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Virtual Shopping Using Image Processing AND Augmented Reality

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Abstract—after studying the fact of emerging advancement in the e-commerce sector we come with an idea of developing project based on the combination of virtual reality and augmentation. To create a web and mobile based platform for end user which will give them a new shopping experience. We are making a web based e-commerce platform where consumer can interact with product such as shoes or clothes at their home place. This will not going required any costly sensor just they have to use their computer and web-cam/ Kinect to interact with the website 3D portal.Our Project will be useful for day to day user to have interaction with the product or services they buy from e-commerce market place prior to actually buying product. They can choose from different product or services they like. And this will be beneficial to manufacturer also to analysis there market plans and production.

*Keywords-*aumented Reality; e-commerce; image processing;Convolutional Neural Network;

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I. INTRODUCTION

Over the past few years use of Online Shopping is increased drastically. Online shopping is a form of electronic commerce which allows consumers to directly buy goods or services from a seller over the Internet using a web browser. Consumers find a product of interest by visiting the website of the retailer directly or by searching among alternative vendors using a shopping search engine, which displays the same product's availability and pricing at different e-retailers. As of 2016, customers can shop online using a range of different computers and devices, including desktop computers, laptops, tablet computers and smartphones.

Virtual reality is a computer technology that uses Virtual reality tools, sometimes in combination with physical spaces or multi-projected environments, to generate realistic images, sounds and other sensations that simulate a user's physical presence in a virtual or imaginary environment. A person using virtual reality equipment is able to "look around" the artificial world, and with high quality VR move around in it and interact with virtual features or items.

As per our research normal consumers are still skeptical about online shopping. The main reason behind it is they not get the actual look and feel of products they buy online they often have to buy based on their own intuition resulting sometimes consumer not get the product they think they purchase and in terms of products such as clothes and shoes they often mismatch the size and quality of it.

To overcome such problem some platform such as akumarugby.com madeinmeshoes.com have made a collaboration of three.js and blen4web JavaScript library a web based platform where people can see the product in 3d geometry and choose the product accordingly. Plus the major enhancement in AR based library make virtual interaction with such product possible i.e. lenskart.com.

In our project our main goal is to overcome such problem using a webcam based tracking system where a normal consumer can use such service in day to day life. And using a Kinect Sensor we are implementing 3D Virtual Dressing for web.

II. HAAR FEATURE-BASED CASCADE CLASSIFIER

The object detector described has been initially proposed by Paul Viola and improved by Rainer Lienhart. First, a classifier (namely a cascade of boosted classifiers working with HAAR-like features) is trained with a few hundred sample views of a particular object (i.e., a face or a car), called positive examples, that are scaled to the same size (say, 20x20), and negative examples - arbitrary images of the same size.

After a classifier is trained, it can be applied to a region of interest (of the same size as used during the training) in an input image. The classifier outputs a "1" if the region is likely to show the object (i.e., face/car), and "0" otherwise. To search for the object in the whole image one can move the search window across the image and check every location using the classifier. The classifier is designed so that it can be easily "resized" in order to be able to find the objects of interest at different sizes, which is more efficient than resizing the image itself. So, to find an object of an unknown size in the image the scan procedure should be done several times at different scales.
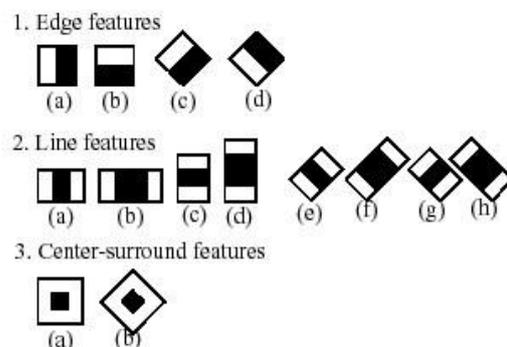

Figure 1. HAAR Fetures Example.

