Netflix Bigdata Analytics- The Emergence of Data Driven Recommendation

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ABSTRACT
In 1997, it started operating. Reed Hastings and Marc Randolph, two internet entrepreneurs, founded the company. Los Gatos, California, is home to the company's headquarters. At first, Netflix offered DVDs for sale or rental. It began making its own TV shows and films in 2012. Netflix employs big data analytics to have a deeper understanding of their clientele. They use this data to provide customers better products or services. Netflix gathers enormous volumes of data from a wide range of subscribers. It gathers information on a user's location, the material they view, their interests, the data they seek, and the time they watch. In this essay, we examine Netflix's several business tactics.

Keywords: Netflix, big data, data analytics, streaming, on-demand video, and customer experience

INTRODUCTION:

Reed Hastings and Marc Randolph, two Internet entrepreneurs, formed Netflix, Inc. It started operating in 1997. Los Gatos, California, is home to the company's headquarters. Netflix's primary business is providing subscription-based internet streaming services for movies, TV series, and original content. With more than 148 million subscribers operating in 190 countries—aside from China, Iran, North Korea, Crimea, and Syria—it is the biggest media service provider [1]. Netflix had significant losses in its early years, but as the number of internet users increased, the company shifted from renting and selling DVDs to launching online video streaming in 2007. Netflix managed to lessen the damage. Netflix has to alter their business plan in order to do this. Netflix produces its own films and TV series in addition to streaming films and TV series from other studios. Netflix began its global growth in 2010, first in Canada, then in Latin American nations in 2011, the United Kingdom, and other European nations including Denmark, the Netherlands, Norway, and others from 2012 to 2015. In 2012, Netflix separated its online streaming section from its DVD rental business. About 3.3 million people used Netflix's DVD rental division as of 2017, and the company intends to continue offering this service for a few more years. The main issues that Netflix is now dealing with include keeping its current members and attracting new ones, growing competition from rival streaming services like Hulu, Disney, Warner Media, and Amazon, and rising original content production costs. Netflix leverages big data analytics to address these obstacles. Netflix has spent more than $1 billion on big data analytics research. They now have a distinct organisation called Netflix Research, which focuses mostly on data analytics topics including machine learning, recommendations, and user experience. For their recommendation systems, they have made significant investments in data sciences and data analytics. These recommendation systems provide recommendations based on their understanding of the consumers. There are nine parts in all in this document. A basic overview of Netflix is given in Section 1. The goals of this case study are explained in Section 2. The approach used in this case study is explained in Section 3. In Section 4, Netflix's business model evolution is discussed and contrasted with that of its competitor, Blockbuster Inc. Section 5 explains how Netflix uses big data analytics to improve consumer experience and their recommendation system. The SWOT and PESTLE analyses of Netflix are explained in Section 6. The results of this investigation are presented in Section 7.

Section 8 offers suggestions and recommendations based on PESTLE and SWOT analysis, and Section 9 Conclusion brings this study to a close.

OBJECTIVES:

Below are the objectives of study
History of Netflix.
To understand about the evolution of business model at Netflix.
To understand about the strategies of Netflix and how new strategies are used to overcome challenges faced by competition.
Overview of recommendation system.
To understand how Bigdata analytics is used by Netflix to improve customer satisfaction.
Use of SWOT and PESTLE analysis for recommendation of Netflix future strategies.

RESEARCH METHODOLOGY:

This case study's main objective is to comprehend Netflix's usage of big data analytics in their recommendation system. The study is carried out using a variety of online resources. The websites of Netflix Inc. and Blockbuster Inc., big data analytics, blogs on recommendation systems, and several conference and journal papers about big data and recommendation systems are the primary sources. The main purpose of Google Scholar is to find relevant literature for the case study. The primary motivation for selecting Google Scholar is its extensive collection of scholarly publications and its free use. It offers a number of capabilities, including citation tracking and individual citation export.

