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Review on Customer Experience with Personalized Recommendation and Targeted Ads

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Abstract: ***The application for malls or e commerce platform that divide the customers into profitable and non-profitable customers plays a vital role in the marketing sector. The administrator within the shopping centers chooses to promote methods and client division points to form a relationship with the first profitable clients by arranging the foremost appropriate marketing procedure. Numerous methods are applied to separate the advertising, but outstandingly tremendous data is uncommonly effective in decreasing their adequacy. Many works used association rule learning is used to establish a relationship between variables. With the use of an appropriate algorithm in this, we find what fitems customers frequently buy together by generating the set of rules and can be used those rules for various market strategies. By using that rules, we also develop a recommender framework that will offer assistance the mall managers or e commerce managers to empowering the market strategies. This not only helps customers have a better choice but also gives advice to businesses selling products with reasonable prices. Customer segmentation is done based on their interest using association learning algorithms like ECLAT algorithm or SFIT algorithm.***
Keywords: E-commerce, data mining, ECLAT.

I. INTRODUCTION

In real time we have 2 different ways of shopping, online shopping and offline shopping nothing but manual shopping. The major goal of any business is to get good profits and also customer satisfaction is important. It is important factor for any kind of business to provide services as per the customer needs. If business provides services as per the customer tastes and needs, definitely business will get profits. Both in manual shopping and online shopping it is important to attract the customers and impress customers by providing some offers, discounts, coupons etc. so that customers will be more impressed and attracted which leads to business profits. Advertisements is a platform to reach consumers. We can publish advertisements in many modes like TV, publishing ads in social media, newspaper, business websites etc... While posting advertisements it is important to find the target customers for the business. In current system advertisements will be posted universal means all different types of customers will get the advertisement posts both in online shopping and manual shopping.

Business to Consumer (Investopedia.com)

Advertisements plays a vital role in attracting suitable customers and improvises the business. In real time customers taste differs, it vary from customer to customer. So it is very important to find what customer wants. Detecting customers' tastes is a challenging task in the current business sector. Both in online shopping and real time shopping it is very important to predict the customer area of interest means customers buying behavior. Many existing e commerce websites provides many customer based features such as recommending products based on customer browsing history, recommending similar products, frequently bought together products, rating for the purchased products. But all these recommendations are universal, published to all category of customers.

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II. RELATED WORK/LITERATURE SURVEY

A. *Mall Customer Segmentation Using Machine Learning*

V. Lakshman Narayana [1] takes our hypothetical firm as an example, and you're trying to figure out how well a particular product will perform from a marketing perspective. Customers might be segmented based on their market behavior. Identify client segments to focus on the possible user base by using clustering techniques (K-means, Agglomerative, and Mean Shift). As a result, they segment customers into groups based on similar factors such as gender and age as well as interests and spending habits.

Equations

$$d = \sqrt{\sum_{i=1}^{n}(q_i - p_i)^2}$$

$$\arg\min_{\mathbf{S}} \sum_{i=1}^{k} \sum_{\mathbf{x} \in S_i} \|\mathbf{x} - \boldsymbol{\mu}_i\|^2 = \arg\min_{\mathbf{S}} \sum_{i=1}^{k} |S_i| \operatorname{Var} S_i$$

$$\arg\min_{\mathbf{S}} \sum_{i=1}^{k} \frac{1}{2|S_i|} \sum_{\mathbf{x},\mathbf{y} \in S_i} \|\mathbf{x} - \mathbf{y}\|^2$$

The equivalence can be deduced from identify

$$\sum_{\mathbf{x} \in S_i} \|\mathbf{x} - \boldsymbol{\mu}_i\|^2 - \sum_{\mathbf{x} \neq \mathbf{y} \in S_i} (\mathbf{x} - \boldsymbol{\mu}_i)^T (\boldsymbol{\mu}_i - \mathbf{y})$$

B. *Recommender Systems for E-commerce in Online Video Advertising: Survey*

Heba Adnan Raheem [2] presents the design of Recommendation systems (RS) have become very widely used in recent years. They assist clients in getting data and making selections when they lack the knowledge required to judge on certain item. They can help the customer in efficacious information sorting. They are software system techniques that make suggestions supporting the client's taste to find new things acceptable for them from a huge amount of data by filtering personal information. The user's likes and preferences should precisely be identified in order to make the most appropriate suggestions. Recommendation systems have a crucial role in online video advertisement through introducing new products onto the market.

C. *Customer Segmentation Using Machine Learning*

Garima Sharma [3] has the business world where customers are increasing daily, it gets difficult to focus on each customer. Analyzing the customers past transactions would help the seller to satisfy customer demands and can easily attract new customers. Companies segments the customers to attain maximum profit and increase in sales. Companies need to understand this data and identify the similarity and dissimilarities in customer's needs, Customer segmentation uses unsupervised learning to segment customers into multiple distinct groups. In this paper we will use algorithms like k-means clustering and hierarchical clustering.

