



## Semi-Automatic Context-Aware Video Annotation for Searching Educational Video Resources

### KEYWORDS

linked data, annomation, annotation, sugartube.

**R. Balamurugan**

Assistant Professor, Adhiparasakthi Engineering College, Melmaruvathur- 603 319 Kanchipuram District. Tamil Nadu.

**K. Rama Praba**

Computer Science and Engineering, Adhiparasakthi Engineering College, Melmaruvathur- 603 319 Kanchipuram District. Tamil Nadu.

**ABSTRACT** *The number of educational video resources in the multimedia web is increasing rapidly. It is crucial to explore, share, reuse, and link these educational resources for better e-learning experiences. The existing linked data technology, adopts video annotation and browser platform with two online tools: Annomation and SugarTube. By publishing Linked Data based video annotations on the web, the video resources become a part of the Linked Data Cloud. The semi-automatic context-aware annotation technique is proposed into the Annomation application to speedup the annotation process. By publishing the video into the server, a unique key will be generated using the RSA algorithm. Anvil, the annotation tool is used to add annotation to a video. Search algorithm is used to search for the contents of the related videos and to filter the search results. User has the probability to get the exact content of the video.*

### 1 INTRODUCTION

In the modern world e-learning activities are essential for distance learning in higher education. More than 5 million students have used or using at least one online course in their studies, and the number of online students is growing by 25% every year. The digital video, one type of the multimedia educational resource, plays a key role in distance learning environments. It is important to accurately describe the video content and enable the searching of potential videos in order to enhance the quality and features of e-learning systems.

Video resources should be described precisely. It is difficult to use only one general description to accurately tell the whole story of a video. Because one section of the video stream may have plenty of information, but some of them might not related to the main points of the video when it was created. Therefore, the normal paragraph based description process is not good enough for annotating videos precisely. A more accurate description mechanism, based on the timeline of the video stream, is required.

The descriptions of the educational resources should be accurate and machine understandable, to support related search functionality. Although a unified and controlled terminology can provide accurate and machine understandable vocabularies, it is impossible to build such a unified terminology to satisfy different description requirements for different domains in practice.

Linking video resources to useful knowledge data from the web. More and more knowledge and scientific data is published on the web by different research and educational organizations. It is useful to break the teaching resource boundaries between closed institutions and the Internet environment to provide richer learning materials to both educators and learners.

The Semantic Web technology is used for, more precise descriptions, the Linked Data approach to address the above challenges. The following lists the major contributions of the approach.

1. The video annotation ontology is designed by following Linked Data principles and reusing existing ontologies. It provides the foundation for annotating videos based on both time instance and duration in the video streams. This allows more precise description details to be added to the video.

2. A semantic video annotation tool (Annomation) is implemented for annotating and publishing educational video resources based on the video annotation ontology. Annomation allows annotators to use domain specific vocabularies from the Linked Open Data cloud to describe the video resources. These annotations link the video resources to other web resources.
3. A semantic-based video searching browser (Sugar-Tube) is provided for searching videos. It generates links to further videos and educational resources from the Linked Open Data cloud and the web.

Semi-automatic context-aware video annotation is proposed to reduce the burden of the annotators and for time consumption. Video is uploaded into the server by the Domain expert. A key will be generated for every particular video. New users should register into the account to search the video. He is not permitted to upload the video or to access the contents of the video. Modified RSA algorithm is used here for the purpose of key generation.

Search algorithm is used to search for the contents in the relevant videos, documents, etc. Anvil is the tool used for video annotation. Search algorithm is used to refine the search results. Errors in the automatic annotations are checked and corrected by the domain experts. Then the video is linked to the Open Data Cloud.

### 2 SYSTEM MODEL

Annotation to a video is not an easy task. If a video is worth more than a thousand words then the video with annotations must be worth a few hundred more. Related files are linked together by linked Data concept. But, Linked Data doesn't produce the exact search results what we are looking for. Search algorithm is used to display the exact search results.

#### 2.1 Proposed Problem

The domain experts or the course creators can only do annotation effectively. Anvil, the annotation tool is used to add automatic annotations to a video. It also supports to edit with the annotation properties. The annotated text should be properly fixed with the timeline of the video. Also the annotated videos are lack in knowledge about the topic. But semi-automatic annotation gives detailed description about the video. So the user can gain more knowledge about the topic.

To do semi-automatic annotation to a video the experts will not take much time. Semi-automatic annotation consumes

less time. The expert should have more knowledge to do manual annotation. In case of proposed method, the experts or the course creators should not have clear idea about the concept.

## 2.2 Design Goals

To provide the error free annotations to a video and to gain more knowledge about the topic the following goals are achieved:

1. Integrity: a distinct key is generated to each video. Only the author has the rights to change the contents of the video.
2. Error free annotation: after the completion of automatic annotation, error detection and correction can be done by the domain experts.
3. Utilization: Search algorithm is used to refine the appropriate results. It helps the user to get the exact video requested by him.

