ISSN PRINT 2319 1775 Online 2320 7876

Research paper UGC CARE Listed (Group -I) Journal Volume 10, Iss 11, 2021

Behavior, Sentiments and Interest Analysis of Consumer Using User Device Activity Monitoring

BireshwarGanguly, Devashri Raich

Assistant Professor, Dept of CSE/IT
R.C.E.R.T, Chandrapur

bireshwar.ganguly@gmail.com

Assistant Professor, Dept of CSE/IT
R.C.E.R.T, Chandrapur
devashriraich@gmail.com

Abstract:*E-commerce companies are using different analysis techniques to analyze the user activities and the interest pattern. It is difficult to handle user surfing pattern on e-commerce web sites since users activity have no direct control over.User surfing pattern can be monitored by tracing the user moving between different hyperlinks or the web pages visiting patterns. Tracking page navigation activities will not help in understanding the user acceptance and liking of web page design or the sections available on individual page. This need extra level of tracking system where system needs to track the user input devices activities like keyboard or the mouse and the period of time of activities. Since every individual customer may have, different user interfaces choices or the demand. This can be seen as the customer profile based user interface modifications. This research work mainly focuses on different methods to understand the user behavior patter while surfing the web pages and providing every individual a user interfaces based on users choices and the likings.*

Keywords: *GUI, Tracking, Events, Scripting*

I. INTRODUCTION

Consumer behavior [1] is the study of how individual customers, groups or organizations select, buy, use, and dispose ideas, goods, and services to satisfy their needs and wants. It refers to the actions of the consumers in the marketplace and the underlying motives for those actions. The rapid growth of information in almost all fields in the era

of globalization compels everyone to cater the need of information technology (IT). Given the scenario of modern generation all the shapes & sizes are now using information technology, in order to make all forms of work easier. To add to this, the booming social media [3] is playing the dominating role in this era to get easy access to any information. These Social Media Apps & Sites on a positive note, services to the individuals with a user friendly & easy access to personal information easily, quickly and from anywhere. With almost 500% rise in Online Shopping Apps & sites, individual's inclination towards window shopping has declined drastically. Now even Tier II & III cities people are also moving towards Online Shopping. If we are to believe prediction of market gurus by the year 2022 Online Market will capture almost 50% of market share. In such scenario management of customer service which would be one of the key factor for all commercial corporate & organizations. Not only customer service but catering only to his needs becomes the prime focus of all companies. Therefore, it is necessary to know the thought of the customer experience, especially how to manage the Customer Experience Management (CEM) [4].

CEM [4] is a term which in recent years has been a much of discussion among businesses and services. Along with the development of IT very quickly in adapting to the customer, it will significantly improve the way of designing and managing relationships with customers. In order to know what is related to the concept of service to the need of appropriate services to the elements, models, frameworks should be used. With the concept of CEM then every interaction to and from customers is stored in form of chronological

ISSN PRINT 2319 1775 Online 2320 7876

Research paper UGC CARE Listed (Group -I) Journal Volume 10, Iss 11, 2021

customer at any time if needed can access quickly. To be able to know more knowledgeable about the implementation of CEM in the field of business need proper CEM concept.

Every day, people are producing huge bulk of data at the social media on the Internet that many companies use to generate personalized marketing to persuade customers to buy their products. So, persons receive a lot of buying offers and recommendations from their social media friends but this data does not bring a fixed knowledge. A recommender is a system that is responsible for providing users personalized and differentiated information about certain products and/or services that may be of interest based on the profile or searches previously consulted. As we know, these systems already dominate the market, especially in social networks, e.g., Facebook and Twitter using recommendation algorithms using Web Scrapping Technique to know the affinities between users who may or not may be in kinship. In this context, some applications have been developed using social networks, such as the proposal of Kazienko et al. where it is described a multidimensional social network into the social recommender system or the work of Xin Liu and Karl Aberer with a contextual recommendation system in a social network. In addition, recommendation systems have penetrated Internet shopping interactions through catalogs like Amazon, Ali-express, Alibaba, and others, based on previous customer.

Table 1: Research Questions

	Research Questions	Goals
RQ1	What are the standard design considerations in e-commerce web page designing?	To study different similar e-commerce web application to find out typical design strategies.
RQ2	How user activities on the web pages can be tracked?	Finding out the web scripting feasibility and possible options available for the user activity tracking
RQ3	What parameters may affecting in understanding the user choices?	Exploring the feasibility of different parameter which may show user interested specific block of web page
RQ4	What would be the methods to dynamically load the user preferred interface?	Study about how user preferred interfaces can be loaded dynamically or programmatically.

