

Association Rules for Prediction of Consumer Purchase Intention with Use of Decision Tree Algorithm

Mrs. Rashmi J. Deshmukh¹, Ms. Sneha D. Dhole²

^{1,2}*Department of Technology, Shivaji University, Kolhapur, India*

Abstract- As of late, we can without much of a stretch watch that animation, comics, and games (ACG) have extraordinary yield esteem and market impact on the amusement and digit media adverts. The ACG business is not an industry of a solitary nation or locale however a worldwide industry. Not with standing its own income, the subordinate results of ACG can stretch out the ACG business to win more business open doors. The ACG business is principally showcased towards more youthful individuals, who are the significant clients of informal organization locales. Thus, the electronic Word-Of-Mouth (eWOM) on interpersonal, organization destinations frequently turns into a reference premise of the youngsters' attitudinal acknowledgment and buy expectation in buying ACG related subsidiary item. In the proposed framework, we break down the persuasive variables of positive eWOM's correspondence inspirations that influence buyer's acknowledgment on informal community destinations, and apply the uncomplicated decision tree algorithm to process the affiliation governs between these compelling components and customer acknowledgment, hoping to comprehend the connection between eWOM on interpersonal organization locales and purchaser acknowledgment. The consequences of this framework can help the business basic leadership in CRM and promoting of the business of ACG related subordinate item.

Index Terms- Animation, Comics and Games, Data mining, Decision tree, Pokemon Go, Purchaser acknowledgment, Word-of-Mouth.

I. INTRODUCTION

A Media outlet catches a wide assortment of media to give preoccupations or to entertain shoppers, and it has turned out to be one of promising markets in the period of flourishing improvement of advanced union. PricewaterhouseCoopers' yearly research on the worldwide amusement and media advertise called attention to that the worldwide excitement and media market would be worth around 1.77 trillion USD in 2013 and 2.21 trillion USD in 2017.

We can without much of a stretch watch that animation, comics and games have incredible yield esteem and market impact on the excitement and digit media showcase. Take Hollywood for example, a ton of blockbuster motion pictures (for instance, "Iron Man") were adjusted from the acclaimed DC or Marvel funnies in the course of recent years. Additionally, the vast majority of the yearly best 10 overall film industry nets were made from the motion pictures identified with activities or funnies. For instance, the greater

part of best 10 most elevated netting motion pictures of 2013 accounted by Box Office Mojo were movements or adjusted from funnies: "Frozen", "Iron Man 3", "Despicable Me 2",

"Monster University", "Man of Steel", and "Thor: The Dark World", which added up to more than 5.5 billion USD.

The animation, comics and games industry is not an industry of a solitary nation or area yet a worldwide industry. Animation, comics and games regularly have solid connection with each other. For instance, if a comic item is famous available, important animations and games will be acquainted with the market soon, or it will even be adjusted into a motion picture or TV appear.

Most games on computer game consoles (for instance, Wii, PlayStation 4, Xbox, et cetera) are identified with the well-known animations. Such connection makes it difficult to isolate them in thought. Rather, animation, comics and games ought to be viewed as an industry of solid inward cohesiveness. Accordingly, the term "ACG" is generally used to speak to the business of animation, comics and games.

Informal exchange furnishes potential clients with a reference wellspring of involvement being used to lessen hazard and vulnerability. Subsequently, the verbal exchange has turned into an essential wellspring of reference data to customers. In this manner, there are two methods of correspondence in the promoting field that can command the buy aim, to be specific, publicizing and verbal (WOM).

Contrasted and different types of broad communications, WOM are an imperative, elective wellspring of data. In the present society, life is loaded with different sorts of publicizing data. In any case, relational WOM correspondence is a wellspring of data of impressive concern and consideration.

The ACG business is basically showcased towards more youthful individuals, who are the significant clients of interpersonal organization destinations. The constant improvement and advancement of Internet innovation have altogether quickened the death of message among individuals, extended interpersonal organizations amongst purchasers, and gave another stage to the gathering of buyer data.

