Using Augmented Reality as a Visual Aid to Teach Tamil Language in Malaysian Tamil Primary Schools

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Abstract: Augmented Reality is a technology which combines computer vision and virtual reality. This technology works in a way that, when certain printed image is brought under a certain vision based software, a 2D or 3D image can be generated in the devices. Hence this technology has greatly potential to be used as a visual aid in education specially in teaching Tamil language in class room environment in Malaysian Primary Tamil Schools. Besides that, this method will allow a much more interactive and interesting teaching and learning method. Several problems involving the learning and teaching can be solving using this method like maintaining the interest level of learning of students in classroom. Student will not need to require following the traditional aspect of learning where a student is needed to open a book to learning, here they can scan a printed image to learning. In addition, it also provides a new teaching and learning method in teaching and learning Tamil language especially in schools. The main emphasis on this technology is computer vision focusing on image processing, 3D modeling and vision manipulation in cameras in computers and similar devices. It gives great details into detection and recognition of object using image processing techniques. This paper delves into possibility to use augmentation reality for Tamil language education in Malaysian Tamil schools via any mobile devices like laptop, iPad, iPhone and any other similar devices.

Keywords: Augmented Reality, Tamil, Education, Teaching, Learning

Introduction

Augmented Reality (AR), is a useful technology which deal with the mixed of reality and virtual reality. Generally AR is the visual results which are generated by computer by merging with a real view to create an augmented display. According to Roched (2011) has stated that Augmented Reality (AR) has existed in sci-fi movies for decades and until recently has been a thing of the future. This can supported since AR has been an interesting and developing technology in recent year, however it was focus more toward advertising and entertainment. Due the recent development in mobile computing devices has enable AR to be used in education as well. Hence there is a great chance that this technology can be used as a visual aid to teach Tamil language in Malaysian Tamil School. Klopfer and Squire (2008) stated that recent push from desktop computers and laptop computers to handheld computers has certain obvious advantages in terms of cost and maintenance, the educational potential of this new platform have been sparsely explored. Indicating that augmented reality has great potential to be developed to toward the cause. Besides that, augmented reality can be consider the level of teaching Tamil language in school due to the fact that the technology has the nature ability to attract people attention due the unique results generated by it. In term of education, this technology has great potential to further improve the teaching and learning level of Tamil language in Malaysian Tamil School. Hence this paper provides a simple prototype on how the technology can be used in such way.

Problem Statement

This paper aims to solve the following problems:

1. Maintaining the interest level of learning in student while studying in classroom
2. Provides a new teaching and learning method in teaching and learning Tamil language especially in Tamil schools.
3. Implement a new scan to read method to replace the old methods used in Tamil schools in Malaysia.

Implementation

Augmented Reality allows virtual images to be imposed over live video of the reality world. This process uses marker which is describe below. A general AR application works as follow;

1. A camera works record videos of reality world and send into computer
2. Then an application will search of any markers
3. If the markers are found, then a pre-drawn graphic model will be generated over the marker.

Implementation of this paper is divided into 3 parts. These parts are details described below;
AR tag markers

Augmented tag markers are printed images with black or white details. The markers are used in collaboration with edge detection to detect any edge pixels which serves as basic for the marker detection process. The figure 1.0 below shows a sample marker which can be used in augmented reality application. It is to be noted that, it is totally different from QR markers which works in almost similar way but requires internet connection to display information. These AR markers do not require any internet connection to display the visual results but required a vision image processing software to work. Therefore setting up the markers is the foremost process in creating an augmented reality application.

![Figure 1.0](image)

**Image processing**

The image processing technique used in creating the application is edge detection. This process involves a detail analyze of the black and white details in the marker. The edge detection which used in this application was Canny Edge Detection which it involves 5 different steps. These steps include smoothing which blurs the image to remove unwanted noise or data. The next is to find the gradient since the edges should be marked to identify the magnitudes. This step is followed by suppression of non-maximum where the only local maxima should be marked as edges. Next, the potential edges are determined by thresholding using the concept of double thresholding. The final step will be to remove edges which are not connected with each other.

