

Netflix Recommendation System (Review)

Anudeep Reddy Puthalapattu, Department of Computer Science, Michiagn Technological University,
Houghton, Michigan, aputhala@mtu.edu

Carlos A. Gomez-Urbe and Neil Hunt. 2016. The Netflix Recommender System: Algorithms, Business Value, and Innovation. ACM Trans. Manage. Inf. Syst. 6, 4, Article 13 (January 2016), 19 pages. DOI:<https://doi.org/10.1145/2843948>

Abstract— The objective of the paper is to review the author's algorithms and mathematical models are Netflix recommendation system, business value, and innovation, and discuss the strengths and drawbacks of mentioned models. The popular method of A/B testing for customer retention and offline experiment click-through rates, revenue through monthly retention, and added business value through recommendation system, areas of innovation, and development were discussed.

Keywords—Netflix recommendation system, customer retention, A/B testing, revenue, churn analysis, click-through rates.

I. INTRODUCTION

The present world runs on feedback, ratings, and suggestions. When we visit a new place, the first step is will open our mobile and search on google about our favorite places, restaurants, or nearby hotels. We will make the decisions based on either user ratings or suggestions provided by the websites. to enhance the user, experience the technology companies work for better algorithms or techniques for better recommendations. The Netflix recommendations start from the user experience and translate that experience into revenue a model. With the advent of smart devices and televisions, video browsing websites are available across the devices. So, there is competition in the market to capture the customers and it becomes an everyday task to provide better recommendations to the user based on their preferences. Manually it is not possible to provide recommendations based on their interests and implementation of machine learning algorithms and mathematical techniques, it is possible to provide recommendations from a large pool of video catalogs. The author discussed several algorithms rather than one model to improve the user experience through better recommendations.

II. SUMMARY

The author discussed the revolutionized product Netflix and its recommendations to the user based on their interests, feedback, clicks, and tracking of their daily activity using machine learning algorithms and statistical analysis. studies identified that consumer loses interest after 60 to 90 seconds of choosing and reviewing 10-20 titles on screens either one or two.

Initially, the recommendations are based on providing the stars on a scale of 1 to 5 post-watching the video. With the availability of huge data and methodologies, the recommendation is possible based on user clicks and views of videos rather than ratings alone. The author mentioned multiple machine learning algorithms and statistical tools like Personalized Video Ranker (PVR), Top-N Video Ranker, Continue Watching Ranker, Trending Now, Video-Video

Similarity, page Generation: Row selection, and Ranking, Evidence, Search, and A/B testing.

The *Personalized Video Ranker* orders the videos based on user interest in genre and preferences. Even though it is the same genre for multiple users, the order of videos will be different based on their preferences and popularity of videos.

The *Top-N Video Ranker* personalizes the top videos rather than displaying all the videos, unlike PVR. Rather than ranking the entire catalog, it ranks the top videos of popularity which combine with the personality.

The *Trending Row* methodology chooses the present scenarios and combines them with user personalization. For example, there is an earthquake nearby the city, and it recommends documentaries related to earthquakes and on Independence Day it suggests the independence movement, its celebrations which are known as short-term recommendations.

The *Continue Watching Ranker* recommends the videos that the user didn't watch and roll over their titles only. It tracks the user signals across the multiple devices and the content is watched completely or not, abandoned videos, etc., It uses different algorithms and mathematical technique's specific purpose to rank the videos.

The *Video-Video Similarity* is simply called Because You Watched (BYW), not a personalized model as it compares the video-video catalog rather than user personalization. For example, if the user watched the documentary on wildlife, it recommends the documentaries and videos related to wildlife in the catalog.

The *Page Generation* algorithm recommends multiple rows of videos rather than a single personalized view. It is the implementation of all the algorithms and techniques discussed above for the user recommendations. Today, it selects the data from a large pool of candidates rather than just because you watched (BYW) to optimize the performance and user experience.

The *Evidence Selection* algorithm evaluates the suggested recommendations and rather than showing similar videos of users watched, it shows the videos related to the artists and genre of it. It provides the best recommendation and improvises the user experience.

