ISSN No. 0976-5697

Volume 5, No. 7, September-October 2014

International Journal of Advanced Research in Computer Science

RESEARCH PAPER

Available Online at www.ijarcs.info

Video Segmentation and Video Indexing For E-Learning

Laxman Tawade
VDF School of Engineering and Technoloy,
Latur ,India

Abida Bapu Aboobacker
Calicut University,
India

Abstract— In this paper , We address the problem of the video lecture sliding /forwarding to particular point or gaining reverse to particular point. So in this system we create a indices within video to make it easier to go particular point just by clicking. So first, we do the Segmentation. Segmentation provides points of access that facilitate browsing and retrieval of video content. Indexing video data is essential for providing content based access Indexing is thus driven by the image itself and any semantic descriptors provided by the model.

Keywords— Video segmentation ,Video Indexing

I. INTRODUCTION

A. Relevance of the project:

Segmenting multimedia data streams is a fundamental problem with many applications. Properly segmented streams can be better organized and reused. They provide points of access that facilitate browsing and retrieval. As more and more multimedia data are created and made available, segmentation algorithms can serve the important function of helping summarize and indexing this mass of material. Indexing video data is essential for providing content based access. Indexing has typically been viewed either from a manual annotation perspective or from an image sequence processing perspective. The indexing effort is directly proportional to the granularity of video access. As applications demand finer grain access to video, automation of the indexing process becomes essential. Given the current state of art in computer vision, pattern recognition and image processing reliable and efficient automation is possible for low level video indices like cuts and image motion properties etc. Using indexed video we can easily forward/reverse video to particular point just by clicking so it avoid the sliding and searching for particular point in video. This is useful for students study from video lectures, also useful in seminars, conferences and business meetings.

B. Project idea:

We address the problem of the video lecture sliding/ forwarding to particular point or going reverse to particular point. So in this system we create a indices within video to make it easier to go particular point just by clicking. So first, we do the Segmentation. Segmentation provides points of access that facilitate browsing and retrieval of video content. As more and more multimedia data are created and made available, segmentation algorithms can serve the important function of helping summarize and indexing this mass of material. There are various algorithms for Video Segmentation. Out of which, the best suitable can be used. Then we create indices within video. Indexing video data is essential for providing content based access. Indexing has typically been viewed either from a manual annotation perspective or from an image sequence processing perspective. Indexing is thus driven by the image itself and any semantic descriptors provided by the model. Two types of indices, text-based and image-based, are needed. The text-based index is typed in by human operator based on the key frames using a content logger. The image-based index is automatically constructed based on the image features extracted from the key frames. Then we recombine this indexed frame sequentially to get indexed video.

C. Innovative things in our project:

a. Intra video Indexing*:* we create indices within video. Indexing video data is essential for providing content based access. Indexing has typically been viewed either from a manual annotation perspective or from an image sequence processing perspective. Indexing is thus driven by the image itself and any semantic descriptors provided by the model. We can easily go to particular point in forward or reverse direction just by clicking.

D. Literature Search:

a. Video Segmentation:

Genetic Segmentation Algorithm (GSA) [1] specifying the encoding, fitness function, crossover and mutation operations. We emphasize that any well-defined evaluation function may be used to characterize the desirable properties of segmentations and will work with the mechanism of the genetic algorithm. Story-based editing and browsing system with the automatic video segmentation [3]. We also point out that a video classification technology can be further integrated to enhance the tool by using visual and audio information. In addition to the semantic segmentation, an instructional video can be edited with an instructor's story. The story-based editing is similar to hyper video. Hyper video is used as a hyperlink in a web. An instructor can construct an instructional material by hyper video links.

The two different video segmentation approaches are

a) Shot-based segmentation*:* it identifies a transition in content between two frames, and uses a key frame to represent a video shot.

b) Object-based segmentation*:* a frame is divided into objects and background according to the temporal relations and spatial relations.

b. Indexing:

a) High Level Indexing: The work by Davis [2] is an excellent instance of high level indexing. This approach uses a set of predefined index terms for annotating video. The index terms are organized based on high level ontological categories like action, time, space, etc. The high level indexing techniques are primarily designed from the perspective of manual indexing or annotation. This approach is suitable for dealing with small quantities of new video and for accessing previously annotated databases.

b) Low Level Indexing: These techniques provide access to video based on properties like color, texture etc. These techniques can be classified under the label of low level indexing. The driving force behind this group of techniques is to extract data features from the video data, organize the features based on some distance metric and to use similarity based matching to retrieve the video. Their primary limitation is the lack of semantics attached to the features.

