A Project Report

on

Movie Recommendation App

Submitted in partial fulfillment of the
requirement for the award of the degree of

Bachelor of Technology in

Computer Science and Engineering

Under The Supervision of
Dr. Ravindra Chahar
Associate Professor

Submitted By

Suraj Kumar Gupta / 18SCSE1180072
Gopal Krishana / 18SCSE1010158

SCHOOL OF COMPUTING SCIENCE AND ENGINEERING
GALGOTIAS UNIVERSITY, GREATER NOIDA
INDIA
December, 2021

SCHOOL OF COMPUTING SCIENCE AND ENGINEERING
GALGOTIAS UNIVERSITY, GREATER NOIDA

CANDIDATE'S DECLARATION

I/We hereby certify that the work which is being presented in the thesis/project/dissertation, entitled **"Movie Recommendation App"** in partial fulfillment of the requirements for the award of the Bachelor in Technology submitted in the School of Computing Science and Engineering of Galgotias University, Greater Noida, is an original work carried out during the period of July 2021 to December 2021, under the supervision of **Dr. Ravindra Chahar**, Associate Professor, Department of Computer Science and Engineering/Computer Application and Information and Science, of School of Computing Science and Engineering , Galgotias University, Greater Noida

The matter presented in the thesis/project/dissertation has not been submitted by me/us for the award of any other degree of this or any other places.

Suraj Kumar Gupta | 18SCSE1180072

Gopal Krishana | 18SCSE1010158

This is to certify that the above statement made by the candidates is correct to the best of my knowledge.

Supervisor Name

Dr. Ravindra Chahar

Associate Professor

CERTIFICATE

The Final Thesis/Project/ Dissertation Viva-Voce examination of Suraj Kumar Gupta: 18SCSE1180072 | Gopal Krishana: 18SCSE1010158 has been held on ___December 2021___ and his/her work is recommended for the award of Bachelor of Technology in Computer Science and Enginnering

Signature of Examiner(s) **Signature of Supervisor(s)**

Signature of Project Coordinator **Signature of Dean**

Date: November, 2013

Place: Greater Noida

Abstract

This paper seeks to explain the impact of video streaming technology and how the video streaming service offered by Netflix has impacted today's consumers and the entertainment industry (television and movies). By taking Netflix as a case study I want to understand how technology works and how it has become a success among users. The service offered by this website has redefined the way users use the media and how the entertainment industry has access to its target market. With the rapid development of network technology and entertainment creation, the types of movies have become more and more diverse, which makes users wonder how to choose the type of movies. In order to improve the selection efficiency, recommend Algorithm came into being. Deep learning is a research field that has received extensive attention from scholars in recent years. Due to the characteristics of its deep architecture, deep learning models can learn more complex structures. This paper proposes a research method of personalized movie recommendation methods based on deep learning, including an overview of personalized recommendation and collaborative filtering recommendation algorithms, which are used to conduct research experiments on personalized movie recommendation methods based on deep learning. The experimental results in this paper show that the accuracy of the training set of the Seq2Seq model based on the LSTM recurrent neural network reaches 96.27% and the accuracy of the test set reaches 95.89%, which can be better for personalized movie recommendation.

Table of Contents

CHAPTER-1

Introduction

Video streaming and broadband connectivity helps users around the world to download and view large video files from the comfort of their own homes. Using this technology, the American company Netflix launched a video streaming website in 2009 where users could watch the latest episodes of Television and Hollywood Blockbusters. Netflix has transformed content use models in the entertainment industry and led to the disappearance of a video rental store in North America.

For today's viewers is all about speed and mobility, the content they want should be just a click to fit their needs. Now everything is possible. Maybe you want to watch an episode of your favorite show while traveling, or maybe every member of your family wants a different look in a different room of the house.

All of these requirements are met with the help of video streaming and the proliferation of devices that give users access to them. Now if you want to play movies, music or watch an episode of your favorite TV show you can easily do it wherever you are.

If we want to fully understand the impact of video streaming on society and the entertainment industry we must first look at technological advances that have opened the way for companies and services such as Netflix, iTunes or Hulu to succeed.