The *Search* algorithm considers the user search for videos, artists, songs, etc., Around 20% of user data is collected from the search options. It's required to display as per the user preferences. The search algorithm looks for the word, type of

video, and character, runs simultaneously runs multiple models, and provides the results. It also provides the feedback of user inputs to improve the user recommendations.

Without personalized recommendations, everyone got the same videos on their homepage. It results in loss of customers and reduction of churn, decreasing the revenue as well. Personalized recommendations are necessarily based on user preferences, watching, and search which improves the user experience and revenue as well.

The better the recommendations the better the retention of monthly customers which is directly proportional to Netflix revenue. Customer retention can be measured through A/B testing and word of mouth gets the new customers as well but there is no algorithm to calculate the word of mouth. If a product change retains more customers, it means that it is an improvement in user experience and strong word of mouth retains new customers as well.

There is still a lot more we can do on recommendations other than A/B testing which is offline experimentation called click-through rates. To improve the user, experience several methods like advertising, account sharing among families, clustering the users based on their interests or preferences, etc., are incorporated into the system.

III. BACKGROUND AND MOTIVATION

The author's objective is to evaluate the Netflix recommendation system, validate the business value, and introduce innovative methods to improve the recommendations. There is a huge market around the globe in growing technology and devices with the inclusion of the internet. The human population can access any information, streaming videos and songs, live chat, etc., Netflix is a streaming video partner and can access anywhere on any device with the help of the internet. To improve the user experience, retain the new customers, and capture the market around the world author discussed the models, statistical analysis, and business value available through it. In the end, explained the most popular model for measuring customer retention A/B testing is explained with an example.

IV. MAIN CONTRIBUTION

The major contribution of the author is specifying each algorithm in detail and their adoption in developing the recommendation system is magnificent. As revenue comes from monthly subscriptions recommendations to each user are different which is achieved through A/B testing, and it considered each user as a cell. The selection of statistics to evaluate enough data is available for the test audience and the selection of probability model to predict the output using the sample size. The design of the recommendation system, evaluation of the test audience, and comparison of predictions with historical data provided evidence of its system performance. The offline experimentation, open problems, and better experimentation methods and future work was discussed. Finally, A/B testing was explained with an example with a mathematical explanation.

V. STRENGTHS

The authors mentioned recommendation system has the following strengths:

- The recommendation system is implemented on several algorithms and mathematical models.
- A/B is explained clearly with an example that is used for measuring customer retention.
- The inclusion of Search which is contributing 20%, as important as other algorithms is not ignored.
- The business value attained through new and existing customers indicates the performance of the recommendation system.
- The flow from tarin models to evaluate and generate hypotheses in a loop with offline and A/B testing to roll out the recommendations is visually displayed.
- The new algorithm is tested on historical data to verify how well the recommendation system is performing.

VI. DRAWBACKS

The authors mentioned recommendation system has the following drawbacks:

- Consideration click-through rates of offline experimentation have their drawbacks. What if the customer randomly clicks on the device and how it is evaluated is not mentioned?
- Sharing the account details with multiple families and friends is not explained or captured in the recommendation system.
- The recency, frequency, and monetary analysis are not performed in comparison to customer retention.
- The techniques to improve A/B testing are discussed but not given the results of an assessment.

VII. CONCLUSION

The contribution of the author in describing the multiple algorithms in the application of the Netflix recommendation system and some open problems; author's main contribution and motivation to discuss the recommendation system, business value, strengths and drawbacks of the mentioned system, and A/B testing review is discussed.

ACKNOWLEDGMENT

Sincere thanks to Dr. Xiaoyong Yuan for providing frequent feedback.

REFERENCES

- [1] Carlos A. Gomez-Urbe and Neil Hunt. 2016. The Netflix Recommender System: Algorithms, Business Value, and Innovation. *ACM Trans. Manage. Inf. Syst.* 6, 4, Article 13 (January 2016), 19 pages. DOI:<https://doi.org/10.1145/2843948>