c) Domain Specific Indexing: These techniques use the high level structure of video to constrain the low level video feature extraction and processing. These techniques are effective in their intended domain of application. The primary limitation of these techniques is their narrow range of applicability. One of the pioneering efforts in the area is by Swanberg et al[3,4]. They have presented work on finite state data models for content based parsing and retrieval of news video. Smoliar el al [2] has also presented work on parsing news video.

c. Recombine:

Numerous video retrieval and management tasks rely on accurate segmentation of scene boundaries. Many existing systems compute frame-indexed scores quantifying local novelty within the media stream [6].

E. Features:

a. No video sliding required due to indexing.
b. No quality distortation during indexing.
c. Content based and Scene change based video segmentation text based video indexing so no increase in size of video.
d. Easy to handle /use of system.

II. SCOPE OF PROJECT

A. Purpose:

We address the problem of the video lecture sliding /forwarding to particular point or gaining reverse to particular point. So in this system we create a indices within video to make it easier to go particular point just by clicking. So first, we do the Segmentation. Segmentation provides points of access that facilitate browsing and retrieval of video content. Indexing video data is essential for providing content based access Indexing is thus driven by the image itself and any semantic descriptors provided by the model.

B. Current Scenario:

Currently there are number of system available on video indexing for database and retrieval. These systems not consider the intra video indexing. The most common approach to content-based video segmentation is shot transition detection: the video sequence is partitioned into shots, each video shot representing a meaningful event or a continuous sequence of action. Shot transitions can be divided into two categories: abrupt transitions and gradual transitions. Gradual transitions include camera movements-panning, tilting, zooming-and video editing special effects-laden-in, fade-out, dissolving, wiping.

