E-Commerce Web Application with Augmented Reality

Suman Zareen[1] , Tuba Masood[2], Pathan Ahmed khan[3]

[1, 2] UG Scholar , Dept. of CSE,ISL Engineering College, Hyderabad
[3]Associate Professor, Dept. of CSE ,ISL Engineering College, Hyderabad

Abstract

This project exhibits an image and object processing methodology for Virtual Dressing Room (VDR) applications that run on the personal computer in the form of e-commerce web application. The proposed user-friendly application requires user image to be pre-processed. Haar Cascade classifiers are an effective way for object detection .Haar Cascade is a machine learning-based approach where alot of positive and negative images are used to train the classifier.

Considering the above extracted keypoints augmented reality will be used to superimpose the products over the buyer's live picture. Proposed VDR is software implemented using OpenCV built in functions. OpenCV is a cross-platform library using which we can develop real-time computer vision applications.It mainly focuses on image processing analysis including features like face detection and object detection.

Having witnessed the influence of the internet on shopping, it will be a grave mistake to ignore the benefits that augmented reality brings to the industry of online shopping. As online retail seeks to improve its conversion rates and bolster more revenue, the benefits of augmented reality cannot be overstated. Augmented reality offers various businesses the chance to create a more interactive shopping experience with their customers as it offers the opportunity to virtually try the product they want to purchase.

1. Introduction

In general, technology can benefit people's lives. For example, during the past 20 years, with the development of computer and Internet technology, e-commerce and online shopping have rapidly progressed, due to the convenience that they provide consumers. E-commerce websites, such as Amazon.com, Dell.com, and eBay.com, have become an integral part of many shoppers' lives.

However, according to most shoppers' experiences, e-commerce and online shopping are still not able to fully replace onsite shopping, especially for products like clothing, shoes, jewellery, and furniture. For many such products, onsite shopping has many distinct advantages over online shopping. One of the main advantages of onsite shopping is that it usually provides more direct interaction with the actual product. In contrast, conventional online shopping websites often cannot provide enough information about a product for the customer to make an informed decision before checkout. Onsite shoppers frequently engage in some sort of interaction with their potential purchase to discover the scent, texture, appearence, and/or sound characteristics of a product before buying it. Such experience is often impossible with current online purchases.

However, technology is progressing. In particular, Augmented Reality (AR), an emerging Human-Computer Interaction technology, which aims to mix or overlap computer generated 2D or 3D virtual objects and other feedback with real world scenes, shows great potential for enhancing e-commerce systems. Unlike VR, which replaces the physical world, AR enhances physical reality by integrating virtual objects into the physical world. The virtual object becomes, in a sense, an equal part of the natural environment.

This chapter presents a new type of e-commerce system, AR e-commerce, which visually brings virtual products into real physical environments for user interaction. The new approach gives customers a chance to "try" a product at home or in another use environment. The chapter presents development of a prototype AR e-commerce system and provide suggestions for improvement. Overall results of the study shows that the AR e-commerce system can help customers make better purchasing decisions.

2. Background

2.1 VR in E-commerce:

Virtual reality (VR) is a computer-simulated environment that allows users to manipulate 3D virtual models online. Recently, researchers have been using VR in e-commerce to provide consumers with a new type of shopping experience by interacting with virtual product models. Hughes et al (2002) presented an adaptive navigation support system for using a virtual environment for online shopping. Sanna et al. (2002) presented a VR ecommerce system based on VRML. They used QuickTime 3D to generate 360-degree image based immersive backgrounds and an animated virtual human to help online shoppers navigate through their e-commerce environment. Bhatt (2004) analyzed the interactivity, immersion, and connectivity of several major VR-ecommerce websites, such as amazon.com, ebay.com, and schwab.com. Daugherty et al. (2005) conducted five experiments to study the usability of VR for e-commerce. Their results showed that users acquired more information about products when using a VR-based e-commerce system than when using traditional

website tools. Fomenko (2006) developed a tool for creating online VR shops, which also gave domain experts more control during the website development process. With Fomenko's tool, developers can use high-level concepts to model and semi-automatically generate a complete VR shop.

2.2 Moving from VR to AR:

Although prior studies show that VR can enhance e-commerce, by providing more product information through enhanced human-computer interaction, current VR methods for ecommerce still only provide scaled virtual product models displayed on traditional computer screens. New, more advanced, methods are needed to provide consumers with more realistic product models, with respect to size, customer experience, and user interaction.