NETFLIX vs. BLOCKBUSTER-EVOLUTION OF BUISNESS MODEL:

Blockbuster Inc., which sells and rents out DVDs via its physical locations, has Netflix as its primary rival. With more than 2800 physical locations, Blockbuster was an unchallenged leader in the entertainment services industry when it was founded in 1985. Through its locations all over the globe, Blockbuster was renting and selling DVDs [2]. Netflix invented the novel concept of renting and selling DVDs without having a physical shop. Netflix used to mail the DVDs by postal service, and users had to choose the movies and TV series they wanted from the repertoire on the Netflix website. In the beginning, Netflix began renting out DVDs. Netflix discovered that it was paying more per client than it was making from DVD rentals. As a result, it switched to a subscription-based business model, renting out DVDs to clients who paid a set subscription cost. In contrast to its competitor Blockbuster, Netflix did not impose any late fees for DVD returns. One of Netflix's founders, Reed Hastings, contacted Blockbuster CEO John Antioco in 2000 with the proposal to acquire Netflix for $50 million since the company had been losing money since its founding. His proposal was that the Netflix team would oversee Blockbuster's online brand, and Blockbuster would have to advertise Netflix in-store. However, the Blockbuster team turned down this offer [3]. The biggest issue Netflix had was the enormous demand for brand-new, critically acclaimed films, which sometimes left customers unhappy since the films weren't accessible. In order to solve this, Netflix developed the Netflix recommendation system, which led to a 20% drop in demand for new movies when compared to more established DVD rental businesses like Blockbuster. Although Blockbuster and Netflix had distinct business strategies, they both fought for the same market. Blockbuster's business strategy was predicated on the notion that the majority of movie rentals are the result of users' impulsive decisions to see new or popular films right away. As a result, its outlets primarily focused on that element. The foundation of Netflix's business strategy was the idea that movies were a common form of entertainment. Netflix used the postal service to send the movies rather than picking them up like Blockbuster. Customers were drawn to Netflix by the simplicity of returning DVDs by postal service and the option to retain them for a longer period of time. By the time Blockbuster saw the danger posed by Netflix and decided to introduce a model like to Netflix's in 2004, they were very late in adapting to developments. However, the notion did not come to pass because of a change in management, so they stuck with their previous business plan. In 2013, the

business finally filed for bankruptcy and ceased operations.

BIGDATA ANALYTICS AT NETFLIX:

One of the first companies to use big data analytics was Netflix, which in 2006 issued a challenge offering $1 million to anybody who could enhance Cinematch, its current recommendation engine, by 10% [4]. Creating an algorithm to forecast subscriber movie preferences using historical data was a problem. Netflix supplied the dataset, which includes around 100 million ratings for 17,000 films from 480,000 users. The ratings were formatted as follows: user, movie name, rating date, and user rating. Over the course of several years, BellKor's Pragmatic Chaos team—which included mathematicians, data scientists, and engineers from various countries, industries, and research institutions like AT&T, Yahoo, and Commendo Research & Consulting GmbH—was given the prise in 2008 [5]. This competition was a huge success, and many of the teams who took part offered comparable solutions to other businesses, such as e-commerce. However, a privacy lawsuit against Netflix over the information used in the competition forced the cancellation of the second competition that Netflix had planned in 2010.

Netflix's recommendation algorithms make use of big data analytics and data science. The phrase "recommender system" was first used in information systems literature in the late 1990s [6]. Recommendation systems continue to be popular because they may be used to address many businesses' real-world issues. Numerous businesses, including Microsoft, Amazon, and others, use commercial recommendation systems [7-8].

NETFLIX RECOMMENDATION SYSTEM:

Depending on the subscribers' interests, it suggests different options. Machine learning is used in recommendation systems. It receives user input and makes suitable recommendations. The Netflix recommendation engine gathers user information, including the user's location, the material they view, their interests, the data they search for, and the time they watch. Its system provides a customised suggestion depending on the subscriber's interests based on these characteristics. The majority of recommendation systems consider the user profile to be a crucial factor. A subscriber's interests, search query history, system interactions, and other information are all included in their subscriber profile. When a user creates a new account or adds a new profile to an existing one, Netflix asks the user to choose a few genres or titles that might serve as the starting parameters for the recommendation system. Netflix will display the most popular material on the user homepage if the subscriber omits this step. Any initial subscription choices will be superseded once the user begins viewing the material. while the subscriber keeps watching. The previously seen information will be used to provide further recommendations [9–10].

Recommendation systems come in two varieties [11].