III. SYSTEM DEVELOPMENT

A. Activity Diagram:

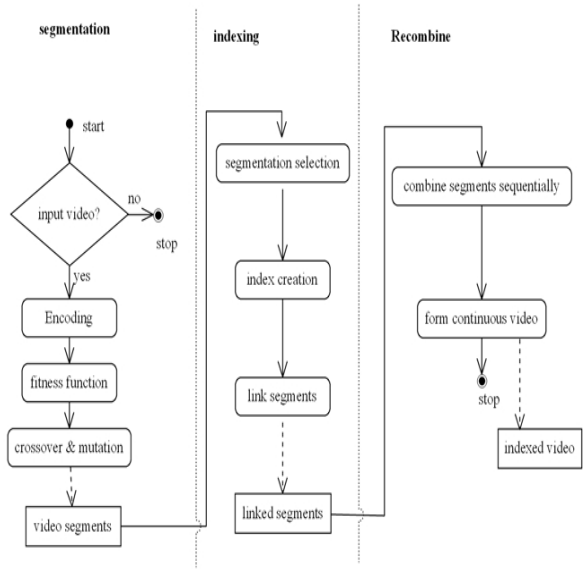


Figure 3.1 Activity Diagram

B. Sequence diagram:

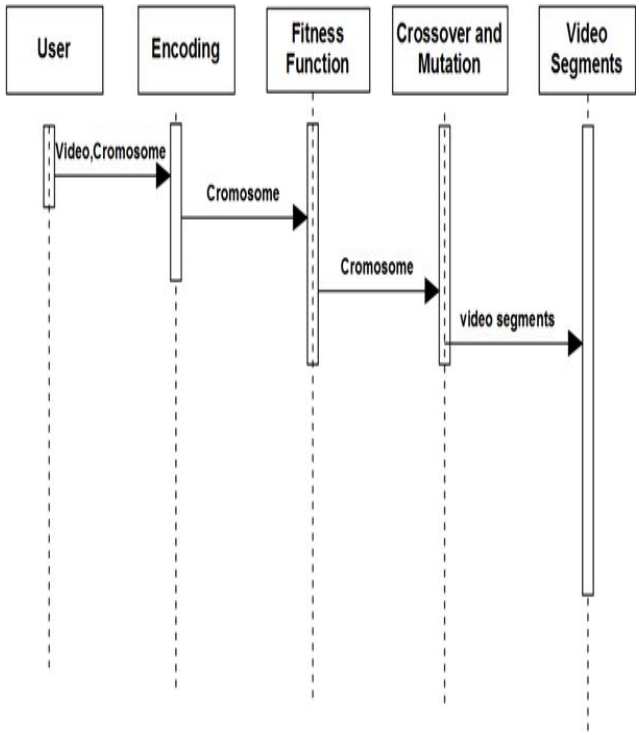


Figure 3.2 (a) : sequence diagram segmentation

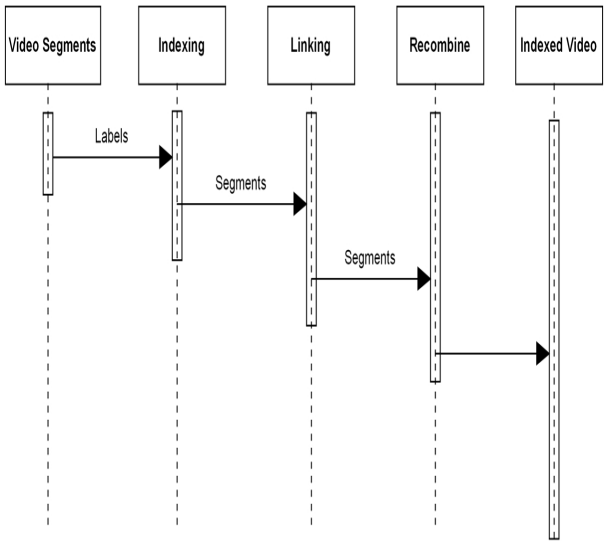


Figure 3.2 (b) sequence diagram indexing and Recombine

C. System Architectural Design:

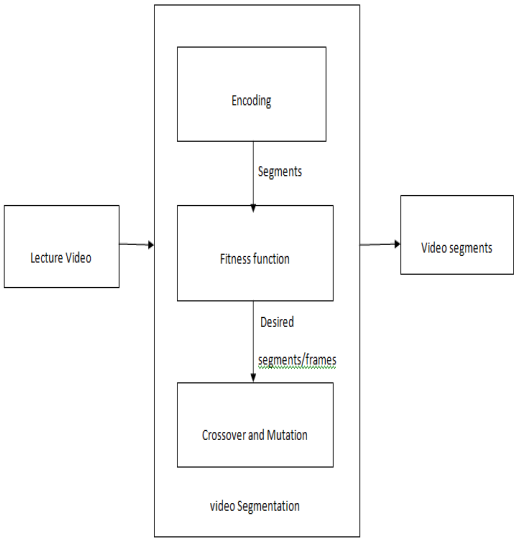


Figure.3.3(a) video segmentation and indexing

a. Procedural Design:

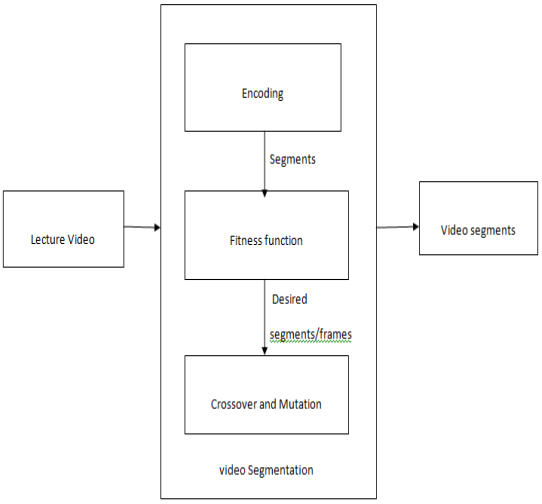


Figure 3.3(b) video segmentation

Video segmentation refers to partitioning video into spatial, temporal, or spatiotemporal regions that are homogeneous in some feature space. It is an integral part of many video analysis and coding problems, including (i) video summarization, indexing, and retrieval, (ii) advanced video coding, (iii) video authoring and editing, (iv) improved motion (optical flow) estimation, (v) 3D motion and structure estimation with multiple moving objects, and (vi) video surveillance/understanding.

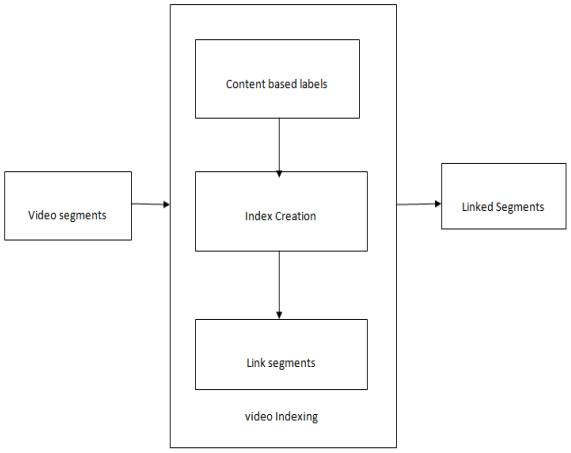


Figure 3.3 (c) video indexing

Video annotation or indexing is the process of attaching content based labels to video. Existing literature on video indexing implicitly defines video indexing as the process of extracting from the video data the temporal location of a feature and its value.

