

An E-learning system with Image compression

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Abstract - In Present Scenario Still Paper Is Being Used For The Purpose Of Learning And Documentation. The Need Of Hour Is To Reduce The Use Of Paper. The Best Alternative To Achieve This Is Making Use Of E-Learning. Current Technologies In E-Learning Provides Only Platform For E-Learning, But Does Not Take Into Consideration The Size Of Data And Speed Of Accessing The Data. The Work Done In This Paper Mainly Focus To Provide An E-Learning Platform, Mainly Deals With The Provision Of Storing The Hand Written Notes In Digitized Form And Also Storing The Images, Diagrams, Audio-Video Lectures Etc. On Cloud. The Data Will Be Stored By Reducing Its Size Which Would Be Beneficial As It Acquires Less Space On Cloud, Thus Data Manipulation Speed Will Be Increased. To Achieve This Various Algorithms Like Thresholding, Grayscaleing Will Be Used.

Keywords – E-Learning, Grayscaleing, Cloud, Thresholding.

I. INTRODUCTION

In the last few years the Information Technologies (IT) have spectacularly grown enabling great changes inside daily life activities, in particular in the education world. IT enable new teaching and learning methods using a wide range of new functionalities. The application of IT to the education sector causes huge transformations at all levels. Firstly, it is evident that the weight of teaching has decreased and the weight of learning is constantly growing. Secondly, the education area is moving from the classroom to virtual spaces. Thus, the teaching-learning process becomes more active than ever. The introduction of IT in the education sector has changed the focus of teaching and learning from a teacher-centered teaching to a learning where the key role is played by the student, who is supported by an advanced technology platform called e-learning system. Note that these platforms have emerged as vital tools to support the teaching and learning process that can complement classroom learning with virtual activities. These platforms can be developed and deployed anywhere; they promote ubiquitous education and encourage the collaborative work because they decrease the barrier not only between teachers and students but also among the students. The emergence of IT in the learning environment does not mean that all the traditional teaching-learning methodologies have become obsolete. In fact, we consider that combining traditional methodologies with new methodologies rising from the inclusion of IT can provide major benefits not only for the student but also for the teacher. Focused on this idea, this work shows the result of combining traditional handwriting with e-learning platforms to improve the teaching and learning experience by bringing the benefits of the traditional paper to the digital

documents. It also includes very important features such as the documents storage, coding and organization of data, the motivation of the associations and attention to important issues. Due to this, the most widely used learning technique is note taking using pen and paper rather than taking them directly through a computer. In the developed platform, which is called E-Learning with quantization, the interface to interact with the e-learning platform is going to be improved by using a digital pen. Moreover, at the present time, the number of schools which use multiple platforms to provide teachers and students with a broader range of services is increasing more and more. The E-Learning with quantization platform offers, as innovative element, data will be stored by reducing its size which would be beneficial as it acquires less space on cloud, thus data manipulation speed will be increased, users can upload the data and add tag to data, can upload photo of assignment etc.

II. E-LEARNING PLATFORMS

Several e-learning platforms are used in the academic environments. These platforms can be categorized into two main groups: commercial platforms and open source platforms. Some of the Existing software include: Blackboard, Moodle, Sakai, Google Docs, etc.

1) BlackBoard [1] [The Blackboard Learning System is a virtual learning environment and course management system developed by Blackboard Inc. It is a Web-based server software which features course management, customizable open architecture, and scalable design that allows integration with student information systems and authentication protocols. It may be installed on local servers or hosted by Blackboard ASP Solutions. Its main purposes are to add online elements to courses traditionally delivered face-to-face and to develop completely online courses with few or no face-to-face meetings].

2) Moodle [2] [An acronym for modular object oriented dynamic learning environment, is a free software learning management system, or virtual learning environment. Moodle is the most extended platform. Moodle was originally developed by Martin Dougiamas to help educators create online courses with a focus on interaction and collaborative construction of content, and is in continual evolution.

3) Sakai [3] [Sakai is a community of academic institutions, commercial organizations and individuals who work together to develop a common Collaboration and Learning Environment. Sakai is also a free, community source, educational software platform distributed under the Educational Community License (a type of open source license). Sakai is used for teaching, research and

collaboration. Systems of this type are also known as Course Management Systems (CMS), Learning Management-Systems (LMS), Virtual Learning Environments]

4) Google Docs [4] [Google Docs is Google's "software as a service" office suite. Documents, spreadsheets, presentations can be created with Google Docs, imported through the web interface, or sent via email. Documents can be saved to a user's local computer (ODF, HTML, PDF, RTF, Text, Office Open XML). Documents are automatically saved to Google's servers, and a revision history is automatically kept so past edits may be viewed (although this only works for adjacent revisions, and there is currently no way to find and isolate changes in long documents). Documents can be tagged and archived for organizational purposes. The service is officially supported on recent versions of the Firefox, Internet Explorer, Safari and Chrome browsers running on Microsoft Windows, Apple OS X, and Linux operating systems.]