At the point when WOM is dispersed through electronic media, the subsequent "electronic WOM" (eWOM) alludes to any data shoppers share by means of these media.

This framework intends to break down the partner effect of positive eWOM on purchasing conduct of buyers of ACG-related subsidiary item. We dissect the persuasive elements of eWOM's correspondence inspirations that influence buyer acknowledgment on informal community locales, and apply the uncomplicated decision tree algorithm to figure the affiliation runs between these powerful factors and customer acknowledgment, hoping to comprehend the connection between eWOM on interpersonal, organization destinations and shopper acknowledgment, with a specific end goal to help the business basic leadership in CRM and showcasing of the business of ACG-related subsidiary item.

II. RELATED WORK

Li-Chen Cheng, Li-Min Sun [1]As the overall revenues of 3G versatile system administrators continuously decrease, and market rivalry turns out to be progressively escalated, they should create rich and various assortments of pristine application administrations to pull in new supporters and hold old ones. Understanding the client's obtaining conduct is a key issue in this procedure. The administrator should precisely get a handle on developments in the market in view of investigation of the conduct of 3G endorsers. This examination proposes a far reaching client relationship administration methodology system to outfit a gainful arrangement to conquer such difficulties. The reliance organize shows the connection between voice administrations, information correspondences, message administrations, micropayments and excitement. At long last, they have proposed some showcasing suggestions for 3G framework administrators in light of these fascinating standards. The main constraint is that every one of the respondents originated from one portable administrator. In spite of the fact that our examining information originate from the greatest versatile administrator in Taiwan, there might be an inspecting predisposition. Second, the outcome can't be summed up to decipher the practices of all cell phone clients. The limit sum every month for the esteem fragments ought to be balanced progressively for the dissecting the practices of adopters of homogeneous or heterogeneous 3G applications and administrations for watching long and here and now clients. Third, clients' statistic information, for example, sex and age, may influence the selection of new administrations as well. In any case, the example information do exclude the clients' statistic data to safeguard individual security.

Yi-tsun Lin [2] With progresses in present day innovation, the Internet populace has expanded step by step universally. For youthful clients who consider comfort and speed as essentials, web based shopping has turned into another kind of utilization. Likewise, business-to-client (B2C) home conveyance markets have come to fruition steadily, on the grounds that virtual stores have risen and created, e.g. mail-arrange, TV advertising, web based business. To coordinate the above explanations, this current framework consolidates web based shopping and home conveyance, and endeavors to utilize affiliation tenets to decide obscure packaging of crisp items and non-new items in a hypermarket. Clients are then partitioned up in groups by bunching examination, and the list is configuration in light of each of the bunch's utilization inclinations.

V. Somaraki, R. Ward [3]Recognizing sporadic document authorizations in extensive, multi-client frameworks is trying due to the complexity of increasing basic comprehension from vast volumes of consent data. In this paper a novel strategy for displaying document framework consents which can be utilized by affiliation lead mining strategies to distinguish sporadic authorizations is exhibited. This outcomes in the making of question driven model as a result. The outcomes show that the procedure can accurately distinguish anomalies with a normal exactness rate of 91%, limiting the dependence on master learning. Trials are additionally performed on engineered registry structures which exhibit a precision rate of 95% when the quantity of unpredictable consents constitutes 1% of the aggregate number. This is a huge commitment as it makes the likelihood of recognizing vulnerabilities without earlier learning of how to record frameworks authorizations are executed inside an index structure.

Henning-Thurau[4]The subsequent examination proposes that customers' want for social association, want for financial motivating forces, their anxiety for different shoppers, and the possibility to improve their own particular self-esteem are the essential components prompting eWOM conduct. Further, eWOM suppliers can be assembled in light of what spurs their conduct, proposing that organizations may need to create distinctive methodologies for empowering eWOM conduct among their clients.