In recent years, with the improvement of people's living standards and the rapid spread of mobile Internet, more and more information is flooding the Internet. Because different users have different hobbies, areas of interest, personal experience, etc., it is difficult for users to filter the information they are interested in from the massive information. How to use the big data that has emerged with the rise of mobile Internet and social media to serve users and carry out personality Chemical recommendation has become the focus of research. Recommendation algorithm is a type of machine learning algorithm that is very closely related to real life. It refers to a type of algorithm that does not require users to provide clear needs but models users' interests by analyzing their historical behaviors, so as to actively recommend products to users that can meet their interests and needs. Among the various recommendation algorithms, the collaborative filtering algorithm is the most widely used and representative algorithm. The basic idea is to use the preferences of a group with similar interests and common experience to recommend what users are interested in. Individuals give a considerable degree of

response (such as scoring) to the information through a cooperative mechanism and record it to achieve the purpose of filtering and help users filter information. The response is not necessarily limited to those of particular interest, and the record of particularly uninteresting information is also very important.

Traditional user interest modeling methods are difficult to express the essential information of the data and require manual extraction of features, so that researchers need to spend a lot of time and energy on data labeling, processing, and feature extraction, and different data need to be different. Feature extraction and the extracted features are not necessarily effective. The effect of feature extraction often determines the performance of the algorithm. In recent years, deep learning has been favored by researchers. It can accurately express more necessary data information through multilayer nonlinear computing units and effectively reduce the difficulty of model training through unsupervised learning.

Chen found that classification is one of the most popular topics in hyperspectral remote sensing . In the past two decades, experts have proposed many methods to deal with the classification of hyperspectral data, but most of them did not extract hierarchically. Chen introduced the concept of deep learning to the classification of hyperspectral data for the first time, first by following the classification based on classical spectral information to verify the qualifications of stacked autoencoders; secondly, they proposed a new method of spatially dominant information classification; A novel deep learning framework is proposed to integrate these two functions, from which the highest classification accuracy can be obtained. The framework is a mixture of principal component analysis, deep learning architecture, and logistic regression. Specifically, as a deep learning architecture, stacked autoencoders are designed to obtain useful advanced features. This research lacks experimental data support. Alhamid believes that context-aware recommendation offers the potential to use social content and use relevant tags and rating information to personalize content searches in a given context. Recommendation systems solve the problem of trying to identify relevant resources from a large number of online available choices. As a result, Alhamid proposed a new recommendation model that can personalize recommendations and improve the user experience by analyzing the context when users wish to access multimedia content; empirical analysis is performed on the data set to prove use of potential preferences to rank items in a given context; use optimization functions to maximize the average average accuracy of result recommendations. This method is not very innovative. Barman found that search engines have become an indispensable part of people’s daily lives. They can help users find specific information from a large amount of data stored on the Internet. The query recommendation function of search engines can respond to users’ original queries

and provide users with Recommend multiple alternative queries. For different users from a specific geographic area, these suggestions remain basically the same, but the acceptability of these alternative queries often varies from person to person. In this work, Barman D proposed a personalized recommendation system based on genetic algorithms and used the search logs of commercial search engines to evaluate the proposed method. This research is not practical and not suitable for popularization in practice .

The innovations of this paper are as follows: propose a collaborative filtering personalized movie recommendation algorithm; construct a user interest model based on Seq2Seq; design a personalized movie recommendation system based on deep learning.

1.2 Formulation of Problem

Machine learning is the science of getting computers to act without being explicitly programmed. In the past decade, machine learning has given us self-driving cars, practical speech recognition, effective web search, and a vastly improved understanding of the human genome. Machine learning is so pervasive today that you probably use it dozens of times a day without knowing it. Many researchers also think it is the best way to make progress towards human-level AI. In this class, you will learn about the most effective machine learning techniques, and gain practice implementing them and getting them to work for yourself. More importantly, you'll learn about not only the theoretical underpinnings of learning, but also gain the practical know-how needed to quickly and powerfully apply these techniques to new problems. Finally, you'll learn about some of Silicon Valley's best practices in innovation as it pertains to machine learning and AI. This course provides a broad introduction to machine learning, datamining, and statistical pattern recognition. Topics include: (i) Supervised learning (parametric/non-parametric algorithms, support vector machines, kernels, neural networks). (ii) Unsupervised learning (clustering, dimensionality reduction, recommender systems, deep learning). (iii) Best practices in machine learning (bias/variance theory; innovation process in machine learning and AI). The course will also draw from numerous case studies and applications, so that you'll also learn how to apply learning algorithms to building smart robots (perception, control), text understanding (web search, anti-spam), computer vision, medical informatics, audio, database mining, and other areas.