AR is a technology which can mix or overlap computer-generated virtual objects with realworld scenes or objects. Unlike VR, which experientially replaces the physical world, AR enhances physical reality by integrating virtual objects into a physical scene. Generated virtual objects become, in a sense, an equal part of the natural environment.

In recent years, much research has focused on developing AR applications, which could be generally classified into two types, based upon the different devices used: optical see through AR and video see-through AR. Optical see-though AR uses a semi-transparent screen onto which computer generated objects can be projected; users, can simultaneously view the computer generated images and see through the screen to view the natural background environment and, thus, see an integrated AR scene. Video see-through AR uses cameras to capture the live scene as a video stream. For each viewed image frame, a captured video image frame is processed and computer generated virtual objects are added. One advantage of video see-through AR is that the mixed scene can then be displayed on different devices. With video see-through AR, markers and computer vision methods are often used for tracking.

3. Related Works :

3.1 E-Commerce Direct Marketing using Augmented

Reality Authors: Xiang Zhang, Nassir Navab

Turning Web customers from "window shoppers" into buyers demands an interactive sales model that informs them, gives them individualized attention, and helps to close the sale at the customer's request. Ideally, sales agents should have in-person meetings with all prospective customers. However, this may not be desirable or feasible.

The next best thing is for sales agents to send promotional e-mails to their prospective customers. In this paper, they described the development of a direct marketing system that uses augmented reality (AR) technology. A set of specially designed markers is used to calibrate the camera and track the motion of the markers for the augmentation of three dimensional product models. There is no special hardware required for this system except a PC camera (e.g., WebCam)

3.2 Enhancing the online decision-making process by using Virtual Trial Room Authors: Saurabh Botre , Sushant Chaudhari , Shamla Mantri

In this ,the proposed system helps in coordination of everyday fashion. The system “Virtual Dressing Environment” involves virtually trying out different cloth models which is done by mining of the user image, alignment of models and skin color detection of image (clicked from a fix distance). Our goal here is to save time of the users during trying out different attires while shopping in stores or online .

Traditional e-commerce systems have reached a limitation that needs to be overcome, because they do not provide enough direct information for online shoppers, especially when they are shopping for products like furniture, clothing, shoes, jewelry, and other decorative products.

4. Proposed System:

The proposed user-friendly application requires user image to be pre-processed and super imposes the clothes and accessories over the buyer's live image.

This feature gives the user an opportunity to try on clothes virtually before buying.

This application can be implemented using webcam on input user video.

Customers from many location can access this feature using web application.

4.1 Advantages:

- Help try first and then decide.
- Help predict what suits the customer and increases chances of buying.
- Multiple options to trial can be made available by e-commerce websites.
- This concept can be adopted my e-commerce companies to increase sales.
- Customers from any location can access this feature using web application.
- It can be a plus point for any e-commerce websites to draw customers towards their website.

5. System Architecture:

A system architecture is the conceptual model that defines the structure, behavior, and more views of a system. An architecture description is a formal description and representation of a system, organized in a way that supports reasoning about the structures and behaviors of the system.

A system architecture can consist of system components and the sub-systems developed, that will work together to implement the overall system. There have been efforts to formalize languages to describe system architecture, collectively these are called architecture description languages.

