The Impact of Recommendation Algorithms: Analyzing the Influence of Data on Marketing Strategies in the Media Sector

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Abstract

The recommendation algorithms used by businesses in the media sector have contributed to their marketing strategies by analyzing consumer engagement and observing where interest is most prominent. Through implementing such algorithms, companies have gained a better understanding of the demographic they are reaching, and are able to better cater to their customers' needs. Algorithms often collect data on the area of a business known to have the most impact on a business's projected growth, as this is the most efficient way to expand a business. The data collected by these algorithms keeps track of metrics that can later be used to grow the business, such as the social, financial, and emotional aspects surrounding each customer. Even details that may be more inconspicuous, such as how long the page is kept open, or how the mouse is moved along the page, greatly influence the value of data from the recommender systems. Therefore, since this data is often contextualized, this study expects to discover a direct correlation between available data and marketing strategy optimization, which further increases consumer retention. This cycle continues due to evolving algorithms that increasingly get more accurate, leading to a customer's experience becoming more individualized. This paper aims to review the different types of recommendation algorithms used by businesses and analyze the data sets that they gather, as well as the ways in which this data is gathered. Then, it will provide an explanation of what type of contribution each data set has on a business, and how marketing strategies are tailored every time a significant conclusion has been made. By doing so, the paper provides a much-needed review of how companies are able to decide on the tangible steps for their business platform, and what areas to concentrate on to optimize consumer experience.

Keywords

Recommendation, Data, Personalization, Retention, Algorithm

1. Introduction

How many times has Netflix recommended a movie that's exactly what its audience is looking for? Further, how do they retain their consumer base no matter how many times their prices go up? Businesses in the media sector use demographic, behavioral, and preference data collected by their recommendation algorithms in order to improve their marketing strategies, including content personalization, targeted audience segmentation, and conversion optimization strategies. Using these recommendation algorithms greatly grows a business, and the data may show connections between specific things consumers do and how heavily the business is impacted. Recommendation systems are quickly gaining a larger role in optimizing user experience, especially in the media sector. Right now, in 2023, the market size of recommender systems, measured in revenue from the industry, is approximately 5.17 billion US dollars. In 2030, this figure is predicted to increase to 54 billion dollars, illustrating the influential role of recommendation algorithms (Straits Research, 2023). So far, there is existing research on recommendation algorithms and the data they analyze. Most papers outline what they do and the ethical implications of using systems such as these. Furthermore, there has been research conducted on the marketing strategies used by businesses in the media sector to increase their customer retention. However, this paper consolidates both topics, showing the correlation between an algorithm's collected data sets and the marketing strategies employed as a result of this data. It thoroughly examines how each data type affects a certain Key Performance Indicator (KPI) and highlights the importance of understanding how the data derived from recommendation algorithms affects marketing strategies.

2. Key Terms

Before analyzing the impact of recommendation algorithms, it is imperative to understand key definitions in order to ensure a clear foundation for the discussion and exploration of their effects on marketing strategies in the media sector. The media sector consists of businesses that affect entertainment, such as streaming services for televised shows and movies, companies involved in music streaming, and companies that create social media platforms. The effect of recommendation algorithms is perhaps most visible in these specific types of companies in the media sector, since this is where content is most personalized to the user. Since the media sector has one of the highest consumer retention rates, it is highly suitable for this analysis. The companies that create media platforms thrive on taking user feedback data and implementing content personalized to each customer to increase consumer retention. This is done through recommendation algorithms, types of data programs associated with machine learning that are able to gather data from consumer activity. A recommendation algorithm is trained to understand the preferences of consumers, in order to present the most personalized experience to any customer. By tracking what a consumer does on the website—what sublinks they click, what sites they navigate to, even

their cursor movement—it is able to predict consumer interest and is used in many businesses to narrow down what people are looking for. For instance, when looking for a new television show to watch, many people find that the first recommended show ends up becoming their next favorite, and often extend their service subscription to finish watching. Without recommendation algorithms to analyze a consumer's preference data, this wouldn't be possible, and many businesses would not retain their consumer base.