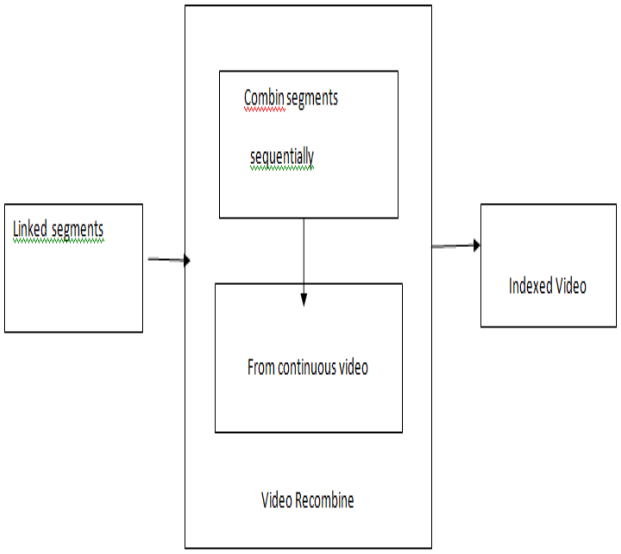


Figure 3.3 (d) video recombine

In video recombine we link indexed segments sequentially and form the continuous Indexed video. This step gives our final output as indexed Video. Finally we verify this Index.In our system implementation ,we have used different classes .In those classes ,we are coding main part in the constructors itself and supporting getter and setter methods are used for communication between classes.

b. Important Constructors:

a) Browse() //It Guides the user for further surfing.It browses for video path and filters video format and shows only .avi and .mpg .It redirect user to either

play video or extract frames (create indices) or contentbased video player.

b) JMFPlayer(JFrame pf, String media) //It is used to play video i.e used to design video player.It takes parameter JFrame as bsae and String as URL.

c) scenechange2jpg(String path,String name) //It is used for scenechange detection and extract that images and store on Hard disk also stores frame names in database.

d) Showscenechange(String loc,String name) //It is used to display extracted frames and provide option for extract text from extracted images and display images+text and save index

e) ContetBasedPlayer() //It is used to show Indexed video .It shows extracted images+text,Index points and video player

f) video_play(String path) //It is used to play video in content based video player .It takes parameter String as URL

g) OCR() //It is used to extract text from Image.Internally it uses AspironOCR.dll as native library.

IV. ALGORITHMS

A. Scene Change detection Algorithm:

a. Select tolerance and minimum frame gap set count to zero.
b. Read current frame
c. If not end of stream Subtract next frame from current frame else goto 5
d. Three cases :
a) If difference less than tolerance and frame count less than minimum gap read next frame ,increment count and goto step 3 .
b) if difference greater than tolerance extract that frame and set current frame equals to this frame ,set count to zero go to step 3.
c) if count greater than frame count that frame and set current frame equals to this frame set count to zero Goto step 3.
e. stop.

B. Text Extraction:

a. Read image in JPEG format.
b. Take sublimate of this image which contain heading i.e take upper rectangular part of image.
c. Setup the OCR and pass image to PerformOCR native library.
d. Save the text return from OCR.
e. Stop.

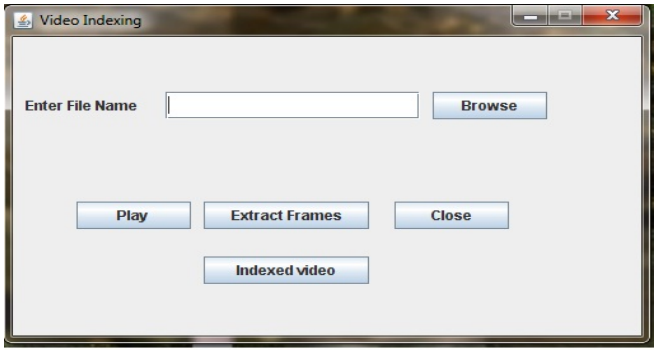
C. Video Indexing:

a. Take input video.
b. Pass this video to scenechange detection module.
c. Extract scene change images and TimeStamp of this images and save imaghs on HardDisk .
d. Pass this images to Text Extraction algorithm to extract headings from that images.
e. Insert the image path,image name,Timestamp,text into database.
f. Onclick of images or text retrieve record from database ,read timestamp and set media time to that time.
g. Stop.