J. Bus. Res. Money [5] This similar investigation looks at whether clients in Japan and the US who utilize referrals to discover business-to-business administrations (e.g., managing an account, publicizing and protection) will probably stay faithful to their specialist co-ops. The impacts of national culture (Japanese or American) and relative

area (remote or household) are foreseen and investigated. Relapse examination comes about show that organizations who utilized referrals to source their specialist co-ops exchanged not as much as the individuals who did not. Besides, organizations working in remote conditions (Japanese organizations in the US and American firms in Japan) exchanged more than those working in household situations. Different culturally diverse and worldwide outcomes are exhibited and talked about.

III. OUTLINE OF PROPOSED WORK

In the proposed system we have a tendency to propose ACG-related spinoff product to research the attributes in buying. Then, we have a tendency to find and modify the crucial attributes of eWOM's communication motivations which may have an effect on consumers' attitudinal acceptance and buy intention on social network sites. Moreover, we have a tendency to study client acceptance for the emptor of ACG-related spinoff product, and develop its potent factors.

The market of ACG-related trade is very profit-making and promising; but, the connected analysis is somehow deficient to grasp this trade a lot of deeply. The results of this may be used as a reference for enterprises within the trade of ACG-related spinoff product to assist the enterprises to enhance client acceptance and so increase total profits.

The general applied math ways typically calculate solely the distribution of the surface of knowledge whereas the choice tree data processing ways will analyze the potential association rules between the attributes from the info. Moreover, by testing the connected attributes' values in keeping with those association rules, the category prediction of the unknown information samples may be any no heritable. We have a tendency to perform ID3 call data processing algorithmic rule to cypher the hidden association rules between the essential attributes of eWOM on social network sites and also the client acceptance for the vendee of ACG by-product product.

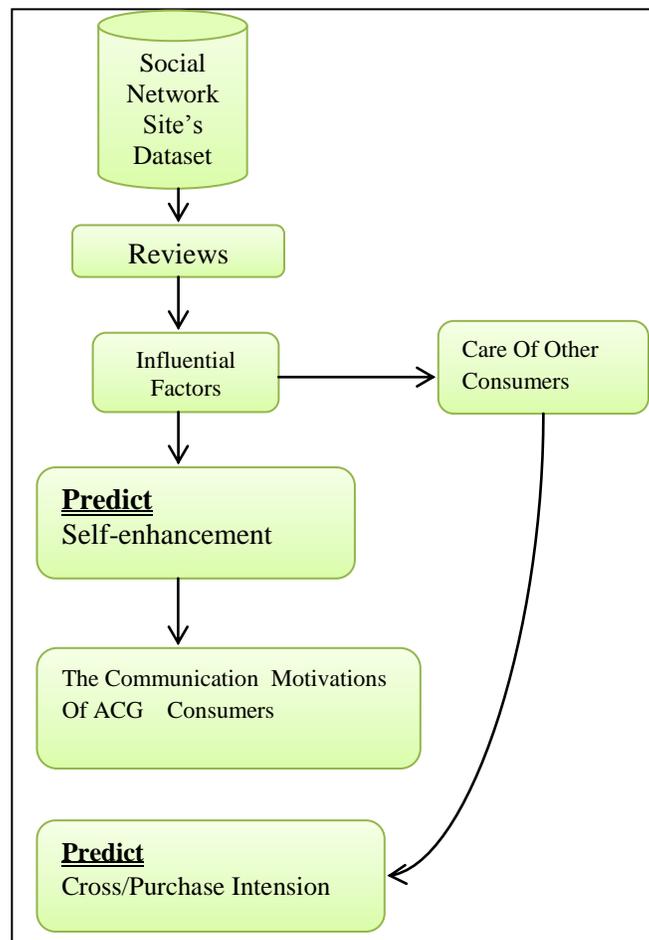


Fig.1. System block diagram of proposed system.

3.1. Decision Tree Analysis

Since different attributes usually have different measure scales, we should normalize the original data collected from questionnaires (such as transforming the patterns of original data and properly quantifying it) in order to carry out decision tree data mining analysis successfully.