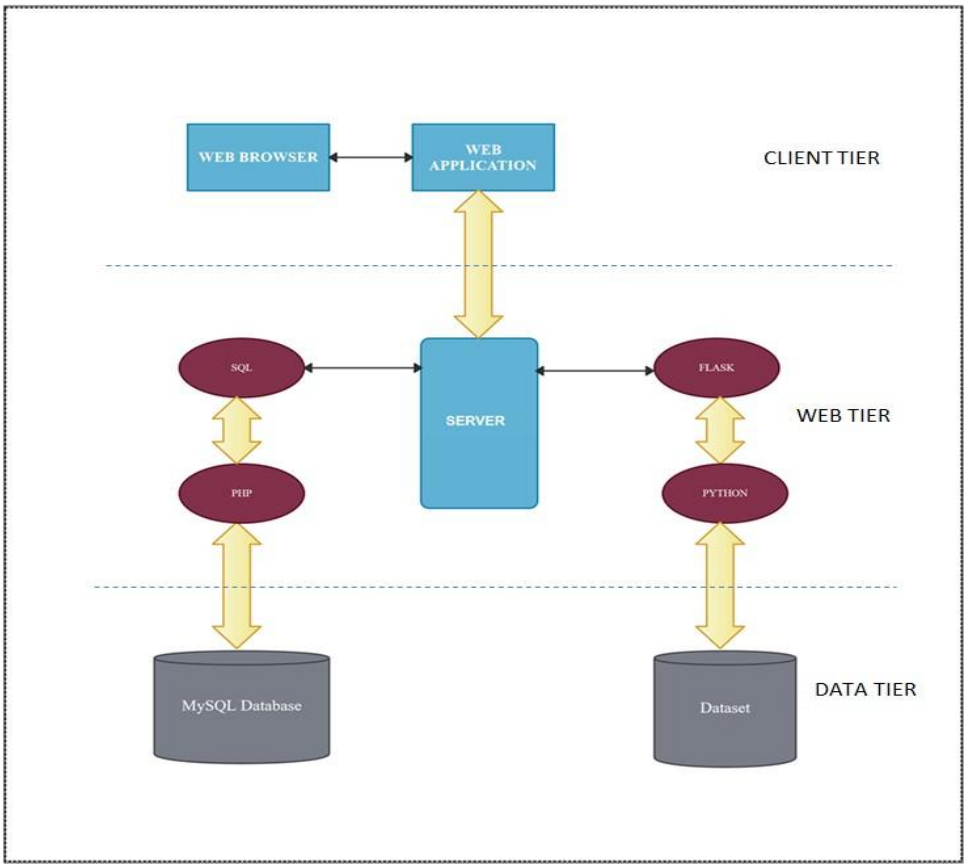


Fig: Shows illustration of E-commerce with AR is based on the three-tier architecture.

Client refers to a customer who requests for certain services and the server refers to the business application through which the services are provided and the data and information is saved in the database. The business application that provides services is deployed on a Web server.

6. MODULES

- Creating the interface
- Creating the dataset
- Training the system
- Testing the system
- Creating and attaching database

MODULES DESCRIPTION

6.1 Creating Interface:

Creating the html pages for homepage , products, registration, login and checkout and running them on the server using Flask. And also added sum products with pictures in the products page for testing.

6.2 Creating the dataset:

Now the pictures of models wearing products are stored. The dataset used here is unstructed i.e; images are used for training the system. Number of models are to be stored to make system learn from it. The products should be easily visible in the pictures and images are easy to learn from.

6.3 Training the system:

The crucial step here is to train the system from the dataset which we created. The Haar Cascades Classifier is used to recognize positive and negative images in the dataset and help

system identify closest match from all the images. First of all for we need to detect body parts of target human body and we need to transfer things according to suitable body parts. . haar features are relevant feature for object detection and non-relevant features are discarded by ada boost algorithm. Adaptive Boosting which transforms weak learners or predictors to strong predictors in order to solve problems of classification.

6.4 Testing the system:

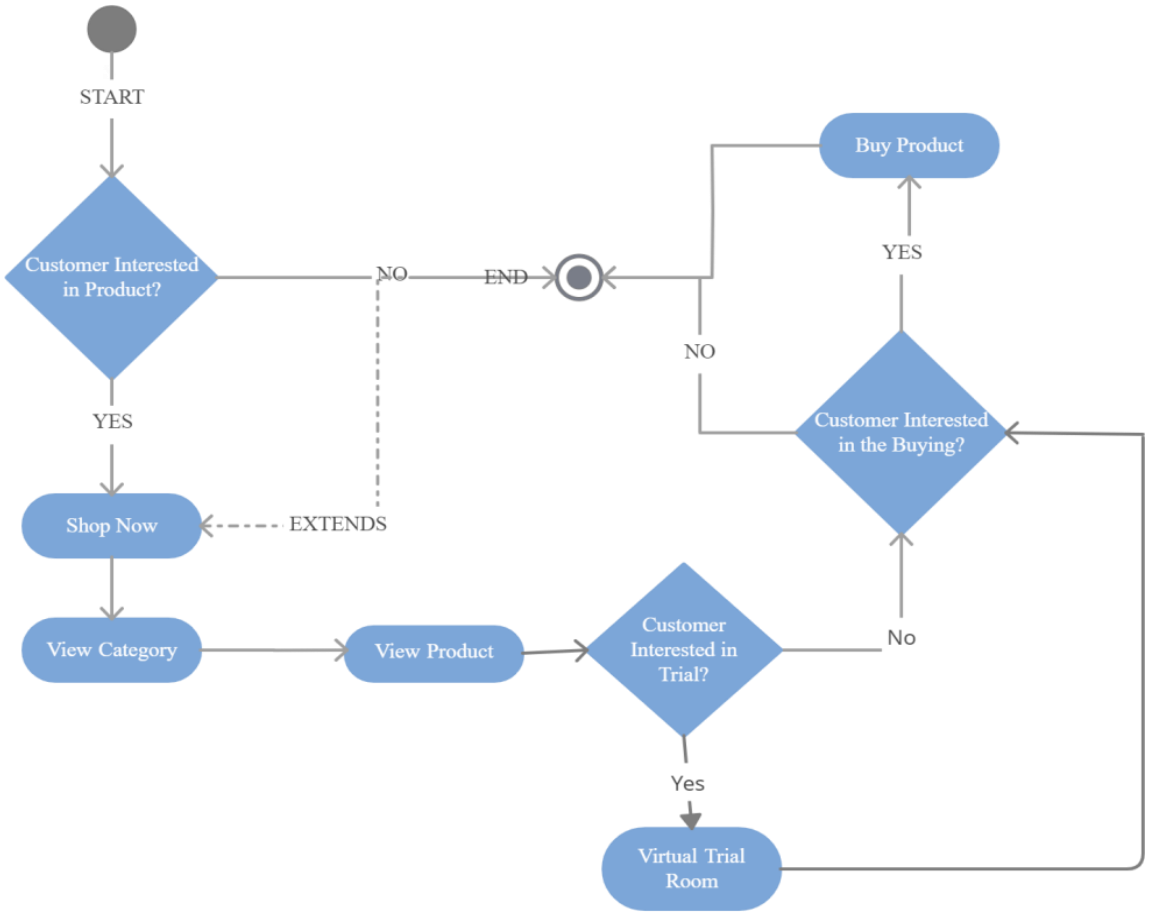
To test the system , we need to first run the main file and visit the IP address provided.