2.1. Data Types

A recommender system mainly looks at demographic, behavioral, and preference data. Demographic data is the most general characteristic of a consumer. This includes qualities such as age, race, or gender, and is gathered through hybridization, the employment of two or more recommender algorithms (Harari et al., 2016). Demographic data is used in conjunction with other recommender systems to enhance the accuracy of prediction. This is done by gathering collaborative data (data that relies on comparing a user's preferences to others') and content based data (data that uses similarities in products, websites, etc. to make connections). Behavioral data consists of data that is registered in response to a consumer's engagement (Axinn et al., 2011). This data can be gathered from websites, apps, email sign-ups, or call centers. Lastly, preference data is information that a consumer willingly shares with a business. Since this type of data is shared intentionally, it includes variables such as budget and purchase intention, and is mainly collected through surveys or interviews (Hu et al., 2014). A KPI is a Key Performance Indicator, a measure of performance over time in relation to a specific objective. It is data that has been collected, analyzed, and summarized to help decision making. Businesses use KPIs in order to determine what marketing strategy is the most efficient for the goals they intend on reaching. In this paper, different KPIs and their impacts on marketing strategies are analyzed to better understand the impact of recommendation algorithms on companies' outcomes.

2.2. Marketing Strategies

The first marketing strategy to discuss is content personalization, perhaps the most direct effect of using a recommendation algorithm. Using content personalization allows businesses to individualize what a consumer sees on the site, and specifically how it is presented to them. Targeted audience segmentation is another popular marketing strategy employed by businesses in the media sector, and it is a method based on identifying subgroups within the existing consumer base of a company in order to deliver more personalized content. This can be done through analyzing preference data, as it allows a business to categorize consumers based on the information they have shared (Fredrikson & Livshits, 2011). For example, if a consumer has indicated a certain price range, a company can only market items in that price range to the customer, making the expe-

rience more fulfilling to both parties. Finally, conversion optimization is a form of marketing that increases the percentage of users who perform a certain action on a website. This includes adding items to a cart, signing up for a service, filling out a form, and clicking on links within the website.

2.3. Literature Review

In the ever improving field of technology, a comprehensive understanding of the existing literature on recommendation algorithms and their impact on businesses is essential since these papers provide important context on the state of recommender systems and how they are used with KPIs. Mehdi Elahi, in "Towards Responsible Media Recommendation," studied how recommendation algorithms function and related their use to the expansion of businesses. The more specific the algorithm functions, the easier it is for a business to develop the corresponding marketing strategies (Elahi et al., 2022). Other papers have analyzed how businesses, specifically in the media sector, aim to use the results from algorithms to increase their consumer retention. When the algorithm yields personalized information about each customer, a business can utilize a consumer's wants in order to market only those things to them, making their experience more fulfilling and encouraging them to continue using the business.

2.4. Methodology

This paper aims to contribute to pre-existing literature by taking a more holistic look at the business sector and its relationship with recommendation algorithms and corresponding key performance indicators. It will use branched analysis: first analyzing three types of businesses in the media sector, and how each one uses algorithms differently. Then, it will study the differences in how they make use of marketing strategies, such as content personalization, targeted audience segmentation, and conversion optimization strategies. Finally, this paper will reflect on how each data type is correlated with a certain marketing strategy for a specific business, and determine steps that can be taken in order to increase consumer retention. This paper will also analyze the privacy issues that arise when using an abundance of recommendation algorithms and machine learning programs in a business. In doing so, the analysis reveals more about the relationship between algorithms and businesses in general, and even more about the media sector.

3. Background

In order to identify the areas to optimize, businesses begin by identifying what parts gain the most traction, and which ones have the most impact. In doing so, companies can gain the most immediate improvements possible and implement them as soon as possible. In the past, businesses mainly used machine learning algorithms to analyze consumer data, such as financial or transactional inputs. These algorithms consisted of both supervised and unsupervised programs

which could collect user data that was purely quantitative. Supervised programs were generally used to classify data and make predictions, and unsupervised programs would be used to understand relationships within data sets (Delua, 2021). Algorithms improved as technology did, and many businesses in the media sector quickly transitioned to using recommendation algorithms. As a branch of machine learning programs, recommender systems could analyze data that was quantitative, but they quickly advanced. They used past data that was collected and combined it with qualitative data in order to predict what a consumer is most likely to do or want when using a business's interface. From the results of the data that is analyzed, such as what part of a website a customer most uses, marketing strategies are formulated to be used by a business. These strategies are based on the data collected so as to increase consumer retention. As a direct result, a business will be positively impacted and expand over time, since they gain the resources needed to optimize marketing and data collection.

However, despite the explicit positive effects of using recommendation algorithms, many concerns regarding privacy and ethics have begun to arise. Though recommender systems are increasingly useful, the data consumers provide results in unnecessary exposure that results in a loss of security and privacy. Consumers are unaware of what happens to their data once it is gathered, or whether it is sold to third party companies. From 2021 to 2022, the amount of Data Subject Requests–formal requests made by individuals to access, modify, or delete their personal data–increased by 72% (Help Net Security, 2023). To combat this, programs that increase the privacy of recommendation algorithms are being developed, such as the Platform for Privacy Preferences initiative (Jeckmans et al., 2013). These will enable businesses in the media sector to analyze data gathered through their recommendation algorithm in order to set the KPIs that enable them to make smarter business decisions in an ethical manner.