**Creating the visual image**

The image that required to be generated can be in any format either 2D or 3D. But this paper only 2D image will be used. The image will be created using Paint software in Windows. But if a 3D image is needed softwares like lightwave or 3D max which can be used to generator the image. The last step is to combine the image processing technique and the visual to produce the image.

**Results**

This section highlights how the proposed application can be used as a Visual Aid to Teach Tamil Language in Malaysian Tamil Primary Schools. The application is able to produce any Tamil language characters or any type of learning mode of the language. A webcam captures the video stream of the markers which is placed on the location which the images are produced. In this case, the marker is glued to wall to obtain a sample result. However a prebuild marker on the wall or any surface can be used. The results are as followed.

![Image of Tamil characters](image)
Future Improvement

The current application uses only 2D image, perhaps in the future implementation can lead to 3D images, video or even animation. Besides that, it is also possible to used advance vision system techniques like motion detection to further manipulate the image from reality world. This will enable to modify the visual result generated on the marker.

Conclusion

As conclusion the usage of augmented reality in teaching Tamil language can be very useful and beneficial to the social and student. Besides that, the technology has the potential to be future progression of the education system in Malaysian Tamil schools. As a visual aid the technology is able to give better understanding the language also acts a much better interaction mode of learning the language. Teachers will able to maintain the level of interest of class as well delivering an effective teaching and learning process to the student. Besides that, students will no longer need to depend on books or normal visual aids to learn when this technology is being used.

References


Bibliography

The idea of dubbing and subtitling free open course wares in Tamil, emerges from Khan academy website, the lack of contribution when compared to the rest of languages, despite the fact, Tamil is one of the largest spoken language across countries. The idea is to reach the existing quality science education to our young minds in our language.

Khan Academy

Salman Khan, who reinvented the free and open Education through Video. Started with Yahoo doodle to teach Mathematics for his cousin Nadia, later he uploaded it on youtube for the benefit of everyone, Khan's teaching were practical, relaxed and in a humorous way, which helped more young minds all over the world. Khan quit his hedge fund analyst job in 2009 and dedicated his work towards free education under the name Khan Academy. www.khanacademy.org

Course Content

Mr. Khan started with his doodle and now their library contains more than 4200 videos, which focus on mathematics, physics, chemistry, biology and extends to history, economics and so on.

Course Languages

Lessons have been dubbed in more than 22 languages with its own lingual sub-domain and the URL's of each video are mapped to original video. Among Indic languages, Telugu and Bengali owns their sub-domain, carrying their language's code.

- http://bn.khanacademy.org (Bengali - BN)
- http://te.khanacademy.org (Telugu – TE)
- http://de.khanacademy.org (German – DE)

MIT Open Course wares

Massachusetts Institute of Technology, top ranking technical university which offers open course ware from their site, MIT's open course ware has both Text lessons and Audio Video lectures, ranging from Computer Science, Aeronautics, Physics, Anthropology, Media Arts to Environmental Science for free, these are also translated in other languages. Audio / Video Lectures

- http://ocw.mit.edu/courses/audio-video-courses

Tamil Contribution

Tamil contribution to Khan academy is relatively very low, the Tamil youtube page of Khan Academy contains only 18 mathematics lessons, which were dubbed in Tamil.

- http://www.youtube.com/user/KhanAcademyTamil

Conclusion

Edunation Malaysia is a non-profit volunteer initiative to ensure quality education to every Malaysians for free. Likewise, It is important to address the need of contributors to dub most of the lessons in Tamil, which will benefit the young minds of Tamil across the globe and make a presence of Tamil site with in Khan Academy.

- ta.khanacademy

About Edunation (from their website)

Edunation is a volunteer driven non-profit educational initiative and we are here to ensure that every Malaysian student has all the educational resources he needs to succeed academically in school.

For the past year we have been hard at work in putting the Malaysian school syllabus online by mapping the Khan Academy videos and creating our own videos.

- www.edunation.my

References

https://www.sites.google.com/a/khanacademy.org/forge/for-translators/translations-update