Technology for Music: A Study on Musical Instruments Online Shopping

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Abstract— In a modern world, people use internet daily. They prefer to buy any types of products through online. There are many online websites and applications which provides service to the people of interacting with products. These services reduce people's time in buying a product. They provide variety of options to the buyers. Researches have proved that the new way of advertising with the help of advanced technology has improved the business in all the fields. Advertisement promotes business and the way of people interacting with the products is one of the main keys of a business. Particularly musical instruments have less interaction with the buyers in online. Technologies like Artificial Intelligence and Machine learning is playing a major role in current business scenarios. Many revolutionary ideas are evolving which This article examines about the various missing factors of people interacting with products.

Keywords— *Musical instruments, Machine Learning, Product modelling, Business analysis*

I. INTRODUCTION

In this modern world people use technology in their day to day life. Computer and mobile phones play a major role with billions of people in all around the world. Technology made people's life very easy. The interaction between humans and computers got increased in different ways. People's data are stored in memory as files, images, videos, etc. These files store multiple data. Nowadays for security, data is encrypted and stored in images and videos. Technology in business plays a major role. Business is all about establishing connection between a product and people. Nowadays technology in business provides multiple ways to connect with people. A healthy business depends upon the interaction between a product and people. So, for a better interaction, business is dependent upon technology.

Machine Learning [1] [ML] is a sub-domain of Artificial Intelligence that provides a system the way to access data and learn it for themselves. It focuses on the development of machines to learn automatically without any human intervention. Using ML produces accurate results in order to get profitable results. But it requires some time to train the machine properly. Algorithms of machine learning are used in email filtering, computer vision, gesture recognition, face detection and more. Android is effectively using Machine learning provide better security for the smart phones through machine learning. Gesture analysis and detection researches are carried out by Microsoft, Intel which are being used in different fields.

Image and video analysis are a part of machine learning in which face detection and hand gesture analysis are used. Gesture analysis is used in many applications for the deaf and dumb people which helps in converting the gestures into words and vice-versa. Image processing is used in many fields. In the field of security image processing plays a major role where the data are encrypted and decrypted in images.

Online E-Commerce websites which are an intermediate between the products and people using the advanced technologies are highly profitable. This makes the business to improve a lot and connects with millions of people all around the world. Technologies like Artificial Intelligence and Machine learning combined with Cognitive computing could bring miracles in the modern world. Processing millions of data all around the world is a challenging task. Facebook has millions of data which is handled by ML and the advanced search in Google and Facebook is possible by using Advanced AI techniques. Google has developed a kit for android used for developing Machine learning based applications which can be used by the developers globally.

II. BUSINESS RELATED FACTORS

A. Interaction between computers and business
Interaction between people and product is strengthened using web applications. The websites which promotes business is commonly known as e-commerce website. The e-commerce website builds a bridge between people and product. Social commerce provides a new way to the people shopping online.

The quality of website and communication is an important aspect for the customer to purchase in social commerce websites. Here internet plays a major role. Internet change how business perform their market and changes the user's behavior and interact to build a network. By using social media, users can share information and can give recommendations.

B. Human-product interaction – Business Level

In this modern world, buying a product is simplified using internet and its technology. The ultimate success of using technology is making people to buy a product form where they are. There are many online websites which provide us a detailed description of a product which the users or buyers need to buy. There are many mobile applications which lots of people use it. Many companies like Amazon, Flipkart, e-bay and many more which have invested more money in acting as an intermediator between a product and buyer. The highest level of displaying the products in online is 3D-Technology. It provides a 360° view of the product. This is used in all kinds of products available online. Buying a musical instrument online has the highest way of displaying its product in video and providing music as an audio file. 3D-Technology is also used in terms of buying a musical instrument. A 3D model of a product gives a better view of it to the buyers. This advanced technology provides us a better interaction with the product.

C. Shopping experience and infrastructure on online customers

The emergence of e-commerce gave more space for many companies. Many start-ups emerged to provide quality services for the people. The most important principles in marketing and business is giving attention to the demands and needs of customers. The companies have recognized the demands and it is an important advantage for the increase in sales and profit. In this competitive business world identifying the needs and demands of customers is very important. The biggest challenge for the company is the satisfaction of the customers. The e-commerce websites use 2D modelling and 3D modelling of a product to view it to the customers. To give a better experience of shopping to the people companies use the leading technologies like artificial intelligence, machine learning and more.

