

Augmented Reality for Learning Platform

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Abstract: New approach for making education easier for humans that makes learning more practical and reliant. Computer Vision has a wide variety of technologies. Augmented Reality is one of the popular technologies of Computer vision. Augmented reality is the next revolutionary approach. These days interactive study is a new boom for teaching industry. The 3D images, audios and videos that explain the text more graphically. This enhances the student's understanding and makes the learning process easier. Also, human verification, biometrics, information gathering using devices such as google glass is more convenient. Deep learning has gained a tremendous amount of influence on the world and the rapid adaptation of Artificial Intelligence in the past few years has been remarkable. Some of the popular object detection algorithms are Region-based Convolutional Neural Networks (RCNN), Faster- RCNN, Single Shot Detector (SSD) and You Only Look Once (YOLO). We are using Object detection and face recognition, which is now accurate up to 95% using tensor flow Object detection API, for training our Model. Also using faster R-CNN algorithms for implementations. This proposes the PCA (Principal Component Analysis) facial recognition system. The key component analysis (PCA) is a statistical method under the broad heading of factor analysis.

Keywords: Augmented Reality, OCR, Deep Learning, Object Detection API, Tensor Flow, Faster R-CNN, CNN, Computer Vision, Face detection, Face recognition, PCA, Eigenspace, Haar cascade, OpenCV

I. INTRODUCTION

When we talk about comfort, from performing tasks to learn something, we can say without any doubt that technology has played a deep and vital role. Which has led to the development of technology sector at this remarkable level. By far, we are the most comfortable generation with technology at our fingertips. Augmented reality goes to be terribly development over time. AR ready smartphones and other devices become more accessible around the world [1]. As virtual environment completely immerses the user into the virtual world. Augmented Reality allows the user to see the real world, with virtual objects superimposed upon or composite with the real world. Having a camera mobile phone is very common these days. All we have to do is pick it up and focus it on an object and humans. Our object recognition and face recognition systems will recognize it and tell you about that object in augmented environment.

Detection of object has become very feasible for our computing devices with the development of Artificial Neural Network (ANN) and also face recognition systems. Object recognition is referring to a collection of related tasks for identifying objects in digital photographs [2]. By recognizing the thing, special points are taken and that we use this information to form generic markers round the scene. Then, an algorithm for pose estimation is employed to seek out the orientation of the real object to permit registration process for 3D objects.

When designing an AR system, three aspects must be in mind Combination of real and virtual worlds; Interactivity in real time; Registration in 3D.

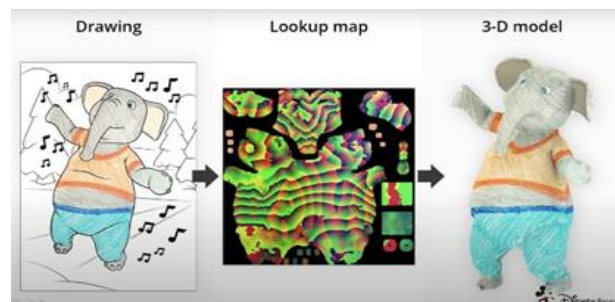


Fig: Static Lookup map for Assigning pixel form drawing to 3-D Model

Using AR combined with Database will be a nice opportunity for making such change in the world where humans can access every relevant information in a very modern approach. This interactive environment is another approach for

humans to understand the things more precisely. As human brain approach toward a solution is always imaginative. This helps humans' brain to understand and imagine a step further from current capability.

Augmented reality (AR) could be a new technology that has emerged with potential for application in education. While lots of research has been conducted on AR, few studies are conducted within the education field, the amount of studies on AR is growing because of the effectiveness of this technology in recent years.

II. LITERATURE SURVEY

Here are the reviews of some object detection, image processing algorithm and database system that were proposed lately:

Chandan G, Ayush Jain, Harsh Jain, Mohana [3], presented an algorithm for object detection in real time, in this the authors use Deep Learning which combines SSD and Mobile Nets, and OpenCV for faster and efficient detection and tracking of objects in real time. For object detection, first step was frame differencing which was done by capturing frames at regular intervals and then estimating differences from consecutive frames. Later the optical flow field was estimated and calculated using algorithm for optical flow, and it was enhanced using local mean algorithm. In this algorithm, Background Subtraction method was used for localizing the objects in a motion, present in the video which was captured by using a stationary camera. In this process the foreground objects were separated from background in a sequence of objects. This algorithm showed excellent detection and tracking results on the objects that were trained.

M. Khan, S. Chakraborty, R. Astya and S. Khepra [4], presented various face detection and recognition algorithms. The authors developed a camera based real time face detection system. In this paper, authors discussed various face recognition algorithms like face recognition using Haar Cascade, face recognition using Fisherface and face recognition using Local Binary Pattern. Authors discussed how a face can be recognized using Eigen Faces and also, it's applications. In this paper authors also discussed about PCA (Principal Component Analysis) which can be used for identification, detection and compression of images.