Based on the Likert five-point scale, the score of each non-numerical attribute was computed by averaging the scores of related questions. Then, we would normalized the scores as three kinds of values: “low”, “middle”, and “high”, with “low” denoting “not important” and “high” denoting “very important”. Moreover, the values of numerical attributes should be classified into proper number of clusters according to the distribution of values.

Then, the influential factors of the positive eWOM and some basic demographic variables were taken simultaneously as the Critical Attributes. Moreover, the three influential factors of consumer acceptance (“Purchase intention”, “Public praise and recommendation intention”, and “Cross purchase intention”) were set as the Target Attributes, which would be used to construct three decision trees. Eventually, we executed ID3 data mining algorithm to analyse the association rules between the Critical Attributes and each of the three Target Attributes respectively. Thus, three decision trees would be constructed, and the association rules should be schematically illustrated in the resulted decision trees. A path from the root node to a leaf node in each decision tree formed an association rule of “if-then” between all internal nodes (chosen Critical Attributes) and the leaf node (a Target Attribute).

IV. METHODOLOGY

4.1 Methods of Data Collection

In the proposed system social site’s dataset is used. In the proposed system, we adopted the most commonly used Cronbach’s a reliability coefficient to measure the reliability.

4.2 Methods of Data Analysis

In the proposed system, we evaluate the positive eWOM through four influential factors, which illustrate the communication motivations of ACG consumers on social network sites. Moreover, we evaluate the consumer acceptance through three major indicators of ACG customer’s behavior. Online questionnaires are used to collect the data from ACG consumers.

The Critical Attributes include the four influential factors of the positive eWOM (i.e., “Involvement of ACG derivative product”, “Self-enhancement”, “Care for other consumers”, and “Take pleasure in communication”) and basic demographic variables of ACG consumers (gender, age, education level, occupation, monthly income, and average amount of money spent on ACG derivative product per month), while the Target Attributes are the three major indicators of ACG consumers’ acceptance (i.e., “Purchase intention”, “Public praise and recommendation intention”, and “Cross purchase intention”). The decision tree data mining algorithm, ID3, is employed for analysis to compute the association rules of “if-then” pattern between the Critical Attributes and the Target Attribute, which will identify the impact of the key influencing factors of positive eWOM on the consumer acceptance as well as the hidden co-relational rules.

4.3 Decision Tree Algorithm

Decision tree builds classification or regression models in the form of a tree structure. It breaks down a dataset into smaller and smaller subsets while at the same time an associated decision tree is incrementally developed. The final result is a tree with decision nodes and leaf nodes. A decision node has two or more branches. Leaf node represents a classification or decision. The topmost decision node in a tree which corresponds to the best predictor called root node. Decision trees can handle both categorical and numerical data.

The core algorithm for building decision trees called ID3 by J. R. Quinlan which employs a top-down, greedy search through the space of possible branches with no backtracking. ID3 uses Entropy and Information Gain to construct a decision tree.

ID3 Algorithm

ID3 (Examples, Target_Attribute, Attributes)

Create a root node for the tree

If all examples are positive then, Return the single-node tree Root, with label = +.

If all examples are negative then, Return the single-node tree Root, with label = -.

If number of predicting attributes is empty then, Return the single node tree Root, with label = most common value of the target attribute in the examples.

Otherwise Begin

This graph shows score for all five categories that is positive, negative, neutral, strong positive and strong negative

VI. CONCLUSION

The proposed system took simultaneously the influential factors of the positive eWOM and some basic demographic variables as the Critical Attributes, and used each of the three influential factors of consumer acceptance as Target Attributes to construct decision tree individually. By performing the analysis of decision tree data mining to examine all influential factors of the positive eWOM, we found that “Involvement of ACG derivative product” (the degree of perception of the ACG product or the real purchasing experience) and “Take pleasure in communication” (the degree of taking pleasure in sharing ACG-related information with others) have a significant correlation with consumer acceptance.