	Blackboard	Moodle	Sakai	Google Docs	E-Learning
Course Management	X	X	X		X
Self-assessment services	X	X	X		X
Real-time collaborative online edition				X	X
Automatic digitized notes uploading					X
External platforms integration					X

Fig 1. Comparison between main existing e-learning platforms

In Fig. 1 a brief comparison of the main existing platforms is exposed. This comparison is focused on the functionality offered by these platforms including E-Learning. The E-Learning platform provides all the features offered by these platforms and also adds a special feature: the digitization of the content generated by students with a digital pen. This feature allows the management of this digitized content through creating and modifying documents stored in different e-learning platforms (Moodle and Google). It also enables the collaborative edition of the digitized documents and the automatic evaluation of exercises.

III. IMAGE COMPRESSION

In this, images (diagrams, photos of assignment etc.) are stored on cloud to reduce size of images compression technique is used.

A. RGB Color Model

The RGB color model is an additive color model in which red, green, and blue color is added together in various ways

to reproduce a broad array of colors. In computing, the component values are often stored as integer numbers in the range 0 to 255. These may be represented as either decimal or hexadecimal numbers.

1) RGB Color Images

Color images are composed of three different channels viz. Red, Green and Blue. • One can also imagine three One can also imagine three overlapped 8-bit images to compose a final 24-bit color image.

2) RGB Color Example

Sample PIXEL value in HEX = 0EDEB5 . In programming the hex numbers are represented as 0x0EDEB5. 0x prefix is for hex notation. Then individual color channels: 0E (red) - DE (green)- B5 (blue) 00001110-11011110-10110101 Actual Color Composed Will Be



B. Gray scale image

In a (8-bit) grayscale image each picture element has an assigned intensity that ranges from 0 to 255. A grey scale image is different from black and white image since a grayscale image also includes shades of grey apart from pure black and pure white color. Grayscale images are usually required for image processing.

2.3) Different Image Types



Fig 2. Original, Grayscaled and Threshold image.

C. RGB To Grayscale Conversion

Steps / Algorithm

1. Traverse through entire input image array.
 2. Read individual pixel color value (24-bit).
 3. Split the color value into individual R, G and B 8-bit values.
 4. Calculate the grayscale component (8-bit) for given R, G and B pixels using a conversion formula.
 5. Compose a 24-bit pixel value from 8-bit grayscale value.
 6. Store the new value at same location in output image.
 7. Traverse through Entire Image
- ```

for(y=0;y<height;y++) {
for(x=0;x<width;x++) {
pix = input[y][x];
8. Extract 8-bit R, G and B values from 24-bit Color Value
b = pix & 0xff;
g = (pix >> 8) & 0xff;
r = (pix >> 16) & 0xff;
9. Calculate grayscale component
gs = (r + g + b) / 3
10. RGB Averaging Formula
gs = (r+g+b) / 3;

```

### 11. Re-Compose 24-bit Value & Save To Output Image

```
r = g = b = gs;
output[y][x]=(r<<16)|(g<<8)|b;
}
}
```

#### D. Pseudo - Code

```
int input[][];
int output[][];
int r, g, b, gs, pix, x, y;
for(y=0;y<h;y++) {
for(x=0;x<w;x++) {
pix = input[y][x]; // read input pixel
b = pix & 0xFF; // extract blue
g = (pix >> 8) & 0xFF; // extract green
r = (pix >> 16) & 0xFF; // extract red
gs = (r + g + b) / 3; // calculate grayscale component
r = g = b = gs; // update value for r, g and b
pix = (r << 16) | (g << 8) | b; // calculate 24-bit pixel value
output[y][x] = pix; // store to output image
}
}
```

#### E. Thresholding

Thresholding [7] is the simplest method of image segmentation. From a grayscale image, thresholding can be used to create binary images

##### 1) Method

During the thresholding process, individual pixels in an image are marked as "object" pixels if their value is greater than some threshold value (assuming an object to be brighter than the background) and as "background" pixels otherwise. This convention is known as threshold above. Variants include threshold below, which is opposite of threshold above; threshold inside, where a pixel is labeled "object" if its value is between two thresholds; and threshold outside, which is the opposite of threshold inside. Typically, an object pixel is given a value of "1" while a background pixel is given a value of "0." Finally, a binary image is created by coloring each pixel white or black, depending on a pixel's labels.