The word "cascade" in the classifier name means that the resultant classifier consists of several simpler classifiers (stages) that are applied subsequently to a region of interest until at some stage the candidate is rejected or all the stages are passed. The word "boosted" means that the classifiers at every stage of the cascade are complex themselves and they are built out of basic classifiers using one of four different boosting

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techniques (weighted voting). Currently Discrete Adaboost, Real Adaboost, Gentle Adaboost and Logitboost are supported. The basic classifiers are decision-tree classifiers with at least 2 leaves. Haar-like features are the input to the basic classifiers, and are calculated as described below. The current algorithm uses the following Haar-like features:

The feature used in a particular classifier is specified by its shape (1a, 2b etc.), position within the region of interest and the scale (this scale is not the same as the scale used at the detection stage, though these two scales are multiplied). For example, in the case of the third line feature (2c) the response is calculated as the difference between the sum of image pixels under the rectangle covering the whole feature (including the two white stripes and the black stripe in the middle) and the sum of the image pixels under the black stripe multiplied by 3 in order to compensate for the differences in the size of areas. The sums of pixel values over a rectangular regions are calculated rapidly using integral images.

III.   HUMAN SKELETON MAPPING

The depth maps captured by the kinect sensor are processed by a skeleton-tracking algorithm. The depth maps of the utilized dataset were acquired using the OpenNI 1. To this end, the OpenNI high-level skeleton-tracking module is also used for detecting the performing subject and tracking a set of joints of his/her body. More specifically, the OpenNI tracker detects the position of the following set of joints in the 3D space G = {gi , i∈ [1, I]} ≡ {T orso, Neck, Head, Lef t shoulder, Lef t elbow, Lef t wrist, Right shoulder, Right elbow, Right wrist, Lef t hip, Lef t knee, Lef t foot, Right hip, Right knee, Right foot}. The position of joint g_i is implied by vector $p_i(t) = [x\ y\ z]\ T$, where t denotes the frame for which the joint position is located and the origin of the orthogonal XY Z co-ordinate system is placed at the center of the kinect sensor. An indicative example of a captured and the tracked joints is given in Figure 2.
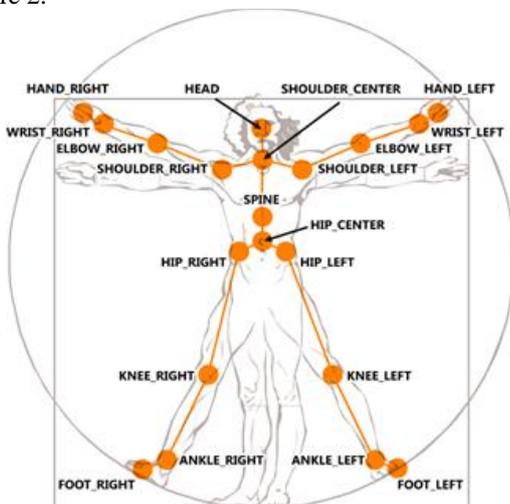

Figure 2.   Tracked Joints using OpenNI.

The OpenNI skeleton-tracking module requires user calibration in order to estimate several body characteristics of the subject. In recent versions of OpenNI, the 'auto-calibration' mode enables user calibration without requiring the subject to undergo any particular calibration pose. Since no calibration pose was captured for the employed dataset, the OpenNI's (v. 1.5.2.23) 'auto-calibration' mode is used in this work.

IV.   PREPOSED SYSTEM

As we are developing e-commerce website our primary focus will be to have all the generalized feature which all the e-commerce website i.e amazon.com, flipkart.com have. This features are enlisted below.

- To navigate to certain product with help of product filtration.

- Showing a single item description and other products in same category user may buy.

- User authentication method to verify account and mange user wish list individually.

- Producer cart and checkout page where user can add products to the cart and then buy those product later.

Apart from this when normal consumers buy product from e-commerce website they often have to buy based on their own intuition resulting sometime consumer not get the product they think they purchase and in terms of products such as clothes and shoes they often mismatch the size and quality of it. The two major module of our project which will give user and unique shopping experience are.

A. 3D View Page

In this page view we are going to show user the product they choose in 3D with mouse control to rotate, pan and zoom the product just like any 3D Geometry based software. Apart from this will show some control to change color of the product is it's available in different color, change material of the product and change the texture of the product. Apart from this user can change the size of the product such as shirt to set size such S,M,L,XL,XXL and a add to cart and buy now button where user can click and purchase the product they customized or save it for later purchase.