4. Different Sectors

4.1. Video Sectors

The first part of the media sector that this paper reviews is the video and movie streaming companies, including Netflix, Hulu, Amazon Prime, Youtube, and many more (Hasan et al., 2018). When video streaming companies like these employ recommendation algorithms, it is always with the intention of getting the user to continue their subscription. Since this is the main way these companies gain revenue, consumer retention is their first and foremost goal. Thus, it is likely that these companies prioritize gathering demographic and behavioral data. In doing so, they are able to categorize their consumer base using characteristics such as age, gender, race, and other preferences. Because demographic data usually corresponds to content personalization, it is the most telling about a consumer's basic preference and will allow a company to better market to that specific customer. Behavioral data will perform similarly, since companies are able to analyze this input to find out how consumers best engage with their web-

site. Companies can take in this data and determine what marketing strategy they want to follow. For companies in the streaming service sector, the most common KPIs they use are content personalization and target audience segmentation. Since content personalization directly feeds off a categorized audience, using these two KPIs in conjunction allows a business to reap the highest benefit from the data they have gathered.

The most common example of how these strategies lead to increased retention is with Netflix. According to Netflix's published list of algorithms, the Personalized Video Ranker and Video-Video Similarity algorithms are the most useful when displaying series or movies on a consumer's homepage (Hinkle, 2021). By using a personalized video ranker, Netflix is able to predict what show a consumer is most likely to watch in each genre, and display the most relevant content first. Like the PVR, video-video similarity uses a consumer's watched shows as input in order to display what they may like next as output on the matrix-like layout of Netflix's home page. As mentioned earlier, Netflix is prominently using demographic and behavioral data in order to accurately anticipate what its audience will want to view next. Overall, this leads to higher consumer satisfaction, and a more satisfactory experience for the consumer, resulting in higher retention, and a constantly growing consumer base for Netflix. This has been evident recently, as the company generated 31.6 billion dollars in revenue in 2022, a 6.7% increase from the previous year (Hinkle, 2021).

4.2. Music Sector

The second part of the media sector that this paper analyzes is companies that specialize in music streaming, such as Spotify, Apple Music, Pandora, etc. Similar to video streaming companies, it is essential for music streaming platforms to retain as many consumers as possible, simply because there are so many alternate companies these consumers could turn to. In order to do this, music streaming services use a combination of behavioral and preference data to personalize a consumer's experience. Since demographics aren't as prominent in terms of listening to music, companies usually don't let this type of data skew their marketing strategies. Rather, they aim to display to a consumer what they may potentially like, based on their indicated preferences. A common instance where preference data is helpful for this type of marketing is when first downloading a music streaming platform, and selecting basic categories to personalize the home page. For instance, when first downloading a streaming platform, the user will be asked to select certain genres of music they prefer, or specific artists they like listening to. This is an example of when a user willingly provides a service with their information, and is able to see a direct reflection of this in their site experience. With behavioral data, music streaming services are able to see which types of artists a listener may choose to follow, what genre of music they tend to search for, or what type of music their playlists consist of. By analyzing this, a music streaming service can output personalized music choices to a user,

or show them music that similar listeners have loved, using audience segmentation.

In the case of Spotify, this streaming platform presents a user with a "Made for [user]" section (Figure 1), featuring songs they have listened to, along with others they might like. How is this possible? Spotify employs audience segmentation in order to categorize their audience into groups by similar music preference. By comparing the music a certain listener has heard to the other song choices of similar users, the Spotify recommendation algorithm is able to present a mix of music that contains choices from all similar users, assuming that at least one will align with a consumer's liking (Freeman et al., 2021). This feature is critical to each music streaming app, and inevitably leads to increased retention, as consumers continually discover music they wouldn't have listened to without said algorithms.

4.3. Social Media Sector

Finally, this paper reviews the businesses in the social media unit of the media sector, such as Instagram, Pinterest, Facebook, TikTok, and more. These rapidly growing businesses employ all three types of marketing strategies discussed after analyzing the three data types discussed. By collecting demographic data from its users, social media companies are able to determine what media to feed to them, varying in terms of data specific to ethnicity, gender, and age. Collecting preference data allows these companies to find out what content their users like to be shown and what genre of content should be fed the most. Doing this also allows the user to see posts that align with their beliefs, making them want to stay on the specific social media they are using.