Once you visit the products page, you need to click trial option to help redirect you to virtual trial room, Here you get to see the webcam and the products. 24 * 24 target window is moving in which you can see your live image. Check if the products are able on superimpose on your body and the correct position. Body part detection we use haar cascade dataset.

6.5 Creating and attaching the database:

After training and test, the original products which images, prices and description are to be stored in database. The tables for user registeration, login, checkout are created in database and attached to the system using location of local server.

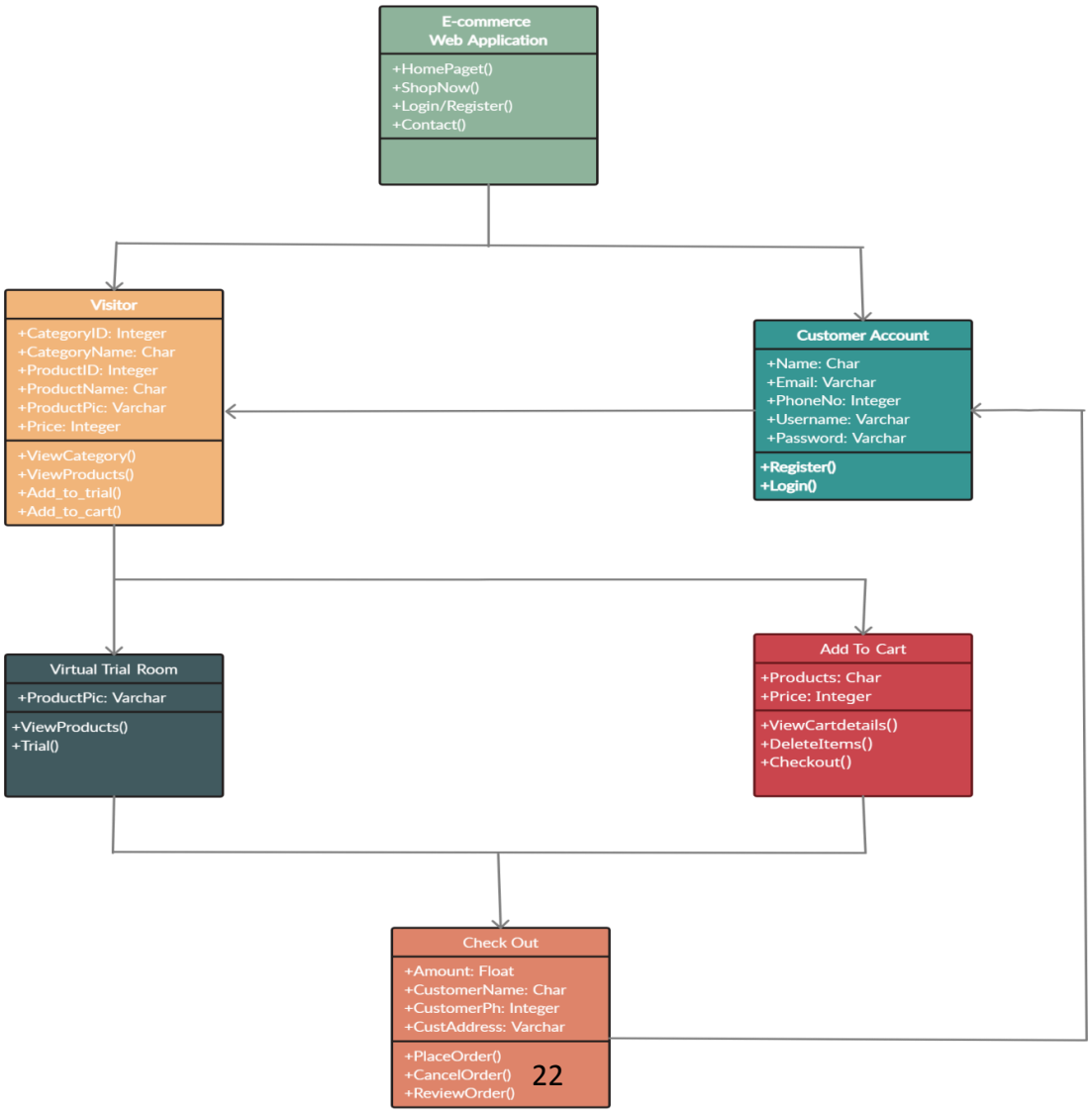
Activity Diagram:



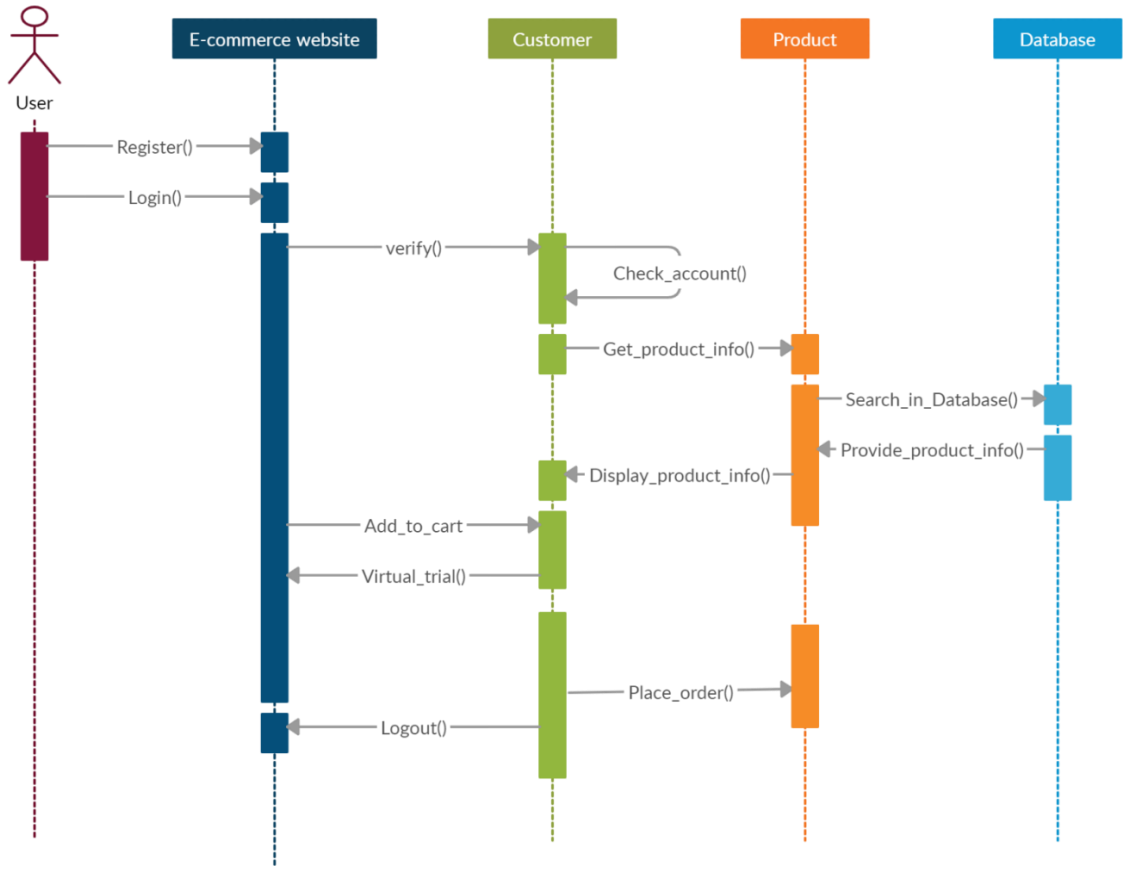
Class Diagram :

A class icon is a 3-part box.