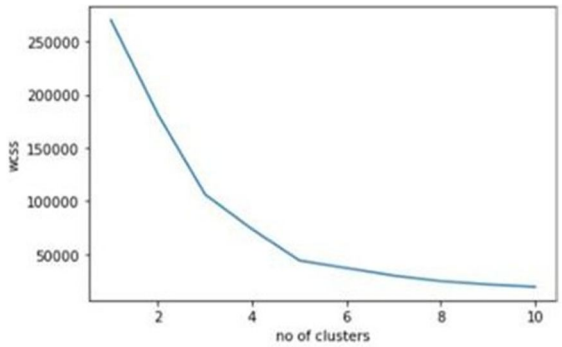

Fig3.3.1 Showing Elbow Method

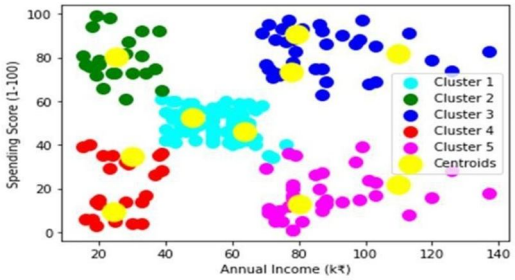

Fig3.3.2 Final Clusters Formed

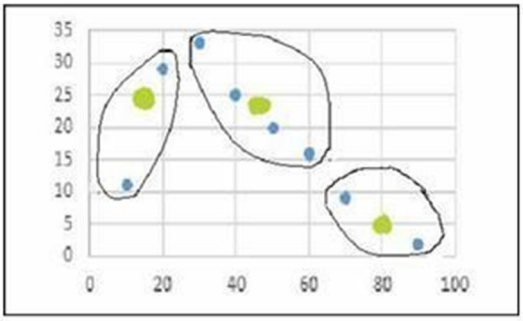

Fig3.3.3 Showing Dendrogram demonstration

D. Data Mining Application in Segmenting Customers with Clustering

Saryu Chugh [4] describes regarding competition level that is raised between the organizations to retain the customers. To have a command in e-business and other fields, data mining is giving an efficient help. By analyzing the data in different manner and summarizing it into useful information. As the databases are huge and multidimensional, it is very difficult to manage the data in online-shops. The major principle is withholding the customer. Two-phase clustering technique is applied for customers' retention. First stage is used to change the kmeans algorithm by utilizing a heuristic approach.

Agglomerative clustering is used to detect outliers. This process gives effective data analysis for the e-commerce sector to avoid client failure.

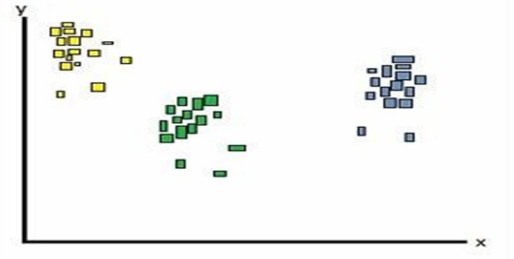

Fig3.4.1: Showing clustered objects

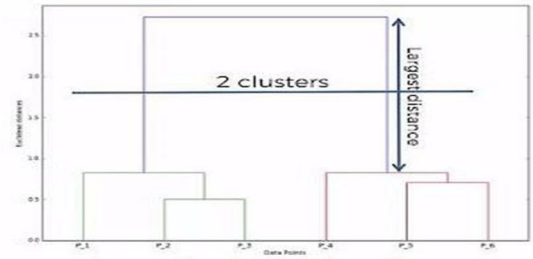

Fig3.4.2 Showing Resultant Clusters.

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E. Segmentation for Factoring Customers: Using Unsupervised Machine Learning Algorithms

Nur Seher Ayyıldız [5] in today's tech-driven era, the ease of data collection presents a significant opportunity, but effective data management is crucial for meaningful insights. Companies rely on customer data to understand evolving needs. As data volumes grow, establishing relationships and separating information becomes challenging. Machine learning methods address this issue. This study explores segmentation, its evolution, and the relevance of machine learning in data selection. Unsupervised learning techniques, including K-Means, Fuzzy c-Means, Hierarchical Clustering, DBSCAN, and Gaussian Mixture Modeling, were applied to a domestic factoring company's customer check data. GMM yielded high-quality results, DBSCAN struggled with clustering, Hierarchical clustering fell short, and the most effective outcomes were achieved with K-Means and Fuzzy c-Means algorithms.