Lastly, collecting behavioral data allows a company to see how a consumer interacts with their platform, through the links they click, advertisements they interact with, or even accounts they choose to follow. Various companies will begin by analyzing demographic and preference data, as it allows them to categorize consumers based on the information they have shared. For example, if a consumer has indicated a certain price range, a company can only market items
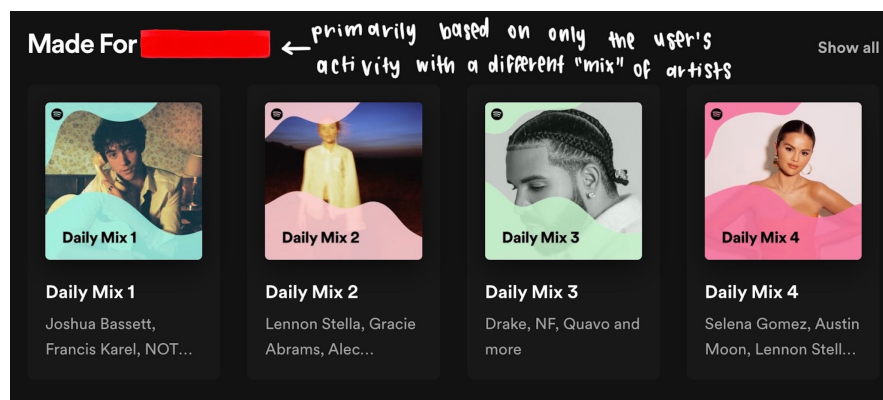

Figure 1. Source: Spotify *App*.

in that price range to them, making the experience more fulfilling to both parties. This allows them to categorize customers in groups, making it easier to market certain products, accounts, or advertisements to them. By employing targeted audience segmentation, companies can gain a better understanding of what their audience likes and how different groups navigate their site. Next, companies analyze behavioral data as the customer's social media usage grows, and begin to tailor each experience. Doing so enables a company to optimize their strategies to get the most people to interact with their site. For instance, when creating an account on Instagram, the explore page is generally unbiased, with neutral themed posts appearing. Slowly, as the user begins to interact with a post about flowers, for example, they notice that their explore page will start to consist mainly of flowers, and slowly blend with other types of posts they interact with. However, since individualizing every experience on Instagram is an inefficient use of a company's resources, they make groups of people that have liked similar posts, like flowers, and market the same types of posts to them, giving different users similar explore pages, through audience segmentation and consumer optimization (Chen et al., 2013). This marketing strategy enables businesses to personalize content to each user, obtaining more value from the visitors they get and learning more about a consumer's preferences, eventually increasing their consumer retention.

5. Privacy Concerns

Despite the pronounced benefits of recommendation algorithms and their positive impacts on consumer retention on businesses in the media sector, one of the most prevailing concerns is about forsaken privacy (MIT, 2019). By collecting different data metrics—preference, demographic, and behavioral—consumers lose their sense of privacy unwillingly. Since they may not be providing information voluntarily, most consumers assume that none of their information is being tracked, or worse, stolen (Ramakrishnan et al., 2001). For instance, when looking for a new song to listen to, most listeners turn to their app's built-in recommender page. There, they find many songs similar to previous music they've liked, and artists similar to their favorites. However, the fact that surprises most users is that their data is being compared to other listeners that have similar music tastes. When opening Spotify, the first page to greet the user is the "Home" page, featuring the user's playlists, and a "Made for (user)" section, as mentioned earlier. After searching the "recommended" page, listeners will find a song that may be entirely different from what they listen to. Spotify spotlights different playlists that fit the mood of the music a user has previously listened to (Figure 2).

But how does Spotify know exactly what a user will like? This is because other listeners with a similar taste profile have enjoyed this song and are now skewing the recommended section of songs for this user. By using the strategies outlined in this section and the previous one, Spotify mixes a listener's information with others' to create an optimal music choice for each consumer. This is prevalent
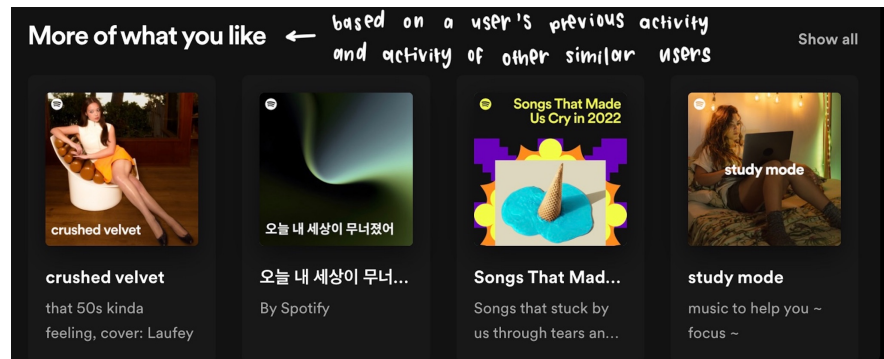
Figure 2. Source: Spotify *App*.