- Recommender System is one of the most important application in Machine Learning.
- When Ng gather information from various company in Sillicon Valley, often he asked what is the most important problems in implementing Machine Learning, he get answered on how to improve the performance of Recommender System
- Recommender System is usually used by Amazon, Google, or any kind of online store or others that trying to recommend based on the user purchased or rating to them.
- Nowadays, Recommender System has a little intention among Machine Learning practioners, even though it raises many problem for the companies in Machine Learning

- That's the main reason, the other is as we approach the end of the class, by now we should know that choosing the right features in Machine Learning is a huge impact for the learning algorithms. Some features tend to make it bias, some distinguish anomaly from normal. Either way, choosing the features manually may not a good idea, in addition if we have to choose from thousand of features.
- This lesson would teach us how is the problem we tend to have in Recommender System
- The slide above is one of example in Recommender System, that is how's the user rating previous movie they watched, and try to recommend the movies they never seen before.
- nu = number of user, nm = number of movies. for '?' rating, means that either they don't rate it, or they haven't watch it yet. Safe to assume they take the later optionr only equal 1 if user has rated the movie
- Recommender Systems is trying to guess the movies rate they haven't watched it before
- And based on all movies that they rate, our job in Recommender System is try to come up with a guess of what rating they should give for movies they haven't watched.
- And based on all the rating the algorithm guessed, pick movies with high rating and recommend the users the movies that have high rating prediction.

1.2 Tool and Technology Used

React is a JavaScript library for user interface (UI) development that Facebook introduced in May 2013 (and still maintains). It uses JavaScript for development and simple state machine components that render dynamic content with ease.

Because React.JS is one of the most powerful frontend JavaScript libraries available, you should learn how to use it if you want to build amazing applications. It's a driving force behind the interfaces of Amazon, PayPal, BBC, CNN, and many other tech giants. Furthermore, the flexible library suits any need and can be plugged into your favorite tech stack to build lightweight apps. You can use React to build anything scalable—data dashboards, messaging apps, social networking applications, single-page applications, and even personal blog sites.

One of the most effective ways to get the hang of React is by using its tools to build web apps for real-world projects. Not only will it help you learn the framework and tools, but it also gives you something to show off to prospective employers.

1.2.1. npm

If you want to get started with JavaScript (including the React library), you need to install Node package manager (npm). Like the package manager that ships with your Linux distribution (or Chocolatey on Windows or Homebrew on macOS), npm provides a command to query a software repository and install what you need. This includes important libraries, like ReactJS components.

1.2.2. Create React App

Create React App is a boilerplate project for getting started with React. Before Facebook released Create React App, setting up a working project in React was a tedious task. But with this tool, you can set up a frontend build pipeline, project structure, developer environment, and app optimization for production in seconds with zero configuration. You can achieve all this with a single command. What's more, if you need a more advanced configuration, you can "eject" from Create React App and edit its config files directly. Create React App is open source under the MIT License, and you can access its source code in its GitHub repo.

What is an IDE?

If you don't want to use Create React App, other boilerplate options are React Boilerplate and React Slingshot. Both are well-maintained and open source under the MIT License.

1.2.3. React Sight

React Sight is a commonly used visualization tool that provides a live component hierarchy tree (like a flowchart) of your entire app. It can be added directly as a Chrome extension and needs React dev tools for reading information about your app. With its rich interface, you can even add filters to focus on the components you need to interact with the most. By hovering on the nodes, you can display the current state and props. React Sight is very helpful for debugging a large and complex project.