Content-based

Collaborative filtering

Content-based filtering: This type of recommendation system is based on the history of the subscriber. The Subscriber will watch a content or movies of a kind like action or comedy again if he has viewed a similar content in past as described in Fig.1. This type of recommendation system takes the customer information [12]. Initially when any subscriber has just joined the service it asks the subscriber to provide the information like which genre he likes and some other information. Some of the data that is collected by the subscribers are as below

It asks the user to rate the content.

User Search data.

Rank the content from least favorite to most favorite.

Choose the better of two items.

Ask the user to create what he likes and what he dislikes.

Analyzing the user search data.

Tracking the users viewing history.

Collaborative filtering: This kind of recommendation system is based on similar profiles of users [13]. To create a subscriber profile the recommendation system mainly focuses on the below two information.
Subscriber preferences.
History of subscriber
For instance, if a subscriber A watches crime, action, horror movies and subscriber B watches crime, action, comedy movies then subscriber A will like to watch comedy movies and subscriber B will like to watch horror movies. Please refer Fig.1.

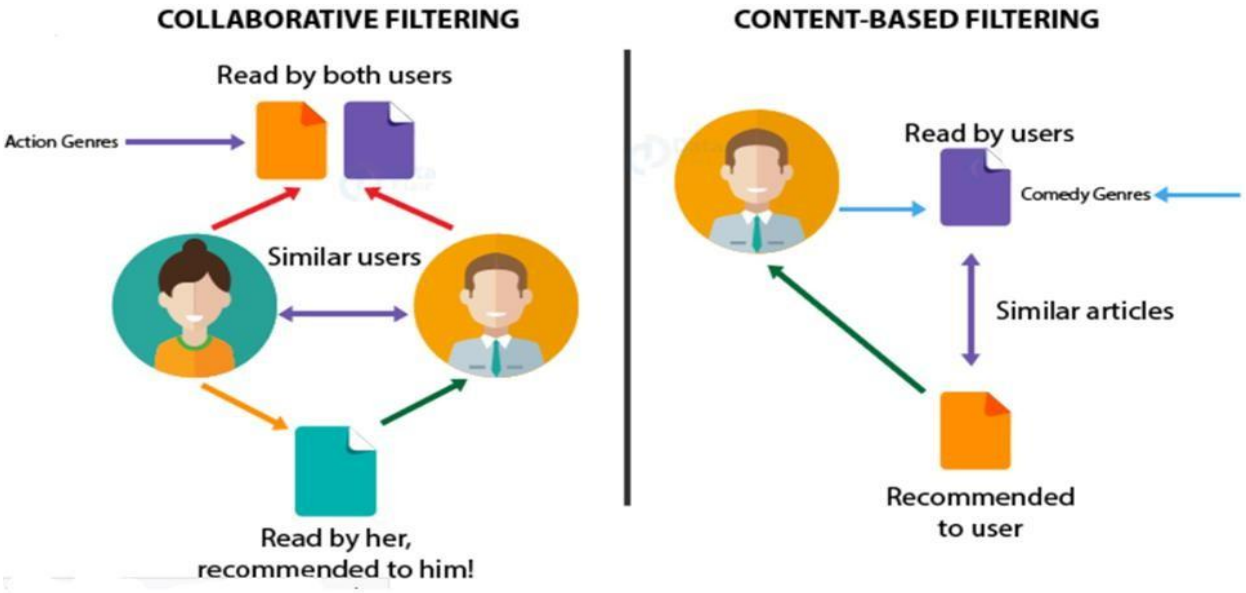


Fig.1: Recommendation Technique
Hybrid Recommendation System: This type of recommendation system is the combination of content and collaborative recommendation system. Netflix uses hybrid approach of the recommendation system refer fig 2 & 3. In this recommendation system a recommendation is made by combining the viewing habits of the subscriber and searching habits of the subscriber with previous history of the subscriber. Below are few of the hybrid recommendation techniques
Weighted: In this type of hybrid technique two or more recommendation system will provide a recommendation to user based on the user preference and finally the scores of different recommendation systems are combined to achieve a high accuracy.
Feature Combination: In this type of hybrid technique the output of one or more commendation system is provided as input to the final recommendation system.
Cascade: This type of hybrid recommendation system is staged recommendation process and is based on priority.
Switching: In this type of hybrid approach based on some criteria switching happens between the recommendation systems.
Feature Augmentation: In this type of hybrid approach the output of one recommendation system is provided as input to other recommendation system.
Meta-level: This type of hybrid recommendation system is order sensitive.
Mixed: This type of hybrid recommendation system is the simplest one. In this different kind of recommendation system are combined to provide the recommendation.