II. RESEARCH STATEMENT

With the increase in globalization there is no longer an organization that does not use the Information Technology (IT).Along with this online transaction in banking, shopping and e-commerce application is reached at next level. Organizations now trust data analytics and other tools to know their customers better. Companies are focusing on targeted audiences to save cost on marketing and reachability to right customer. Every customer is having different views, point of angle and choice. It is proved with analytics that maximum percentage of sale is depending on the right suggestions, reviews or the offers. Finding out the targeted audiences are bit easier with the help of social media and marketing trends but it is more challenging to understand the customer choices or interest and serve them customized shopping experiences every time. On other hand user's reviews, start rating and like or dislike selection has contradictions this need to be corrected automatically using natural language processing algorithms. Analyzing and understanding user's online behavior and surfing patterns may help researchers to know their customers in better way in order to serve them a customized interface with better surfing experiences. Proposed system is aimed at understanding customers' behavior, emotions and interest using data analytics and on field physical survey. System will employee custom built web browser or the re-distributable web packages which can be embedded into existing e-commerce application to trace the customers' movements and browsing patterns. This will enable companies to understand customer in better way and keep the system updating on the basis of inputs and data analysis.

III. METHODOLOGY

Almost every e-commerce web portal giving customer better options and features most reviewed by other customer rather it should be on the basis of individual customer choice so the proposed system is aimed at understanding

ISSN PRINT 2319 1775 Online 2320 7876

Research paper UGC CARE Listed (Group -I) Journal Volume 10, Iss 11, 2021

customers' behavior, emotions and interest using data analytics and on field physical survey. System will employee custom built web browser or the re-distributable web packages which can be embedded into existing e-commerce application to trace the customers' movements and browsing patterns. This will enable companies to understand customer in better way and keep the system updating on the basis of inputs and data analysis.

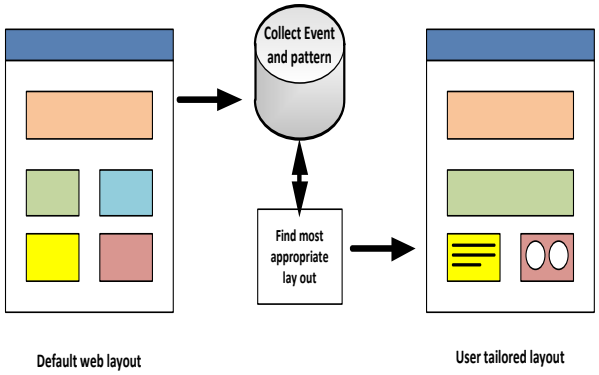


Figure: 1.0: System layout

Figure 1.0 describes the system basis layout. Proposed system comprise of automatic web layout changes adoption on the basis customer last transaction, web surfing patterns, sentiments, emotions and feedback. Proposed work deals in following sequence.

- Developing the e-commerce web portal to allow customers (Volunteers as a part of research) to surf web portal with regular practice in normal way.
- System in background track customers (Volunteers) mouse patter, scrolling speed and section stop timing, video viewing, review reading, rank selection and product selection.
- Customize web layout dynamically on the basis of user experience and shown only section which are best selected and liked by customer

This research work help in finding out what best liked by customer and show right content and layout to enhance customer shopping experience and to connect customer with product. Complete research work will be divided in to multi phases as following,

Phase I: - In first phase of research and development we will go with the understanding the available terminologies prepared by the companies for data analytics. Understanding the ad-sense and Google chrome web browser as a tool developed by Google to trace the user web activities and displaying user desired result on the basis of users last web transactions. On other hand in this phase we will try to find out the different algorithms suggested and developed by different researchers this will help us understanding the performance and functionality advantages available with existing methods and processes. Main parameter of consideration for research will be; customer's reviews, frequency of options selection, time spend on different sections, surfing pattern, interest about sections, attentions on auto suggestion and utilization of available options on the portal.

Phase 2: - Once we are ready with the understanding of the generic e-commerce application and features involved, next we will develop our own e-commerce application with desired sections and terminologies. Main idea will be design & development of Generic Ecommerce Web Portal which will includes following features,

a. ***Structured Layout & Contents:*** Application will be featured with customizable structured layout and content where with minimum efforts layout can be changes as per the requirement
b. ***Multiple sections:*** Application will be having multiple sections like product information, purchase information, user reviews, similar suggested products, related videos, product information, offers or rewards if any and finally image gallery.
c. ***Data collection web form:*** User web form to collect user review and experience about the e-commerce application with following points of considerations; quality of user interface, ease of usage, surfing pattern quality, etc.

Phase 3: - In third phase system we will be focusedon development of sentiment, rating and acceptance identification of product through user textual review.With the help of Natural Language Processing algorithm and knowledge base dictionary system will calculate the impact of negative and positive sentiment words in text. As many time customer input positive text and still select low star rating and chose dislike options hence given algorithm will also help system to

ISSN PRINT 2319 1775 Online 2320 7876

Research paper UGC CARE Listed (Group -I) Journal Volume 10, Iss 11, 2021

remove the contradiction in reviewed text, star rating and like dislike opinion.