React Sight is open source under the MIT License, and you can access its source code in its GitHub repo. Install React Sight from the Chrome web store.

1.2.4. React Belle

React Belle is a configurable React component library containing reusable components like Toggle, Rating, DatePicker, Button, Card, Select, and others to provide a smooth user experience. The components are customizable and support ARIA accessibility standards. It offers different themes, like the popular Belle and Bootstrap.

Belle is open source under the MIT License, and you can access its source code in its GitHub repo.

1.2.5. Evergreen

Built on top of the React UI primitive, Evergreen is a UI framework that contains highly polished components that you can use to build your project. One thing that developers like about this tool is its hassle-free import of components.

Evergreen is open source under the MIT License, and you can access its source code in its GitHub repo.

1.2.6. Bit

Bit offers an online platform and command-line tool for publishing and sharing React apps. It is one of the best options if you are creating and sharing components. Its marketplace is a store where people can publish their React apps and other people can search for the components they need, so they don't have to reinvent the wheel every time they need a new React app. Bit's core features include:

Allows code reuse
Increases design and development efficiency
Retains UI and UX consistency
Increases a project's stability
Bit is open source under the Apache 2.0 License, and you can access its source code in its GitHub repo.

1.2.7. Storybook

Storybook lets you set up a live development server that supports hot reloading, so you can create components in isolation from your whole project. It helps with component reuse, testability, and development speed. It also offers an online UI editor that allows you to develop, inspect, and eventually showcase your creations interactively.

What's more, Storybook's API offers myriad features and facilitates configuration like no other. It is used in production by companies like Coursera, Squarespace, and Lonely Planet. Storybook is open source under the MIT License, and you can access its source code in its GitHub repo.

1.2.8. Formik

Formik helps in creating and validating forms for debugging, testing, and reasoning in React. It allows you to generate dynamic forms, so you don't have to manually change or update the state and props of form components. It is a step towards a faster and more pleasant development experience. Formik is open source under the MIT License, and you can access its source code in its Gi

1.2.9. Immer

Immer is a JavaScript library that enables you to modify nested objects without fear of mutating them. Its purpose is to make immutability in your code simple.
Here are some of Immer's top features:
Immer is strongly typed: It is useful when your state object has a type.
Immer reduces boilerplate code: Most state management tools require you to write a lot of boilerplate code. Immer is different. It lets you write less (and more concise) code.
Immer allows you to use JS data structures: You can produce immutable states in Immer by using basic JS data structures.
Immer is open source under the MIT License, and you can access its source code in its GitHub repo.

1.2.10. React Proto

React Proto is an application prototyping tool for developers and designers. It helps you layout your project structure to make decisions in advance, so you don't waste time making changes later in development. This tool specifically helps people who prefer design over coding; for example, you can drag and drop elements instead of writing them. The tool helps you mark all potential components and give them names, properties, and a hierarchy for prototyping.

What is an API? (Application Programming Interface)

API is the acronym for Application Programming Interface, which is a software intermediary that allows two applications to talk to each other. Each time you use an app like Facebook, send an instant message, or check the weather on your phone, you're using an API.

What exactly is an API? Finally learn for yourself in this helpful video from MuleSoft, the API experts.

What Is an Example of an API?

When you use an application on your mobile phone, the application connects to the Internet and sends data to a server. The server then retrieves that data, interprets it, performs the necessary actions and sends it back to your phone. The application then interprets that data and presents you with the information you wanted in a readable way. This is what an API is - all of this happens via API.

To explain this better, let us take a familiar example.

Imagine you're sitting at a table in a restaurant with a menu of choices to order from. The kitchen is the part of the "system" that will prepare your order. What is missing is the critical link to communicate your order to the kitchen and deliver your food back to your table. That's where the waiter or API comes in. The waiter is the messenger – or API – that takes your request or order and tells the kitchen – the system – what to do. Then the waiter delivers the response back to you; in this case, it is the food.

Here is a real-life API example. You may be familiar with the process of searching flights online. Just like the restaurant, you have a variety of options to choose from, including different cities, departure and return dates, and more. Let us imagine that you're booking you are flight on an airline website. You choose a departure city and date, a return city and date, cabin class, as well as other variables. In order to book your flight, you interact with the airline's website to access their database and see if any seats are available on those dates and what the costs might be.