Limitation of Recommendation System:
Cold-Start: For any new subscriber there is not enough data available to make recommendation at beginning.
Scalability: As there are vast number of users and contents. A huge amount of computational power is necessary to provide accurate recommendation with shortest time possible.
Data Sparsity: As the database is huge the most active users might have rated only a few of content.
Accuracy: It is one of the major limitations as it deals with the ability of recommendation system to predict what a user wants more accurately.
Diversity: This is helpful in avoiding bias. There should be a diverse set of recommendation to be available**.**

PREDECTING VIEWING HABITS OF SUBSCRIBER:

To provide personalized recommendations to its subscribers Netflix collects huge amount of data from its user base. Below are some of the things which Netflix tracks
When a user stops a content.
When a user fast forwards a content.
When a user pauses a content.
Time during which the user watch.
Location of the user.
What content the user watch.
On what device does he watch (TV, Smartphone etc.)
Browsing behavior of user.
Searching habit of user.
Reviews and ratings given by user.
Based on these data Netflix gives personalized recommendations.

FINDING THE NEXT HIT TV-SERIES: A STUDY ON HOUSE OF CARDS:

Netflix is now producing and distributing original content. It began creating its own TV series. Bigdata is the driving force behind Netflix's approach. Netflix defeated a number of rivals, including HBO and AMC, to create House of Cards. The intriguing reality is that Netflix paid $100 million for the two seasons of the 26-episode series without ever seeing a single episode. Bigdata analytics was the driving force behind this choice. Netflix was able to ascertain that viewers of the original House of Cards, which broadcast in the UK in the 1990s, were interested in seeing films directed by David Fincher and starring Kevin Spacey by looking at historical viewing data. Based on big data analytics, Netflix was quite convinced that the programme they would create would be a huge success. Compared to other networks, which have a far lower success rate than Netflix, Netflix has an around 80% success rate for original programming. Bigdata analytics and other data mining methods are used to estimate the size of the audience that would watch the production or original content.

NETFLIX PERSONALIZE CUSTOMER EXPERIENCE:

Netflix uses A/B test to personalize user experience. Whatever the it is shown on the platform (eg: images) is driven by data collected by A/B test. Each test present two different versions for subscriber and observe how the subscriber react to these. Netflix uses landing cards. Landing cards are images or video teasers that can be seen in the homepage of the subscriber. Landing cards is helpful in attracting the subscriber to watch the content. Users are more likely to watch the content if the images are attractive to them. [14]

ANALYSIS:
Both SWOT and PESTLE analysis are performed as per the guidelines mentioned in Company analysis case study [15-21]

Company Background [22] **Company:** Netflix Inc **CEO:** Reed Hastings
Year founded: 1997
Founders: Reed Hastings and Marc Randolph
Headquarter: Los Gatos, USA **Industry:** Cable/Satellite TV **Number of Employees (2018):** 5,500
Public or Private: Public
Ticker Symbol: NFLX
Market Cap (Feb 2019): $155.81 Billion **Annual Revenue (2018):** $15.79 Billion **Profit |Net income (2018):** $1.21 Billion
Products & Services: Video on demand, online streaming
Competitors: Hulu | Disney+ | HBO| Warner Media | Amazon |
SWOT Analysis: SWOT analysis can be used by organization to identify internal factors that is of strategic importance like Strength and Weakness of an organization and External factors like Opportunities and Threats.
SWOT analysis helps the organization to develop four types of strategies as below SO-Strength-opportunities Strategy.
WO-Weakness-opportunities Strategy. ST-Strength-Threat Strategy.
WT-Weakness-Threat Strategy.
Strengths:
Established Brand Name.
Reliable distribution network.
Global Customer Base: Netflix is serving over 190 countries worldwide.
Good performance in new markets.
Successful track record.
Successful market strategies.
Technology: Netflix is ready to embrace changes rapidly it is one of the early adapters of bigdata analytics and data science.
Product innovation.
Original Content: Netflix is in production of original content and the quality of the content which Netflix produces are liked by many viewers.
Weakness:
Huge Debt: The production of original content involves huge costs this results in debts.
Limited Copyrights: For many of shows or movies Netflix has taken rights from other studios. It is becoming difficult to manage the content library as the rights taken from other studios expire and the content will be taken off from Netflix.
More investment in newer technologies.
No success outside core business.
Opportunities:
Expansion into other countries including China.
Partnership in Europe to meet European laws.
Alliances: It can partner with various service providers to provide bundle packages at discounted price.
Potential to earn revenue by other means like advertisements.
Attracting New customer base with the use of data analytics.