It can help the business decision-making in CRM and marketing of the industry of ACG related derivative product. We found that the degree of perception of ACG product and the degree of taking pleasure in sharing ACG-related information with others have a significant correlation with consumer acceptance.

VII. REFERENCES

- [1] Electronic word-of-mouth via consumer-opinion platforms: what motivates consumers to articulate themselves on the internet? Henning-Thurau, T., Gwinner, K.P.
- [2] Money, R.B., 2004. Word-of-mouth promotion and switching behavior in Japanese and American business-to-business service clients. *J. Bus. Res.* 57 (3), 297–305.
- [3] Dick, A.S., Basu, K., 1994. Customer loyalty: toward an integrated conceptual framework. *J. Acad. Market. Sci.* 22 (2), 99–113.
- [4] Engel, J.F., Blackwell, R.D., Miniard, P.W., 1993. *Consumer Behavior*. Dryden Press.
- [5] DeVellis, R.F., 2012. *Scale Development: Theory and Applications*. Sage Publications.
- [6] Jones, T.O., Sasser Jr., W.E., 1995. Why satisfied customers defect. *Harvard Bus. Rev.* 73 (6), 88–99.
- [7] Dichter, E., 1966. How word-of-mouth advertising works. *Harvard Bus. Rev.* 44 (6), 147–160.
- [8] Nunnally, J.C., 1978. *Psychometric Theory*. McGraw-Hill Book Company, New York. Ohmann, C., Moustakis, V., Yang, Q., Lang, K. Acute Abdominal Pain Study Group, 1996.
- [9] Evaluation of automatic knowledge acquisition techniques in the diagnosis of acute abdominal pain. *Artif. Intell. Med.* 8 (1), 23–36.
- [10] Oliver, R.L., 1997. *Satisfaction: A Behavioral Perspective on the Consumer*. McGraw Hill, New York.
- [11] Prus, A., Brandt, D.R., 1995. Understanding your customers. *Market.Tools*(2)(5), 10–14. PWCPriceWaterhouseCoopers, 2013
- [12] Quinlan, J.R., 1986. Induction of decision trees. *Mach. Learn.* 1 (1), 81–106.
- [13] Quinlan, J.R., 2014. *C4. 5: Programs for Machine Learning*. Elsevier.
- [14] Romiszowski, A., Mason, R., 1996.
- [15] sComputer-mediated communication. *Handbook of Research for Educational Communications and Technology*, vol. 2, pp. 397–431.
- [16] Sheu, J.J., Chu, K.T., Wang, S.M., 2016. The associate impact of individual internal experiences and reference groups on buying behavior: a case study of animations, comics, and games consumers. *Telematics Inform.*
- [17] Stärk, K.D., Pfeiffer, D.U., 1999. The application of non-parametric techniques to solve classification problems in complex data sets in veterinary epidemiology – an example. *Intell. Data Anal.* 3 (1), 23–35.
- [18] Sundaram, D.S., Mitra, K., Webster, C., 1998. Word-of-mouth communications: a motivational analysis. *Adv. Consum. Res.* 25, 527–531.
- [19] Swan, J.E., Oliver, R.L., 1989. Postpurchase communications by consumers. *J. Retail.* 65 (4), 516–533.
- [20] Tanimoto, J., Fujii, H., 2003. A study on diffusion characteristics of information on a human network analyzed by a Multi-Agent simulator. *Soc. Sci. J.* 40, 479–485.
- [21] Auditing file system permissions using association rule mining - S. Parkinson, V. Somaraki, R. Ward
- [22] Mining customer knowledge to implement online shopping and home delivery for I ii hypermarkets - Shu-hsien Liao, Yin-ju Chen, Yi-tsun Lin
- [23] Exploring consumer adoption of new services by analysing the behavior of 3G subscribers: An empirical case study - Li-Chen Cheng, Li-Min Sun
- [24] Liao, S. H., & Chen, Y. J. (2004). Mining customer knowledge for electronic catalog marketing. *Expert Systems with Applications*, 27, 521–532.