Class name
Attributes
Operations



Sequence Diagram:



7. Classifier:

Haar Cascade classifiers are an effective way for object detection. Haar Cascade is a machine learning-based approach where a lot of positive and negative images are used to train the classifier.

Positive images – These images contain the images which we want our classifier to identify.

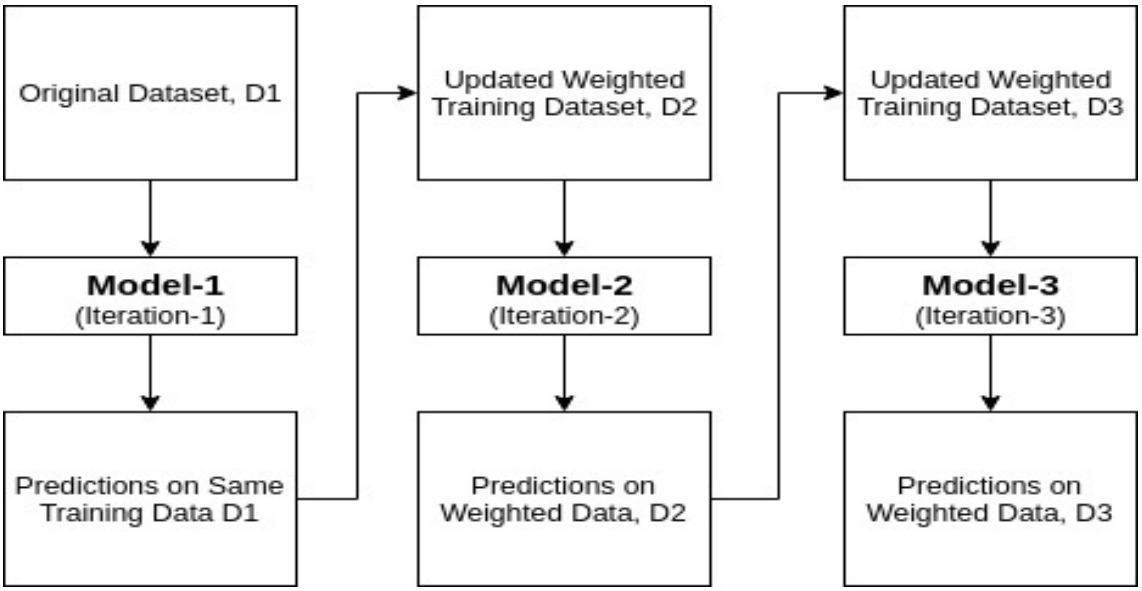
Negative Images – Images of everything else, which do not contain the object we want to detect.

- First of all for we need to detect body parts of target human body and we need to transfer things according to suitable body parts.
- So for body part detection we were used haar cascade dataset.
- 24 * 24 target window is moving on to the image and it contains features like(line features, rectangular feature, edge feature etc..)
- Value of feature is computed using concept of integral images(it would select best value of feature among this by using adaboost classifier)

They are like convolutional kernels. haar features are relevant feature for object detection and non-relevant features are discarded by ada boost algorithm

8. Adaboost alogorithm:

- Initially, Adaboost selects a training subset randomly.
- It iteratively trains the AdaBoost machine learning model by selecting the training set based on the accurate prediction of the last training.
- It assigns the higher weight to wrong classified observations so that in the next iteration these observations will get the high probability for classification.
- Also, It assigns the weight to the trained classifier in each iteration according to the accuracy of the classifier. The more accurate classifier will get high weight.
- This process iterate until the complete training data fits without any error or until reached to the specified maximum number of estimators.



9. CONCLUSION

Considering two of the biggest retail brands in India today Amazon and FlipKart, which about estimated monthly traffic of 500 million and 157.5 million.

It is evident that a lot more people are becoming increasingly comfortable doing their shopping online. It is so shocking that despite the increase in the trend of online shopping, there are only between 2 and 4 percent of visitors who actually make a purchase.

Having witnessed the influence of the internet on shopping, it will be a grave mistake to ignore the benefits that augmented reality bring to the industry of online shopping. As online retail seeks to improve its conversion rates and bolster more revenue, the benefits of augmented reality cannot be overstated. Augmented reality offers various businesses the chance to create a more interactive shopping experience with their customers as it offers the opportunity to virtually try the product they want to purchase.