Threats:
Increased Competition: Other Providers like Hulu, HBO, Amazon, Disney and Warner Media are entered or entering the online streaming service.
Piracy: It is the biggest threat many users download the content by illegal means.
Increasing the Subscription price lead to subscribers switch to other providers.
Sharing of Single Subscription between multiple users.
Change of subscriber behavior
Different countries liability laws.
PESTLE Analysis: PESTLE analysis is used to analyze the macro environment of any organization. PESTLE stands for
P-Political
E-Economical
S-Socio-Cultural T-Technological L-Legal
E-Environmental
PESTLE analysis provides a detail analysis of macro environment of organization along with its operational challenges
Political:
Due to European regulations Netflix belonged to same category as television distributors. Netflix needs to follow the European rule that 30% of the content needs to be European.
Due to restrictions of US on some countries like Crimea, North Korea Netflix cannot expand to those countries.
Due to permission issue by Chinese government Netflix could not expand its business to china.
Existing petition in US by AT&T in Federal Communication Commission to limit online streaming platforms like Netflix.
Censorship: different countries has different laws regarding censorship. US content may not be suitable for many countries where it needs to be highly censored.
Mandatory Employee benefits.
Economical:
Change of exchange rates impacts the revenue of Netflix.
Competitive pricing.
The price of Netflix in US is much lower than traditional service providers.
Tax laws in different states of US.
Inflation and Interest rates.
Skill level of workforce.
Cost per Employee.
Socio-Cultural
Many Customers are moving to watch content through their smartphone.
Netflix is known for charity work like providing scholarships.
Demographics and skill level of countries population.
Technological:
Recent technological advancement and impact on product offerings.
Improving quality of streaming with less data consumption to support 4K content efficiently.
A new software called ‘Hermes’ is developed by Netflix Research which automatically grades a translation. With the use of this Netflix will be able to serve the faster and good quality translation of shows to different countries.
Legal:
Due to copyright laws Netflix has introduced blockers that will block the users accessing the contents from other countries this will affect the user base.
They need to handle the video piracy affectively.

Employment law.
Copyright and Intellectual property.
Consumer protection law.
Environmental:
Netflix needs to work more towards using of renewable energy and reduce the carbon footprint of its data centers.
Recycling and waste management.
Use of ecological products.
FINDINGS OF THE STUDY:
Netflix is one of the early adapters in bigdata analytics.
Use of bigdata analytics has resulted in customer satisfaction.
Data analytics has helped Netflix in production of original content.
Data analytics has helped Netflix to be leader of streaming market.

SUGGESTION AND RECOMMENDATIONS:

Based on the SWOT and PESTLE analysis below are few recommendations
Netflix to continue its use on Data analytics and Data Science to improve the customer experience.
It is recommended to reduce the subscription cost as similar as its competitor for developing countries like India.
Use of limited Advertisements to compensate loss of revenue due to lower subscription prices.
Explore other territories for expansion.
Produce more original content region specific.
Tie Ups with different production studios to increase the content library.
Use of advanced authentication techniques like finger print or facial recognition [23-26] or Multi factor authentication [27-28] for subscriber authentication.

CONCLUSION:

In this essay, we have examined Netflix's business strategy in comparison to Blockbuster Inc.'s and how Netflix overtook its rival to become the industry leader in online streaming services. We spoke about the Netflix prise competition and how the winner team's algorithm improved the accuracy of Netflix's current algorithm. We have also spoken about the many types of recommendation systems, such as Netflix's usage of a hybrid recommendation approach and content-based and collaborative filtering recommendation systems. Additionally, we have examined the usage of Bigdata Analytics' recommendation system to enhance customer satisfaction. We've also spoken about how Netflix uses big data analytics to forecast subscribers' watching preferences and how this helps create original material that will be a tremendous hit. Lastly, we have given Netflix a few suggestions to enhance their company strategy based on the SWOT and PESTLE analysis.

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