it is robust to many 2-D and 3-D video transformations.

The work in this paper can be extended in multiple directions. For example, our current system is optimized for batch processing. Thus, it may not be suitable for online detection of illegally distributed multimedia streams of live events such as soccer games. In live events, only small segments of the video are available and immediate detection of copyright infringement is crucial to minimize financial losses. To support online detection, the matching engine of our system needs to be implemented using a distributed programming framework that supports online processing, such as Spark. In addition, composite signature schemes that combine multiple modalities may be needed to quickly identify short video segments. Furthermore, the crawler component needs to be customized to find online sites that offer pirated video streams and obtain segments of these streams for checking against reference streams, for which the signatures would also need to be generated online. Another future direction for the work in this paper is to design signatures for recent and complex formats of 3-D videos such as multiview plus depth. A multiview plus depth video has multiple texture and depth components, which allow users to view a scene from different angles. Signatures for such videos would need to capture this complexity, while being efficient to compute, compare, and store.

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