##### 2) Threshold selection

The key parameter in the thresholding process is the choice of the threshold value (or values, as mentioned earlier). Several different methods for choosing a threshold exist; users can manually choose a threshold value, or a thresholding algorithm can compute a value automatically, which is known as automatic thresholding (Shapiro, et al. 2001:83). A simple method would be to choose the mean or median value, the rationale being that if the object pixels are brighter than the background, they should also be brighter than the average. In a noiseless image with uniform background and object values, the mean or median will work well as the threshold, however, this will generally not be the case. A more sophisticated approach might be to create a histogram of the image pixel intensities and use the valley point as the threshold. The histogram approach assumes that there is some average value for the background and object pixels, but that the actual pixel

values have some variation around these average values. However, this may be computationally expensive, and image histograms may not have clearly defined valley points, often making the selection of an accurate threshold difficult. One method that is relatively simple, does not require much specific knowledge of the image, and is robust against image noise, is the following iterative method:

1. An initial threshold (T) is chosen, this can be done randomly or according to any other method desired.
  2. The image is segmented into object and background pixels as described above, creating two sets:
    1. = {f(m,n):f(m,n)>T} (object pixels)
    2. = {f(m,n):f(m,n) < T} (background pixels) (note, f(m,n) is the value of the pixel located in the column, row)
  3. The average of each set is computed.
    1. = average value of
- Thresholding (image processing) 2
2. = average value of
  4. A new threshold is created that is the average of and
  1.  $T' = (\text{ } + \text{ })/2$
  5. Go back to step two, now using the new threshold computed in step four, keep repeating until the new threshold.



Original image



Example of a threshold effect used on an image

#### IV. CLOUD COMPUTING

Cloud computing [5] [6] [7] [8] is typically defined as a type of computing that relies on *sharing computing resources* rather than having local servers or personal devices to handle applications. In cloud computing, the word cloud (also phrased as "the cloud") is used as a metaphor for "the Internet," so the phrase *cloud computing* means "a type of Internet-based computing," where different services — such as servers, storage and applications — are delivered to an organization's computers and devices through the Internet. Cloud computing is comparable to grid computing, a type of computing where unused processing cycles of all computers in a network are harnessed to solve problems too intensive for any stand-alone machine.

#### V. SYSTEM ARCHITECTURE

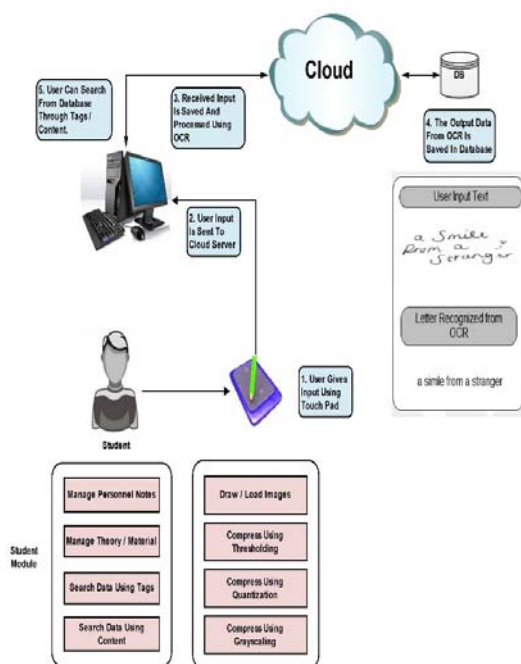


Fig 3. System Architecture

Here a student can manage their personal notes, upload/download images from the cloud, search for images using tags. When a user uploads an image on the cloud, compression techniques are applied on the image so that size of the image is reduced and less storage space required. Grayscaleing, thresholding, quantization are some of the

techniques used. The image is then saved on the cloud, for further usage. Handwritten notes can be saved on the software too. This comes in handy when notes taken in class needs to be uploaded immediately on the software. This software uses the technology of OCR for such notes.

#### VI. CONCLUSION

In this paper author has discussed various aspects and models related to cloud based communication. This system provides a brand new application which makes communication in daily life easy. The author has implemented software as a service architecture in the system. The system provides facilities of sms, email, notifications, and various other features which gives the user a user friendly interactive communication. The system provides high security, data storage and authentication. Theft of information and miss usage of user's account is not possible. This creates a feeling of secured and safe communication in the users mind. It plays an important role in educational institutions by providing a platform for the students and staff for efficient and effective interaction. It is cost effective as communication is done using Wi-Fi technology. The availability of low cost cell phones embedded with latest technologies, almost every other human possess a cell phone. This makes the application widely and globally useful for future research and development

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