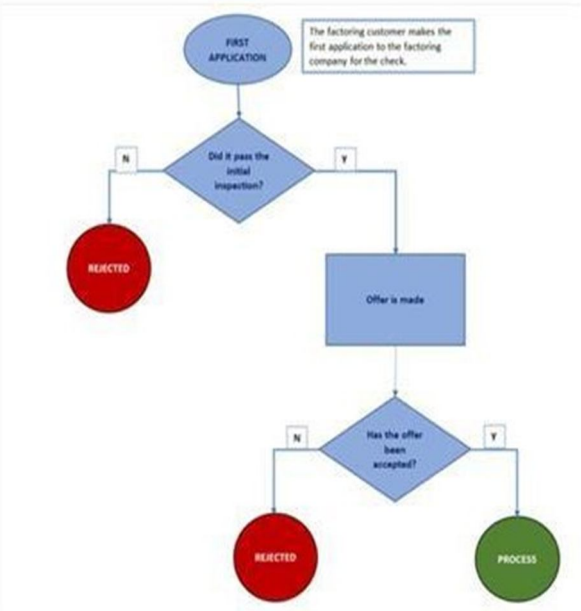

Fig. 1. Brief information of factoring processes

F. Customer Segmentation Using Credit Card Data Analysis

Saikat Raj [6] Customer segmentation is a separation of a market into multiple distinct groups of consumers who share the similar characteristics. Segmentation of market is an effective way to define and meet Customer needs and also to identify the future business plan. Unsupervised machine learning algorithms are suitable to analyze and identify the possible set of customers when the labeled data about the customers are no available. In this research work the spending of different customers who have credit cards are analyzed to segment them into different clusters and also to plan further business improvements based on the different characteristics of these identified clusters.

G. Survey Summary

In real time many e commerce websites are there such as amazon, flipkart, ebay, snapdeal, shopclues etc... All these existing e commerce applications provides numerous features to impress the customers and to earn best profits. We have the following e commerce features to attract customers.

1) Recommending products based on customers history.
2) Recommending similar products.
3) Universal advertisements for new products, offers, discounts etc.
4) Product reviews, rating options.
5) Recommending frequently bought together products.

All these features available to all types of customers. In real time it is important to provide the services as per the customer tastes where existing e commerce application lacks. Customer requirements, tastes differs from time to time and also differs from customer to customer. So it is important to identify the target customers to publish advertisements so as to improvise the business profits

III. A COMPREHENSIVE ANALYSIS OF VARIOUS ALGORITHMS IN LITERATURE SURVEY

AUTHOR	PURPOSE	TECHNIQUES USED
V. Lakshman Narayana	Mall Customer Segmentation Using Machine Learning	K-means, Agglomerative, and Mean Shift
Heba Adnan Raheem	Recommender Systems for Ecommerce in online video advertising: Survey	Recommendation systems
Garima Sharma	Customer Segmentation Using Machine Learning	Segmentation, k means, clustering and hierarchical
Saryu Chugh	Data Mining Application in Segmenting Customers with Clustering	Two-phase clustering technique
Nur Seher Ayyıldız	Segmentation for Factoring Customers: Using Unsupervised Machine Learning Algorithms	K-Means, Fuzzy c-Means, Hierarchical Clustering, DBSCAN, and Gaussian Mixture Modeling
Saikat Raj	Customer Segmentation Using Credit Card Data Analysis	Unsupervised machine learning algorithms

IV. DISCUSSIONS

In this topic customer segmentation is done based on market perspective. There is no Ads concepts and recommendation concept based on customer perception. Clustering techniques used to group similar customers and checks how a particular product will perform. Takes more time for processing data. Takes gender and age constraint for segmentation.

System is a new product recommendation based on the customer tastes. There is no Ads recommendation based on consumer perception. Just survey done. No real time implementations done.

System aims at sales forecasting based on the customer tastes. Less datasets used. There is no Ads recommendation based on consumer perception. No real time implementations done. Data mining algorithms used. Require huge datasets. The objective is to retain the customers. No Ads recommendation and real time implementation. Drawbacks of existing system. Universal product recommendations. Lack of customer based services. Not able to find the target customers. Universal advertisement publishing. Unwanted ads, recommendations for the customers More time consumption and more expensive.