What is TMDB's API?

The API service is for those of you interested in using our movie, TV show or actor images and/or data in your application. Our API is a system we provide for you and your team to programmatically fetch and use our data and/or images.

Why would I need an API?

The API provides a fast, consistent and reliable way to get third party data.

What is the difference between a commercial API and a developer API?

A commercial API is for commercial projects and a developer API is for developers. Your project is considered commercial if the primary purpose is to create revenue for the benefit of the owner.

How do I apply for an API key?

You can apply for an API key by clicking the "API" link from the left hand sidebar within your account settings page. You need to have a legitimate business name, address, phone number and description to apply for an API key.

Does the API key cost anything?

Our API is free to use as long as you attribute TMDB as the source of the data and/or images. However, we reserve the right to charge for the commercial API key in the future.

Is there an SLA?

We do not currently provide an SLA. However, we make every reasonable attempt to keep our service online and accessible.

What about SSL?

It's currently available API wide. This includes both the API endpoints and assets served via our CDN. We strongly recommend you use SSL.

Does the API ever change? How can learn about new features?

Yes, it can from time to time. We try our best to post these relevant updates to the official documentation.

What are the attribution requirements?

You shall use the TMDB logo to identify your use of the TMDB APIs. You shall place the following notice prominently on your application: "This product uses the TMDB API but is not endorsed or certified by TMDB." Any use of the TMDB logo in your application shall be less prominent than the logo or mark that primarily describes the application and your use of the TMDB logo shall not imply any endorsement by TMDB. When attributing TMDB, the attribution must be within your application's "About" or "Credits" type section.

Finding Data

There are 3 ways to search for and find movies, TV shows and people on TMDB. They're outlined below.

/**search -** Text based search is the most common way. You provide a query string and we provide the closest match. Searching by text takes into account all original, translated, alternative names and titles.

/**discover -** Sometimes it useful to search for movies and TV shows based on filters or definable values like ratings, certifications or release dates. The discover method make this easy. For some example queries, and to get an idea about the things you can do with discover, take a look here.

/find - The last but still very useful way to find data is with existing external IDs. For example, if you know the IMDB ID of a movie, TV show or person, you can plug that value into this method and we'll return anything that matches. This can be very useful when you have an existing tool and are adding our service to the mix.

General Features
Top rated movies
Upcoming movies
Now playing movies
Popular movies
Popular TV shows
Top rated TV shows
On the air TV shows
Airing today TV shows

Popular people
Account Features
Get details
Get lists (created and marked as favourite)
Get favourite movie lis

CHAPTER-2 Literature Survey/Project Design

Methods of Personalized Movie Recommendation Methods Based on Deep Learning

2.1. Personalized Recommendation

Through personalized recommendation by extracting the user's historical information features, it is convenient and accurate for the user to mine the things he may like from the large database and make personalized recommendation for each user. For example, in the e-commerce market personalized recommendation algorithms can stimulate users' potential purchase desires and reduce the time for users to select products, thereby facilitating users' shopping methods; in the news or video fields, personalized recommendation algorithms can provide users with recommendations. The information of his "appetite" improves the user's reading efficiency, reduces the time for users to select product content, and can also attract users' interest in the product. Nowadays, recommended websites can obtain user behaviors such as length of stay, favorite links, and number of likes. These behaviors are roughly divided into explicit feedback behaviors and implicit feedback behaviors. Explicit feedback behaviors can directly present user preferences. Commonly it is the user's rating of the item.

The implicit feedback behavior cannot clarify the user's preferences. A common implicit feedback behavior is the user's web browsing record. The user may not be interested in the item when browsing the web but may click and browse the item out of curiosity or unintentionally. Although the record does not clearly know the user's preferences, the implicit data obtained by the general website account for a large proportion. Therefore, based on the use of explicit feedback data, it is necessary to dig out the implicit feedback data value meaning content, so as to achieve personalized recommendation.