D. Artificial intelligence in business

Artificial intelligence is a field which makes computer to think intelligent as humans. AI is the mother of number of different technologies. It is used to solve many problems. It helps business to increase customer experience, fraud detection, automate work processes and more. Logistic companies use AI for better inventory and delivery management. AI is the future of business. The technologies under AI are getting multiplied so the companies can take

advantages of it. Machine learning is one of the subdomains of AI. It reduces the fault occurrence in business.

III. E-COMMERCE APPLICATIONS

Stress can be detected by using various physiological sensors namely: heart rate (HR) sensor, Galvanic skin response (GSR) sensor combination of HR and GSR, Photoplethysmogram (PPG) Optical Sensor.

A. Flipkart

Flipkart provides a better way for the people to buy products from different dealers with a better price through online. Flipkart's major share is hold by Walmart (81%). Walmart is also a business platform where they operate a chain of stores which helps people in providing the required products. The idea of Flipkart is to provide the service through internet so that it connects millions of people around the world. They sell products from different dealers and the different dealers gives different offers to the people.

The images of products are in 2D module. 2D images are less interactive, they provide only the one phase of a product. 2 Dimensional images are of X and Y axis. It is the traditional way of representing a product to the buyers in online. Sometimes a product appears to be different when compared to real. The images in flipkart can be zoomed in for the ease of buyers. It also provides all the detailed information of that product. But this 2D images does not give an interactive way for the buyers to surf the products.
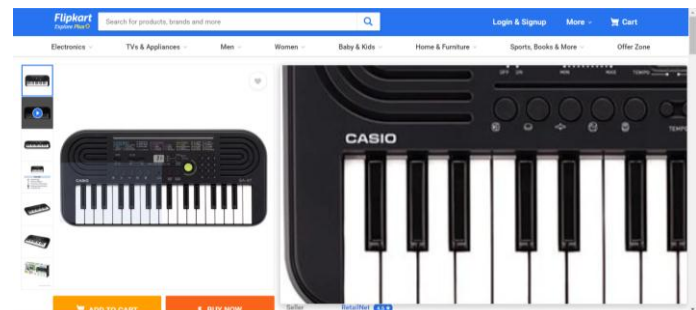

Fig 1 : flipkart

B. Bajaao

Bajaao is India's largest Musical superstore. They provide service for purchasing musical instruments online. They provide Business audio solutions which refer that they provide the best music and audio experience to make the customers experience extraordinary special, music schools for growing students, end to end services for setting up recording studios.

C. Sketchfab

Sketchfab is an online platform where people can buy, sell, view 3D modules [10] of a product. People all around the

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world can share their own 3D modules created. 3D modules created by sketchfab gives a new experience for the buyers. It allows the audience to interact and engage with the products displayed in rich 3D.

D. Musical Instruments in E-Commerce

Nowadays to buy a musical instrument we visit websites like flipkart, amazon, bajaao and more. These websites give only 2D images of musical instruments to the buyers. Buyers feel it as less interactive. To play and buy a musical instrument, people needs to go to the nearby stores. This playing option is not provided any of the leading e-commerce websites. With the technology being evolved in years we can provide a better interactive experience of the buyers of musical instruments in online.
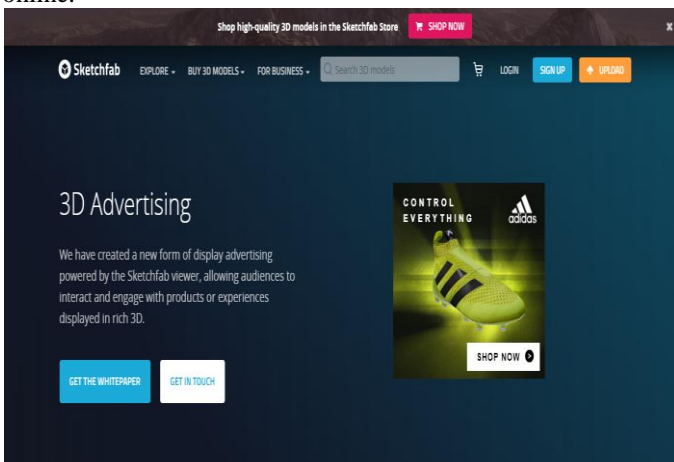

Fig 2: Sketchfab

IV. HAND GESTURES RECOGNITION TECHNIQUES

Hand Gesture recognition is a field where gestures are recognized and are processed to produce the required output. The gestures are captured through sensors or camera. There are many sensors which recognizes the different types of gestures and are used for multiple purposes. It is a developing field where many multinational companies have invested more money. Companies like Intel has developed many gesture-based products as smart wearables. Microsoft has developed Kinect, a motion sensing device for PCs and Xbox 360° video games. Apart from sensors, machine learning techniques are available for capturing the hand gestures. Open CV is one of the ways to detect gestures. It is also used for object detection in an image or video.