Phase 4: - As a part of main aim of the research and development, in this phase we will modify the e-commerce application or custom built web browser so that system can trace the user different activities while surfing. This will help system identify customers' area of interest, surfing pattern and other defined activities. This phase development will be totally depends on the system event and input device stats tracking using system modules and this is the most challenging part of research. After gathering different behavioral level information system can perform machine learning and data analytics algorithm in order to dynamically changing the user interface and application layout. This will help customer find right product at very few clicks. This phase is mainly focused at finding following point of considerations,

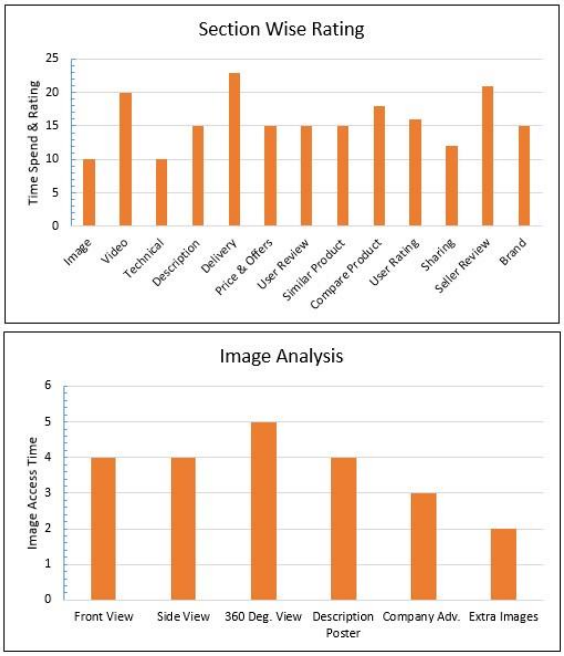
- Behavior while handling the e-commerce application
- Traverse Pattern of user during visiting e-commerce application
- Cursor movement and mouse clicked, stopped and number of clicks
- Used and unused section of web application

Phase 5: - Once system is ready with review management and sentiment analysis in next phase we will design and develop the auto suggestion and recommendation generation on the basis of history of transaction system will employee machine learning and interrelated product analysis using methods similar to Apriori algorithm. After successful implementation of these phases we will test the application and take the computerized survey through real application and multiple user over web portal. Secondly in this phase we will perform physical questionnaire through Google forms and compare the system generated result with real input taken from user physically this will lead us to calculate the accuracy of the system

Phase 6: - Finally after complete development analysis and different survey performed through different mythologies system will be able to generate desired result. But all these will be single application and not feasible to modify this for different organization and not even the system will become reusable or modular. Hence in last phase we will convert this complete design and implementation as a reusable package using Machine Learning Technique to avail this facility to multiple e-commerce application. With the help of API set different organizations can incorporate everything in proprietary applications. Proposed system is mainly designed to make it self-learning through its incremental knowledge base summation to give more accurate result over the period. As a final result system will automatically and dynamically change its layout and appearance on the basis of user behavior, choices and interest

IV. RESULT AND CONCLUSION

Since the complete development focus on time and access analysis, figure 2.0 part (A) and (b) illustrates the result generated through manual analysis of the time data. It clearly shows and conclude the different sections and the average time spend by customers. These analysis could be a based on individual access which helps in profile and choices based dynamic lay outing or group of customer analysis to get the user acceptance towards individual sections available in the e-commerce application



(A)

(B)

Figure 2.0 (A) Section wise analysis (B) Individual image wise analysis

Complete research work mainly focuses on giving customer better shopping experiences

ISSN PRINT 2319 1775 Online 2320 7876

Research paper **UGC CARE Listed (Group -I) Journal Volume 10, Iss 11, 2021**

with best suited content for every individual along with covering all the aspect which company willing to showcase to customer. Main expectation from the research work is to learn and understand what are the main expectations of different customer from web portal in the form of sections layout, products or the surfing experience. Better we learn best we can serve to the customer is the main goal of the research work.

ISSN PRINT 2319 1775 Online 2320 7876

 UGC CARE Listed (Group -I) Journal Volume 10, Iss 11, 2021

REFERENCE

[1]. Qiong Wu, Wen-Ling Hsu, Tan Xu, Zhenming Liu, George Ma, Guy Jacobson, Shuai Zhao, *"Speaking with Actions — Learning Customer Journey Behavior"*, 2019 IEEE 13th International Conference on Semantic Computing (ICSC)

[2]. Abu Bakar Sedek, Abdul Jamak, AmjadShamim, ZulkipliGhazali, *"Impact of Customer Citizenship Behavior onCorporate Brand Experience"*, 2015 International Symposium on Technology Management and Emerging Technologies (ISTMET), August 25 - 27, 2015,Langkawi, Kedah, Malaysia