B. Try on page

Here user will same feature to change color, material, texture and size of the product. They can buy and add the product they choose similarly done in the view 3D page. The mouse control here will be replaced by the image recognition based unique feature of human body which is going to be done using WebGL and by implementing HAAR feature based classifier algorithm. Even mouse scroll is going to be replaced by simple hand moment done in front of webcam/kinect just like feeling all the button and menus hovering in the 3D environment in from of user. From here user also can share the snapshot and save it or share it on social media websites.

V.   IMPLEMENTATION

At Start we create some sample 3D Models of some clothing products using Autodesk Maya. Autodesk Maya, commonly shortened to Maya software, is a 3D computer graphics software that runs on Windows, macOS and Linux, originally developed by Alias Systems Corporation and currently owned and developed by Autodesk, Inc. It is used to create interactive 3D applications, including video games, animated film, TV series, or visual effects.

A. E-Commerce website module:

- Product Portfolio

- Single Item View

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- Filters For product
- Cart System
- Checkout for product
- Authentication module
- Custom User Login
- User Review

Then we developed a Demo Virtual reality E-commerce website which showcase our product as a demo item. This website contain all the E-commerce features show above.

Figure 3.   3D Model View Page

Then we added a virtual Try on toolkit page on our website to display our clothing products so that user can interact with it before buying it. After our website setup we will add and render our 3D Products generated in Autodesk Maya on to our website using Three.js JavaScript library. Three.js is a cross-browser JavaScript library/API used to create and display animated 3D computer graphics in a web browser. Three.js uses WebGL. Three.js allows the creation of GPU-accelerated 3D animations using the JavaScript language as part of a website without relying on proprietary browser plugins. This is possible thanks to the advent of WebGL.

After rendering our 3D products on screen in our website we developed interactive system to interact with those clothing product. This will use Face and Human Body Pose detection algorithm which will be running on our website. For implementation of those algorithm we are using and implementing different JavaScript library based on product features and implementation scope for the user.

VI.   CONCLUSION

This online marketplace will be available to the normal house consumer as it just required internet connection and webcam and kinect to work. It will provide consumer a unique way to interact with the product they are buying online from e-commerce website. As well as this product will provide advance market place and interactive why for the e-commerce merchant and sellers to market their product to the consumer online.

This will distribute online purchases via direct shipping from the nearest store location. This will allow to provide timely shipping and eliminate the need for a central warehouse or facility from which to store and ship its products. Merchant and sellers will have to pay small cost to add such future to their own website or they can use a online portal to upload their product and have it done for them.

REFERENCES

[1] Sander Soo, ICS Conference, "Object detection using HAAR-cascade", Institute of Computer Science, University of Tartu, 2015.

[2] Rajashree Tripathy, Proceedings of SARC-IRF International Conference, "Real time face detection and tracking using HARR classifier on SOC",ISBN: 978-93-84209-03-2, 2014.

[3] Mehdi Mekni, ACS International Conference, "AugmentedReality:Applications, ChallengesandFutureTrends",ISBN: 978-960-474-368-1, 2016.

[4] Akumarugby, Akumarugby ToolKit Deginer, https://www.akumarugby.com/kit-designer

[5] Lenskart, Lensekart Try on Lens Deginer,http://www.lenskart.com/

[6] Madeinmeshoes, Shoe design website toolkit Deginer, http://madeinmeshoes.com/en/design-your-own-shoes-for-women

[7] Madeinmeshoes, Shoe design website toolkit Deginer,http://madeinmeshoes.com/en/design-your-own-shoes-for-women

[8] Brandon Jones, OpenCV Documentation Deginer, http://alereimondo.no-ip.org/OpenCV/34

[9] Blendnder, blender Render engine for website powered by Deginer,https://www.blend4web.com/en/technologies/

[10] Audun Mathias, js-objectdetect is a javascript library for real-time object detection.

[11] ThreeJS, Render engine for website.