S. Thakare, A. Kamble, V. Thengne and U. R. Kamble [5], presented a technique which accepts an image containing text in any language and as an output it produces the exact translation of the text present in image in any language. For this, python script and various python libraries were used like Google Trans. In this firstly the position of text is determined in the image and then pattern recognition techniques are applied to correctly identify the characters present in the image. In this the most important process is segmentation, in this process the text present in image is separated into individual characters. Tesseract-OCR was used in this technique which is used in python for extracting the text from the image and Google Trans was used for translating the text present in image.

B. N. K. Sai and T. Sasikala [6], presented an approach for detecting the threatening objects presented in the image. In this paper, the authors have used TensorFlow object detection API to train model and Faster R- CNN algorithm for the implementation. In this, firstly the image data files are in xml file format so a csv file is created that has the data of all the images, but as size of images were more so the authors converted the data into record i.e., TFrecord file format so that these data files can be optimized in multiple ways. Then the trained model of Faster R-CNN is used by changing the default parameters as per the use. Then the model built is trained with higher number of steps until the expected minimum loss is achieved. The authors were able to achieve to get a loss under 0.1 and when the model was tested it performed well by providing better results.

A. Das and S. S. Devgan [7], implemented a multimedia database system that allows to deliver the multimedia information online using video streaming. For this system, the authors first compress the video file to RM (real media file) and then inserts it into BLOB (Binary Large Object) field of MySQL database server in binary form. So, when this file is requested, the database delivers it in blocks of data. The authors used PHP language for embedding real time player in web browser. So, based on client query real time video streaming is created and multimedia file stored in database is retrieved.

III. PROPOSED WORK

This Project has 5 step process to extract and provide the Meaningful details to the user. Steps to perform video capturing, image classification, ML module for object detection, database search, animation rendering. To perform all these steps relyantly the collection of various data is needed to train the module, As well as the device used to capture the video also plays an important role. This project will purely web-based application. All rendering process will be executed through browser and the web server.

Step 1: The video capturing process" it is considered as the temporary data to our Module. As whenever we start capturing a video Python Pandas and OpenCV libraries starts to save the frames of these videos in 30fps. So that we have enough data to detect the object correctly as well as to train the module in the later step.

OpenCV is an open source computer vision library that allows developers to perform many complex tasks such as AR, image processing, video surveillance, object detection and many more.



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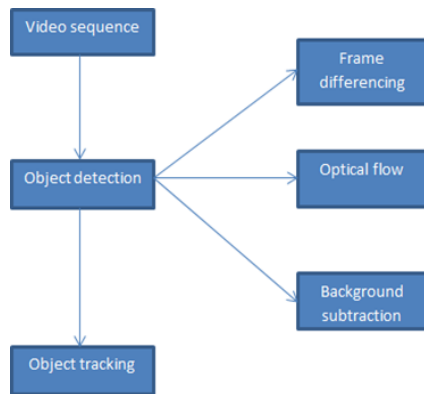


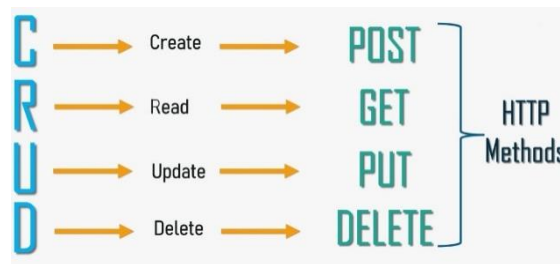
Fig. Basic Block Diagram of Object Detection and Tracking

Fig. Detection of Bicycle

Step 4: Database receives the key from previous step and provide relevant details. All that details will be in JSON format as an API will be developed for the database process.

This generation database systems requires handling, of not only traditional text data but also multimedia (Audio, video etc.). Text data, unlike multimedia is static and handling can be done using tables but in the case of multimedia data, not only storage handling but nonchalant data transfer is also required.

API CONNECTIONS



Conventional database and file systems. however, do not provide the basic support needed for dealing with multimedia data. The difficulty stems from the fact that multimedia data, such as images, video and audio, differ from conventional data (e.g. text) in their characteristics, and hence require different techniques for their organization and management [6]. Big data has really grown over a decade which also leads to the need to grow these technologies that can only be possible when a huge number of datasets are available. That’s why nowadays, data has become a new oil. Using of database such as MySQL, NoSQL is required for this implementation. Storage of data always depend on amount of data available.

Step 5: JSON object will contain the animation key as well as the other important info for the object. So that using the key our pre saved animation starts to render from the web server to the browser window. And show it to the screen in animated format.

IV. CONCLUSION

An information directory application study is implemented using technologies like Augmented reality, OpenCV, OCR, Deep learning, Database. To make a learning fun, Augmented Environment helps in the learning and also enhances the imagination capability using this technology. Object detection using Deep learning, SSD and mobile Net platform, face detection using Haar cascade and LBPH, Tesseract OCR for the text recognition, OpenCV for the video and image processing for Complex processes, Database for storing the data and managing and processing it for the best and reliable outcomes of the whole process. We have also discussed the evolution of the AR from its invention to till date. Also, some application that are important for the society.

**V. FUTURE WORK**

The application made can be used in various devices such as smartphones, smart glasses, robots, vision related systems, faceverification booths etc. It can be a revolutionary change in this field if the huge database system gets creates and humans have access to them (with their access type accordingly).

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