A. Artificial Intelligence in Business

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B. Intel Curie and MICA

Recent researches are been focused on next generation imaginative, fitness, fashionable and entertaining applications. In 2015 the wearable devices were introduced. Intel curie is all about tiny device module based on the 32-bit Intel Quark SE system on chip (SoC). The first wearable by Intel as My Intelligent Communication Accessory (MICA) was released for women, a bracelet which had AT&T mobile and would send text messages and e-mail alerts. This was also used to play music virtually and was released in 2016. It was used in a concert by AR Rahman which was very useful to play music for his live show. This gave an incredible experience to all the musicians.

TABLE 1: COMPARING COMMERCIAL WEBSITES

	Flipkart	Bajaao	Sketchfab	Intel curie
Image & Video	☐	☐	☐	☐
3D Models			☐	
Notes				
Virtual play				☐
Tutorials		☐		

C. Intel Curie Wearable

Intel curie wearables [3] are developed using intel curie. This technology uses intel quark SE system on a chip (SOC). It is a small sized board which is considered as low power module hardware. The music band uses the sensors along with the intel curie which produces music when hand gestures are made. These wearables can be used in both hands.

TABLE 2: RECENT RESEARCH WORKS

Researches	Contribution	Mobile Accuracy	Application
Air touch system	Traditional way (i.e.) 2D models converted to 3D models.	☐	
Hand-ultrasonic gesture	Gestures recognized using ultrasonic. Achieves 90% accuracy		☐
Connectionist temporal classifications	Classification algorithm is use and achieves 96%		☐
Clustering analysis	Categorized as iconic, metamorphic, deictic.		☐
Wi-fi based hand gesture	Based on channel state information	☐	

D. Air touch System

The traditional way of human-product interaction which is viewing the product in 2D model which limits the user experience. To overcome this limitation the 3D contactless touch sensing model was proposed as air touch system. Grouping algorithm [4] was proposed to capture the accurate finger positioning. This system provides a greater opportunity to detect the finger positions and gesture recognition for advanced interactive games for mobile devices.

E. Hand-Ultrasonic Gesture

A micro hand gesture recognition is built using ultrasonic active sense. The proposed system is called as hand-ultrasonic gesture (HUG) [2]. It works based upon the ultrasonic waves. High quality sequential range-Doppler features, they propose a state transition based hidden Markov model for gesture classification. This method achieves 90% accuracy using symbolized range-doppler effects.

F. Connectionist Temporal Classification

It is a method for dynamic hand gesture recognition [5]. Zhenyuan Zhang proposed an algorithm which is used to train the network for class labels in gestures. The results show high recognition rates 96% which is higher state-of-the-art hand gesture recognition systems. This can be used as real time hand gesture system. Connectionist Temporal Classification algorithm is used.

G. Clustering Analysis

Cluster analysis is used to evaluate hand motion control for any a motion of any android bot. The gesture functions are categorized as iconic, metamorphic, deictic. Iconic is a type of function which is used to detect through a structural way. Metaphoric gestures are not limited to concrete events. Deictic gestures are the usage of extensible body part.

H. Wi-fi based hand gesture

Every movements of hand generates weak signal which is reflected from the hands re capture using a wi-fi device [7]. The device captures the reflected signals and builds the motion of the gestures made. It provides an accuracy of 0.96. This process is full based on channel state information. Android bot. The analysis is used to control the gesture

I. Dynamic Gesture recognition based on Kernel density

The gestures made by us is captured using Kinect sensor. The Kinect sensor captures the gesture region. It is captured using fingertip angle set template matching algorithm. The method gesture segmentation is fast and accurate.

V. DISCUSSION

From the analysis of different methodologies in projecting a product and different hand gesture recognition techniques, we infer that, it is difficult for the users who buy musical instruments online because there is no hand on experience of playing it. Air touch systems provide only the traditional way of 3D models of a product. The use of Intel Curie is dependent upon a band (hardware) which recognizes the gestures to produce music. Therefore, ever user is required to have a hardware to use the application which results as a major disadvantage. Clustering analysis can be only used for android bots which can be used for converting gestures to speech.

VI. CONCLUSION

The interaction between products and human can be improved with the new technologies. The different methodologies discussed have their disadvantages which can be further improved. It is about how we use the existing algorithms and

techniques in business to improve the productivity. After the production of products, the proper way of using technology leads to a better way of interacting with the products. The overall analysis of various hand gestures is provided. For recognizing the gestures in android Open CV and ML kit is suggested.

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