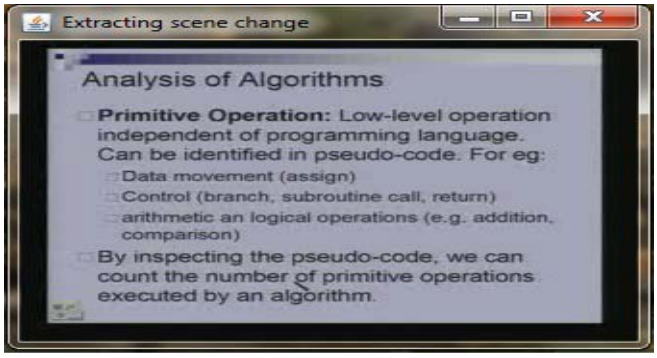
V. RESULTS

A. Screen-shots of GUI

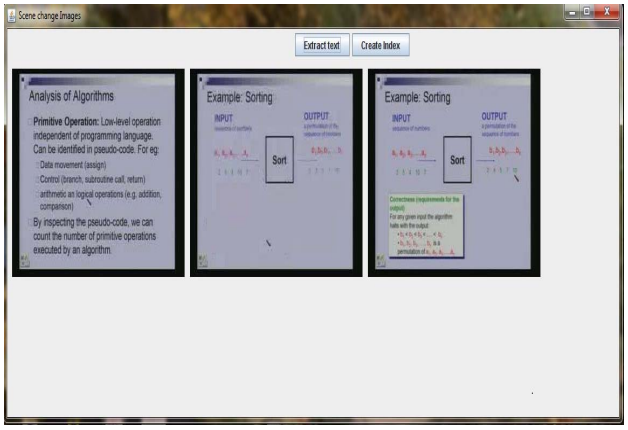
a. BrowseWindow:



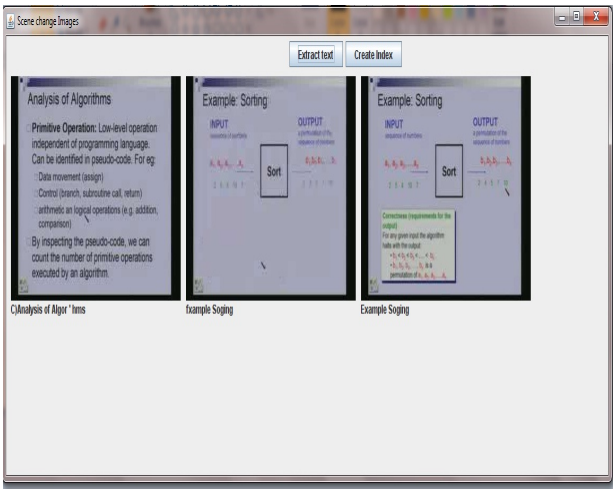
B. Scene Change Detection:



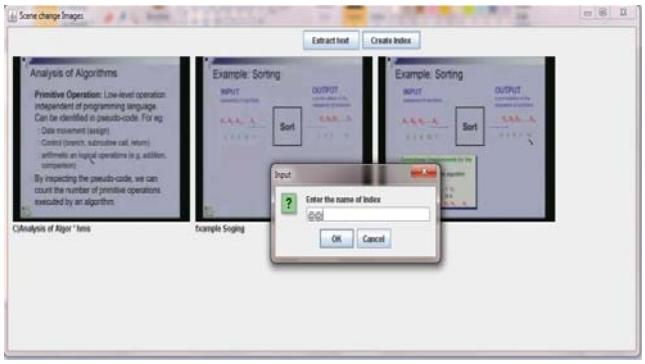
C. Display images:



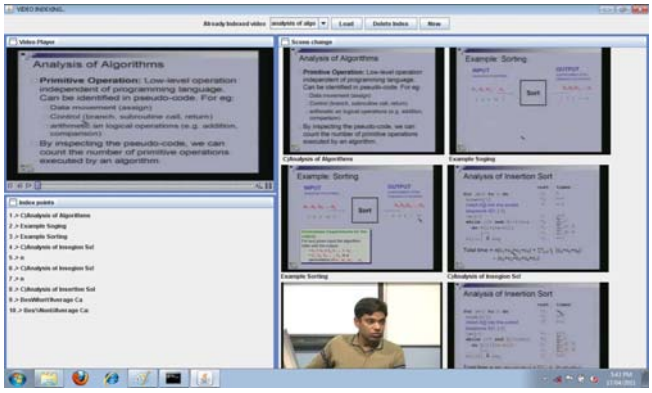
D. Text Extraction:



E. Indexing:



F. Content based video player:



VI. CONCLUSION

As the conclusion instead of sliding the video, using indices we can go directly to particular point just by clicking the link it is very useful for students study from video lectures also useful in seminar, conferences and business meetings. We have segmented the input video. Segments are displayed in appropriate manner. Then labels are added to segments and indexing is done. Segments are linked together. At last all segments are recombined and we get indexed video.

VII. FUTURE SCOPE

Future work will involve expanding the set of video indexing for video large sized video of any format along with quality improvement, video compression, video security. Another research scope in the near future could be to provide the E-Learning contents to the users on the web browser. The future concerns of this project also relate to the security aspects of video such as insertion of some owner information in index points. Incorporation of Video Indexing and the use of Video lectures as an E-Learning material will also be the future prospects of this project.

VIII. REFERENCES

[1]. Patrick Chiu, Andreas Girgensohn, Wolf Polak, Eleanor Rieffel, Lynn Wilcox,"A genetic algorithm for video segmentation and summarization.", 2005 IEEE Intl.Conference on Multimedia Computing and Systems.

[2]. Video indexing from http:// dynamo. ecn. purdue.edu/~ ace/parse/parsing.html ".

[3]. Yi-Chun Liao, Chun-Hong Huang. "Automatic Video Segmentation and Story-Based Authoring in E-Learning", from journal of software ,vol. 4 no. 2 April 2009 .

[4]. W. A. C. Fernando, C. N. Canagarajah and D. R. Bull "Scene change detection algorithms for content-based video indexing and retrieval."from IEEE.

[5]. U.Gargi,R.Kasturi,S.Antani "Performance Characterization and Comparison of Video Indexing Algorithms. "from http://ieeexplore.ieee.org.

[6]. Matthew Cooper,"Video Segmentation Combining Similarity Analysis and Classification" from *MM'04*, October 1016, 2004, New York, New York, USA.

[7]. Hand Book of Image and video processing by Al bovik.

[8]. Digital Image Processing, A practical introduction Using JAVA by Nick Efford

Short Bio Data for the Author

Laxman Tawade has pursued BE degree in Electronic & Telecommunication from Pune University, India in 2011. Currently he is working as lecturer in VDF School of Engineering and Technology, Latur, India. He has done project internship at Reliance Innovation Communication Lab, Mumbai, India. He is member of International Association of Computer Science and Information Technology (IACSIT), Machine Intelligent Research Lab (MIR Lab), Universal Association of Computer and Electronics Engineers (UACEE), Academy and industry research collaboration center (AIRCC). He has 3 paper in international conference and 15 papers in International Journal to his credit. He has published papers in good reputed journals like Springer, Elsevier and John Wiley Son's Publication. He has worked as Reviewer for international journals and international conference sponsored by IEEE & also worked as program committee member of few international conferences. He is working as technical program committee member of few international conferences. He is also invited as the Chair/Speaker of Network Security at the upcoming 2nd Annual World Congress of Emerging InfoTech 2013 (InfoTech-2013) at China. He is nominated for"Who's Who in the World". His research interest includes Image Processing ,Security & Communication Network, Optical Fiber Communication and optical access networks based on WDM-PON, Biomedical signal processing and Power quality.

Abida Bapu Aboobacker is working as associate professor in Holy Grace Engineering College, kerala from 2012 till date. She was working with IES College of engineering from 2006 to 2012 as Assistant Professor cum head of department incharge. She had worked in Almihad Institution Alrigga, dubai from 2004 to 2005 as IT department in charge. She has worked as lecturer in Ansar Computer College from 2002 to 2004 for MCA students. She was incharge of R&D Lab, AICTE, DTE, IEEE students chapter of the institution .She is member of IEEE and CSI. She also participated in various national level conferences .Her research interest include Image Processing, computer vision and Robotics.