[3]. Zhang Hai-yan, Wang Qi, Ma Xuan, *"Research on WeChat marketing path of enhancing customer marketingexperiences", 2016 28th Chinese Control and Decision Conference (CCDC)*, IEEE

[4]. PrionggoHendradi, *"IT-based Customer Experience Management: ASystematic Literature Review"*, 2017 International Conference on Applied Computer and Communication Technologies (ComCom), Jakarta, Indonesia

[5]. Shu-an Liu, Jun Gong , Luping Ma , Miao Yu, *"Influence of Waiting Times on Customer Loyalty and Queueing Behaviorin Call Centers", 2017 29th Chinese Control And Decision Conference (CCDC), IEEE*

[6]. Munoz-Arcentale, A. Montoya, M. Chalen, W. Vel´asquez, *"Improve Customer Experience Based on Recommendation and Detection of aPattern Change in Eating Habits"* , 978-1-5386-4649-6/18 2018 IEEE

[7]. Marko Seppänen, IlkkaLaukkanen, "Business Model Innovation: Focus on CustomerExperience", 2015, IEEE

[8]. WanxinXue, Yilei Pei, *"Analysis of the Profit Model of Enterprise ExperienceMarketing based on Customer Experience",* 978-1-4799-1891-1/15 2015 IEEE

[9]. Gull, M., &Pervaiz, A. (2018). Customer Behavior Analysis Towards Online Shopping using Data Mining. 2018 5th International Multi-Topic ICT Conference (IMTIC). doi:10.1109/imtic.2018.8467262

[10]. Ponyiam, P., & Arch-int, S. (2018). Customer Behavior Analysis Using Data Mining Techniques. 2018 International Seminar on Application for Technology of Information and Communication. doi:10.1109/isemantic.2018.8549803

[11]. Asniar, &Surendro, K. (2019). Predictive Analytics for Predicting Customer Behavior. 2019 International Conference of Artificial Intelligence and Information Technology (ICAIIT). doi:10.1109/icaiit.2019.8834571

[12]. Lei, F., Lei, S., Liu, J., & Wu, L. (2020). Studying Customer Behavior of Shopping on e-Commerce Platforms from the Perspective of College Students. 2020 International Conference on E-Commerce and Internet Technology (ECIT). doi:10.1109/ecit50008.2020.00017

[13]. ShofiyaArrahmani,YusufDurachman,"Transactional Quality, Relational Quality and Customer Loyalty Aspects in Transactional E-commerce", The 8th International Conference on Cyber and IT Service Management (CITSM 2020)

[14]. Huang, Y., Zhang, M., & He, Y. (2020). Research on improved RFM customer segmentation model based on K-Means algorithm. 2020 5th International Conference on Computational Intelligence and Applications (ICCIA). doi:10.1109/iccia49625.2020.00012

[15]. Wang, Z., & Wang, J.-F. (2020). Experiential Marketing Activities Enhance Customer Citizenship Behavior: Is It Possible? An Empirical Study on Huawei Mobile Phone, China. 2020 International Conference on E-Commerce and Internet Technology (ECIT). doi:10.1109/ecit50008.2020.00034

[16]. Sartortt, M., Bernardino, J., &Pedrosa, I. (2020). Customer Experience Personalization in Fashion e-Commerce Through Virtual Fitting Rooms. 2020 15th Iberian Conference on Information Systems and Technologies (CISTI). doi:10.23919/cisti49556.2020.9141121

[17]. Natalia, Fortuna, R., &Leonita, L. (2020). Segmentation of Mobile Applications Users: Classification of Customer E-Loyalty Behavior in Online Shopping Platform. 2020 International Conference on Information Management and Technology (ICIMTech). doi:10.1109/icimtech50083.2020.9211141

[18]. Qian Zhang, Rui Shi, Hao Tang, "Analysis Model of Customer Reviews Based on Neural Network", 2020 IEEE 3rd International Conference on Information Systems and Computer Aided Education (ICISCAE)

[19]. Xiaotong Dou, "Online Purchase Behavior Prediction and Analysis Using Ensemble Learning", 2020 IEEE 5th International Conference on Cloud Computing and Big Data Analytics

[20]. Girsang, M. J., Candiwan, Hendayani, R., &Ganesan, Y. (2020). Can Information Security, Privacy and Satisfaction Influence The E-Commerce Consumer Trust? 2020 8th International Conference on Information and Communication Technology (ICoICT). doi:10.1109/icoict 49345.2020.9166247

[21]. Halim, E., Julianto, Y., &Hebrard, M. (2020). The Impact of Visual Merchandising and Transaction Attitude to E-commerce Purchase Intention. 2020 International Conference on Information Management and Technology (ICIMTech). doi:10.1109/icimtech50083.2020.9211259