Augmented Reality technology is a must-have in the business of eCommerce as it offers a lot of benefits from customer satisfaction and experience, increased sales, repeat business which will later lead to better conversion rates and revenues. In the world of eCommerce, it is vital that you continue to find innovative ways to interact with customers and Augmented Reality gives you that innovative edge.

In e-commerce with AR the digital information and animations can interact with physical space opening a new experience to a user.

10. References

- Ioannis Pachoulakis and Kostas Kapetanakis “Augmented Reality Platforms For Virtual Fitting Rooms”, Intl. Journal of Multimedia & Its Applications (IJMA) ,Vol.4, No.4, August 2012 -057
- Chang H.T, Li Y.W, Chen H.T, Feng S.Y, Chien T.T, “A Dynamic Fitting Room Based on Microsoft Kinect and Augmented Reality Technologies”, 15th, Intl. Conf. Human-computer interaction, 8007; 177-185
- Stefan Hauswiesner, Matthias Straka, and Gerhard Reitmayr, “Virtual Try-On Through Image-based Rendering”, IEEE Transactions on Visualization and ComputerGraphics, vol. 19, no. 9, September 2013
- Kim, H. Lee, H. Kim, "Magic mirror: A new VR platform design and its applications", ACM SIGCHI Intl. conf. on Advances in computer entertainment technology 2004
- Lingyan Jiang, Jian Yao “Automatic Body Feature Extraction from Front and Side Images”, Journal of Software Engineering and Applications, 2012, Published Online December 2012.

• Python OpenCV doc https://opencv.org/

• New Technology Lets You Try on Virtual Clothes Before You Buy https://youtu.be/_1GyAO5lFpE

• Zugara's Augmented Reality & Motion Capture Shopping App https://youtu.be/NxQZuo6pFUw

[31]Akbarzhon Madaminov, “Recommendation Systems”, Engpaper Journal

[32]Aathi oli.S , “REVIEW PAPER ON PHISHING ATTACKS”, Engpaper Journal

[33]Rania Fernando, “IoT based – Street Light Controlling System”, Engpaper Journal

[34]K. SAI BHARGAV, V. RAJENDRA, “Study on Data Structures for Machine Learning”, Engpaper Journal

[35]Brundha P, Guruprasad K N, Amith V Hiremath,Sirisha R, Chandrakanth G Pujari , “Face Detection Based Smart Attendance System Using Haar Cascade Algorithm”, Engpaper Journal

[36]Afsana Nadaf , “RFID BASED LIBRARY MANAGEMENT SYSTEM”, Engpaper Journal

[37]Mr. Vedant Thube, Neha Thakur, Mr. Siddhesh Balsaraf,Ms. Priyanka Hanchate, Dr. S. D. Sawarkar , “Accident Prevention using Eye Drowsiness & Yawning Detection”, Engpaper Journal

[38]Abhishek A Hishobkar, Rutuja Gaonkar, Jagdish Chintamani , “DIGITAL DIARY”, Engpaper Journal

[39]Pooman Suryavanshi, Aryan Ghadge, Manali Kharat , “TAXI SERVICE for VISUALLY IMPAIRED”, Engpaper Journal

[40]Mr. Pankaj yadav, Shila Jawale, Mr. Ashutosh Mahadik, Ms. Neha Nivalkar, Dr. S. D. Sawarkar , “NEWS ARTICLES CLASSIFICATION”, Engpaper Journal

[41]Rahul Chavan, Manvee Bhoir, Gaurav Sapkale, Anita Mhatre, “Smart Tourist Guide System”, Engpaper Journal

[42]Rutik Desai, Akash Jadhav,Suraj Sawant ,Neha Thakur , “Accident Detection Using ML and AI Techniques”, Engpaper Journal

[43]Anagha Vishe,Akash Shirsath, Sayali Gujar, Neha Thakur , “Student Attendance System using Face Recognition”, Engpaper Journal

[44]Ms.Sayali Patekar, Shila jawale, Ms.Pranali Kurhade, Mr.Shubham Khamkar , “Smart Classroom Application”, Engpaper Journal

[45]DOSHI SAKSHI, DEVYANI CHAUDHARI, POOJA GAIKWAD, RUTUJA CHABUKSWAR,MRS. SUJATA KOLHE, “TOURISM SIMPLIFIED THROUGH VOICE”, Engpaper Journal