## 2.3 Overall Architecture

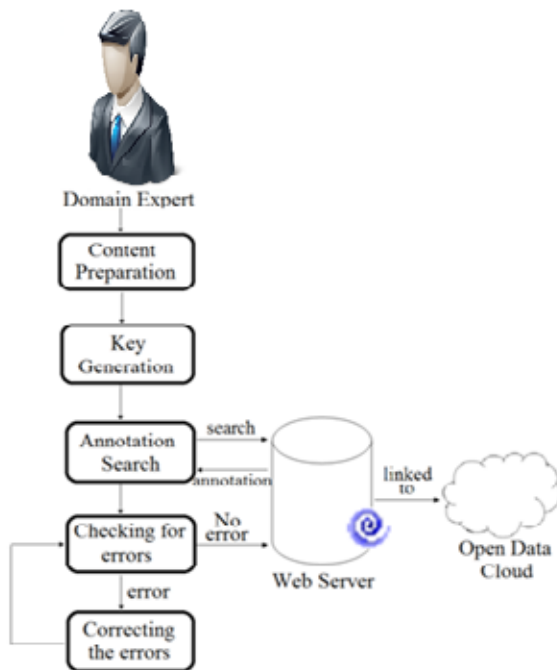


Figure 2.1 System Architecture

The large increase of video data demands effective organization for efficient user retrieval and browsing. Tagging or annotation enables text-based querying and context summarization. Although some practical video oriented sites such as YouTube have user generated tagging, the annotations have not been quality-controlled.

Domain expert will select the video which he/she is going to upload. After uploading the video in the server, a unique key will be generated for the video by using the modified RSA algorithm. Annotations are automatically added to a video by the Anvil. Search algorithm is used to filter the search by providing the search results appropriately.

## 3 RELATED WORK

Work flow of the project is divided into several units.

### 3.1 Content Preparation

Domain expert will prepare the video to upload in the server the admin was provided a username and password. A unique key will be generated for every particular video and the admin should enter the key already produced by the server to add or edit the contents of the video. New user should reg-

ister into the form to get his/her username and password. Using the username and password the user can view the video with contents and annotations. Admin should select the videos of AVI type to upload in the server. Since this type of video is smaller in size and it takes less time to upload.

User will be provided by the search page, he/she can search for the video that he is looking through. If the searched video is available in the server then it will be produced in the result page.

### 3.2 Key Generation

While uploading the video in the server a unique key will be generated. The key that is generated for the video will have to be matched with the user while the user tries to modify that particular video content. Modified RSA algorithm is used here for key generation.

The user can only have the permission to view the contents of the video. When the domain experts need to modify the contents of the video, then he should enter the key which was generated for that particular video. The integrity of the video is not maintained if all the users can modify the content of the video. Only the author has the permission to edit the contents and annotations of the video.

#### 3.2.1 Modified RSA Algorithm for Key Generation

RSA involves public key and a private key. Private Key is used here to provide actions for the authorized user.

#### Algorithm

1. choose two very large random integers: a and b
2.  $genkey = a + randomNumber(n)$
3.  $randomInteger = 65 + randomGenerator(m)$
4.  $key = (char)randomInteger + genkey$

### 3.3 Search Algorithm

The user searches for the video that is needed by him/her. The requested content will be listed if it already available in the server. The content requested by the user will be retrieved from various sources. By using the search algorithm, the user has the probability to get the exact content required by him/her.

```

Search (Array A, int Lb, int Ub, int Key)
begin
for i = Lb to Ub do
if A(i) = Key then return i
return -1
  
```

end

### 3.4 Creating Annotation

Admin has to select the video which is to be annotated. Anvil is the tool that is used here to add annotation to a video. Then open the video in the annotation window, now the window gives the detail about the total number of frames that video has. He can select the frame in which annotation has to be added and can create annotation for the same. Also the created annotation can be viewed upto the final frame which the admin select for.



Figure 3.2 Creating Annotation

### 3.5 Error Detection and Correction

The domain experts and the course creators will check for the errors that are present in the annotation. The course creators should have prominent knowledge about errors and grammar mistakes, to identify and to correct the errors. The errors that are reported in the error detection stage are corrected by the domain experts or the course creators. Error correction is carried out manually. Finally the video is uploaded into the cloud server through the application server.

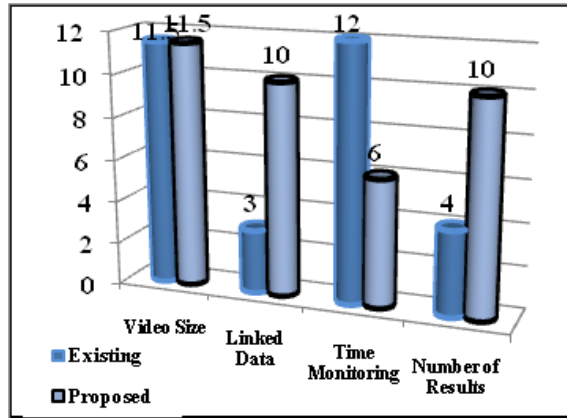


Figure 3.3 Result Comparison

### 4. CONCLUSION

The semi-automatic annotation will improve the annotation quality to a video resource. Through this users can access the related videos easily in the cloud. Annotation is added to the video and the video is successfully uploaded in the cloud environment with secured key access. User can easily search for the video in the User page. Users are not allowed to upload video. The integrity of the video is maintained. RSA algorithm is implemented successfully to generate key for the video. Search algorithm produces the related video searches.

### REFERENCE

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