on various social media platforms as well, as Mark Zuckerberg mentioned in an interview in early 2022. Zuckerberg mentioned that 15% of the content shown on a user's Facebook and a little more on Instagram is content from unrelated accounts that others have enjoyed (Meta Platforms, Inc., 2022). He states that the machine learning programs they use find content that other people find interesting, and display it to various accounts in order to increase engagement and the quality of their feeds. Therefore, many consumers are taken by surprise since they did not explicitly give consent for their data to be combined with that of others.

5.1. Tracking

Another common situation where tracking is imminent is when using different platforms while signed out. Most consumers assume that using a streaming service, like Youtube, signed out will obstruct recommendation algorithms from tracking their preferences. Although this inhibits data from being linked to their specific profile, this does not stop algorithms from keeping track of a consumer. The Youtube homepage will still display videos in correlation with what they have been viewing, searching, or even clicking on for short periods of time. As a result, many consumers have expressed dislike towards these tracking methods, with around 62% of adults believing it is not possible to go through daily life without companies collecting data about them. So, companies have adapted this feedback and have implemented new features into each app or service they release.

Furthermore, some Congress members have introduced legislation to severely limit the use of recommendation algorithms, like the California Consumer Privacy Act (CCPA) and General Data Protection Regulations (GDPR), prompting companies to alter their marketing strategies more (Busch, 2023). Companies like Apple have incorporated new features that give the user control over their privacy settings. For instance, when downloading and launching apps for the first time, the system prompts the user to choose whether the app can track their activity across the company's apps and websites, or if the user wants to "ask app not to track" their information. If the user chooses to do this, the company will

be blocked from gaining access to behavioral and preference data, and will not access demographic data unless the user provides it (Pew Research Center, 2019). In doing so, companies are able to give power back to the user, slowly battling the issue of privacy loss through recommendation algorithms.

5.2. Addiction

An additional problem that arises when consumers are given personalized content is addiction. When recommendation algorithms are put to work, presenting data to a customer that is relevant to them alone, it creates a positive feedback loop that is inherently negative in feeling. Consumers are being fed data that consistently aligns with their interests, their opinions, and their feelings (Congressional Research Service, 2023). As a result, they may feel more satisfied with the service they use, and continue to pass time on that specific service, unknowingly becoming addicted to the validation they receive. This is harmful to the user, but ultimately benefits the service. As an example, Instagram's explore page is famously known for confirmation bias. This is a tendency to interpret new evidence as confirmation of pre-existing beliefs, or even largely opinionated theories (Modgil et al., 2021). When a user has their pre-existing beliefs fueled, they are inclined to remain on the site, increasing other accounts' analytics, and Instagram's overall consumer retention. Slowly, as Instagram's recommendation algorithm begins showing the user can explore page with content they might identify with, and other content that similar users reacted positively to, they are not only able to reflect a consumer's preferences; they are able to shape preferences. As a result of this, the amount of users marketers have been able to reach has increased by roughly 23.5% leading up to April 2023. Due to these negative side effects, many consumers are reluctant to use common sites or online platforms that may track their data or extremely restrict their data.

6. Conclusion

This paper examines the usage of recommendation algorithms in the media sector, detailing their impact on the video and audio streaming industries, and the social media industry. Recommendation algorithms are known to aid businesses in developing their marketing strategies used to increase consumer retention. This paper also outlines what data may be collected by each industry, and which key performance indicator would correspond to the data types. Though recommendation algorithms have had obvious positive effects on each industry, and the media sector as a whole, with the growth of their usage over time comes the growth of privacy concerns. Many users and consumers fear the safety of their information, and thus companies must develop ways to combat this issue. Another underlying problem that comes with increased retention is addiction. Companies furthering their own businesses are often doing so at the expense of a consumer's health. In the future, it is necessary for companies to address these concerns with their users, and find ways to implement the findings of recommenda-

tion algorithms and the resulting marketing strategies without sacrificing the privacy of a consumer.

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Conflicts of Interest

The author declares no conflicts of interest regarding the publication of this paper.

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