[46]Afreen Fathima,Samreen Jameel, Pathan Ahmed khan , “ACCIDENT DETECTION AND ALERTING SYSTEM”, Engpaper Journal

[47]Suman Zareen, Tuba Masood, Pathan Ahmed khan, “E-Commerce Web Application with Augmented Reality”, Engpaper Journal

[48]Lok Shan CHAN, “Selection of Waterfall and Agile Methodologies in Software Testing”, Engpaper Journal

[49]Barve Rutu, “CLOUD COMPUTING SYSTEM FOR GAMING”, Engpaper Journal

[50]Harshvardhan Singh, “Machine Learning: Fake News Blocking”, Engpaper Journal

[51]M.Al Batahari, “SERVERS ROOM MONITORING SYSTEM USING IOT”, Engpaper Journal

[52]AYUSHI ANKITA RAKSHIT, “VIRTUAL MASTER USING PYTHON”, Engpaper Journal

[53]Baldeep Kaur, “REAL TIME SLEEP DROWSINESS DETECTION USING FACE RECOGNITION”, Engpaper Journal

[54]Suchitav Khadanga, “Two Stage CMOS Operational Amplifier From Specification to Design”, Engpaper Journal

[55]nidhi sharma, “Introduction to Remote Sensing”, Engpaper Journal

[56]Rohith N Reddy, “COVID-19 Detection using SVM Classifier”, Engpaper Journal

[57]Swapnil Kole, “COVID-19 Database on Consortium Blockchain”, Engpaper Journal

[58]TejalLengare, PallaviSonawane, PrachiGunjal, ShubhamDhire, Prof.Shaikh.J.N , “Accident Detection & Avoidance System in Vehicles”, Engpaper Journal

[59]Abhishek Pawshekar, Deepti More, Akash Khade, Pratiksha Wagh, Ganesh Ubale, “Augmented Reality: to converting and placing object into 3D model”, Engpaper Journal

[61]Prof.Ubale.G.S, Pranjal Adhav,Pooja Gaikwad, Sushama Nadavade ,Pooja Kale , “Iot based Bridge Monitoring System”, Engpaper Journal

[62]Divya Deewan, Priyanka Maheshwari, Sanjay Jain, “A REVIEW OF BATTERY-SUPERCAPACITOR HYBRID ENERGY STORAGE SYSTEM SCHEMES FOR POWER SYSTEM APPLICATION”, Engpaper Journal

[63]Prof.Ansari.M.B, Pranjal Adhav,Pooja Gaikwad,Sushama Nadavade,Pooja Kale, “Survey on MyHelper IOT based Bridge Monitoring System”, Engpaper Journal

[64]Shreyas.S.J, Saddam hussain, Chaithra E, “COMPARATIVE STUDY ON SEISMIC RESPONSE OF MASONRY INFILLED RC FRAME BUILDINGS AND MIVAN BUILDINGS WITH DIFFERENT PERCENTAGE OF WALL OPENINGS”, Engpaper Journal

[65]Yusuf Ali Hassan, “Somali Power-Grid Significant Challenges”, Engpaper Journal

[66]Ahmed N. Elhefnawy, “Refractive IR Objective Optical Design Operating in LWIR band For Military Observation Applications”, Engpaper Journal

[67]S MANJULA, D SELVATHI and SUCHITAV KHADANGA, “Design of low-power CMOS transceiver front end for 2.4-GHz WPAN applications”, Engpaper Journal

[68]Suchitav Khadanga, “Fabrication of MEMS Pressure Sensor on thin film membrane”, Engpaper Journal

[69]Suchitav Khadanga and Dr. K.R.Suresh Nair, “An Introduction to Bluetooth”, Engpaper Journal

[70]Suchitav Khadanga and S. Ahmad, “DESIGN AND FABRICATION OF LOW COST MICROWAVE OSCILLATOR”, Engpaper Journal

[71]Ameen Ahmed, Noushad S, Suchitav Khadanga, K.R.Suresh Nair, P.K.Radhakrishnan, “DEVELOPMENT OF LOW PHASE NOISE SMALL FOOT PRINT SURFACE MOUNT VOLTAGE CONTROLLED OSCILLATOR”, Engpaper Journal

[72]Suchitav Khadanga , “Synchronous programmable divider design for PLL Using 0.18 um cmos technology”, Engpaper Journal

[73]Kavya.G.R, Shivaraju.G.D, Dr. T V Mallesh, S R Ramesh, “PROGRESSIVE COLLAPSE RESISTANCE OF FLAT SLAB BUILDING”, Engpaper Journal