V. CONCLUSION

The discussed papers collectively address various aspects of marketing, customer segmentation, recommendation systems, and competition within the business world. the focus is on marketing a hypothetical firm's product by employing clustering techniques such as K-means, Agglomerative, and Mean Shift. The goal is to identify client segments based on market behavior, including factors like gender, age, interests, and spending habits. The design of recommendation systems (RS), which have gained widespread use. RS aids clients in decision-making by providing personalized suggestions from vast datasets. The paper emphasizes the crucial role of recommendation systems in online video advertising and introduces new products to the market based on user preferences. The challenges of managing increasing customer numbers are addressed. Past transaction analysis is proposed to understand customer demands, attract new customers, and maximize profits. Customer segmentation, employing unsupervised learning algorithms like k-means and hierarchical clustering, is highlighted as a means to comprehend and leverage customer data effectively. The focuses on the rising competition among organizations in customer retention. Data mining is proposed as an efficient tool to analyze and summarize large, multidimensional databases in e-business. A two-phase clustering technique, involving a modified k-means algorithm and agglomerative clustering to detect outliers, is suggested for effective data analysis in the e-commerce sector. All these papers collectively underscore the significance of data-driven approaches in marketing and business strategy. They advocate for the use of clustering techniques for customer segmentation, recommendation systems for personalized marketing, and data mining for effective analysis in the competitive e-commerce landscape.

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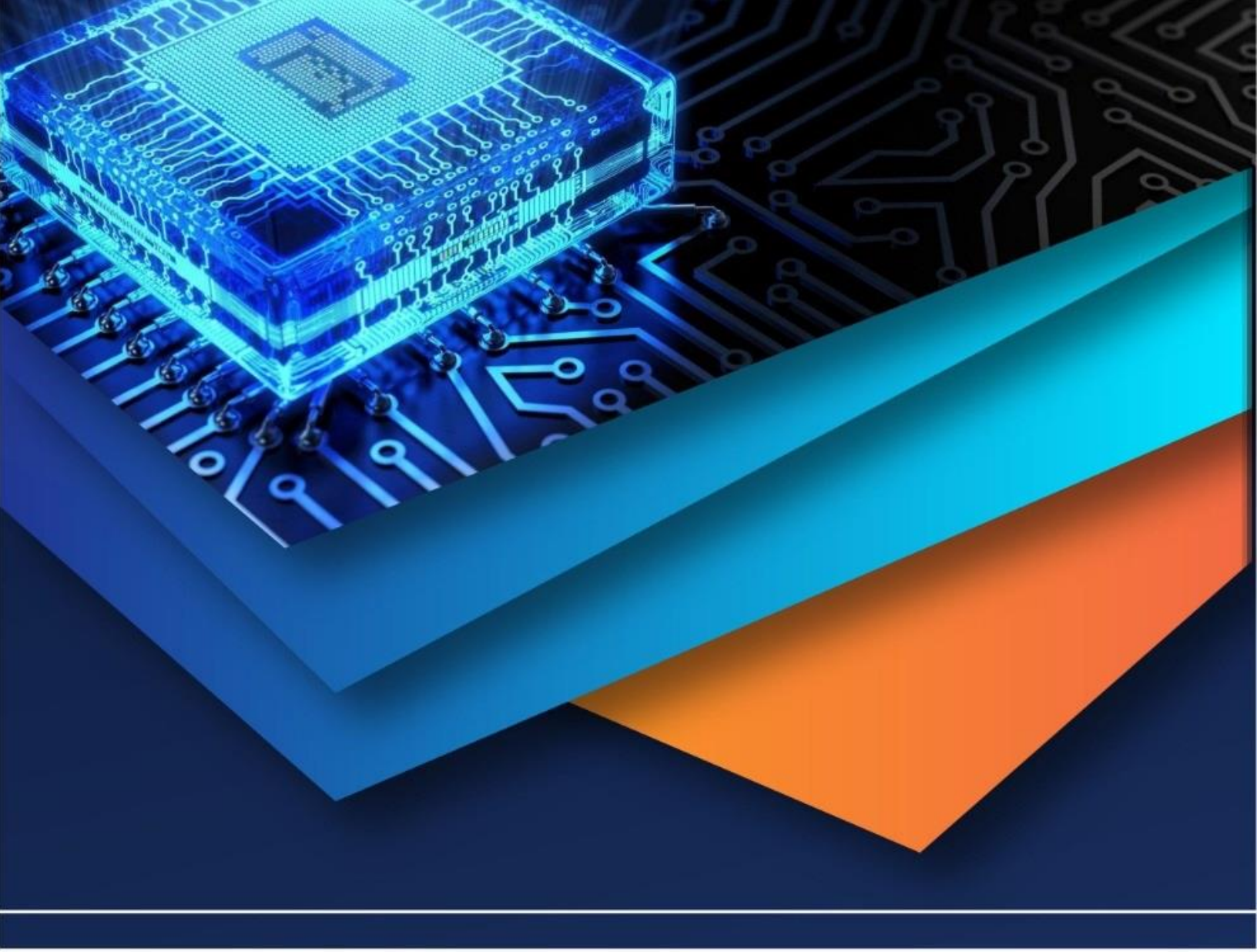

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