According to the different data types, the algorithms needed for personalized recommendation are mainly composed of two types: the first is a recommendation algorithm based on content, and the second is a recommendation algorithm based on collaborative filtering. The main idea of the content-based recommendation algorithm is to recommend to users the information with the greatest similarity in the content of the items they like and the information they have followed; the personalized recommendation system basically uses a collaborative filtering algorithm, and its core recommendation idea is as follows: the user has other users with similar preferences and then recommends to the user items that other users have purchased but this user has not purchased.

2.2. Collaborative Filtering Recommendation Algorithm

2.2.1. Similarity Calculation

The measure of similarity between users is generally compared by the method of vector calculation. Among these comparison methods, Pearson similarity and cosine similarity are the most commonly used.

The calculation formula of cosine similarity is as follows, where represents the similarity between users x and y and $N(x)$ and $N(y)$ represent the collection of ratings of users x and y, respectively:

2.2.2. Matrix Decomposition Recommendation Algorithm

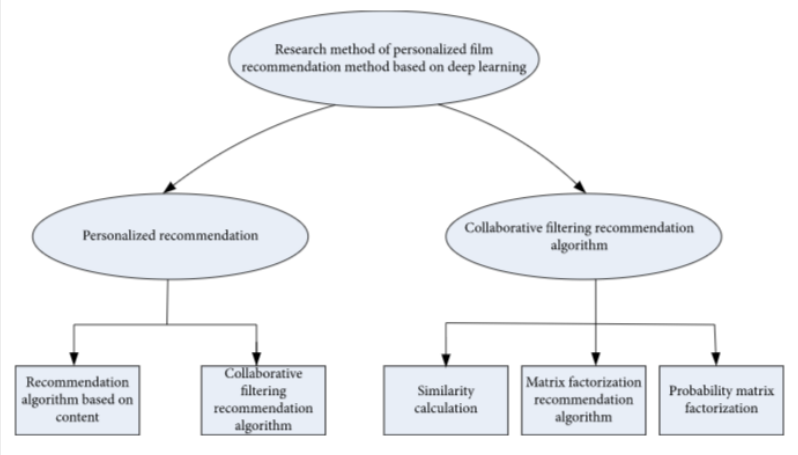
The basic principle of the matrix decomposition recommendation algorithm is as follows: analyze the user's historical information and construct a rating matrix, which is composed of user ID, item ID, and rating. Then, the user item rating matrix is decomposed into two low-dimensional feature matrices through matrix decomposition algorithm. Finally, these two low-dimensional matrices are used to estimate items that users have not commented on. The initial user-item rating matrix is decomposed, and the user vector representation and the item vector representation are obtained, respectively, and then two feature matrices are obtained, namely, user feature matrix and item feature matrix , where n is the number of users, m is the number of items, and k is the dimension of the hidden vector feature space. Multiplying the two matrices obtained by decomposition is the predicted score:

2.2.3. Probability Matrix Factorization

Probabilistic matrix decomposition is to introduce a probability model on the basis of matrix decomposition to optimize. The introduction of the probability model has greatly improved the performance of matrix factorization and further improved the accuracy of the matrix factorization model. Probability matrix decomposition has two leading assumptions: one is that the difference between the overall rating matrix R of the user and the inner product R of the eigenvectors of the user and the movie obeys the Gaussian distribution of variance; the second is that the eigenvector matrix U of the user and the movie's elements of the eigenvector matrix V, respectively, obey the Gaussian distribution with the mean value being 0 and the variance being and .

According to hypothesis one, the probability density function of R can be obtained, where is an indicative function representing whether user i has made an evaluation for movie j; if the evaluation has been made, its value is 1; otherwise, it is 0:
According to hypothesis two, U and V probability density functions can be obtained:
The stochastic gradient descent method is used to solve the matrices U and V. Then, the partial derivatives of E with respect to U and V are expressed as the following formulas:
Get updated U and V, where α is the learning rate:

The method part of this article uses the above method for the research of personalized movie recommendation algorithm based on deep learning. The specific process is shown in Figure 1.



3. Streaming Video: Connecting to the digital age.

Video streaming speeds up everything. Movies are now being released from streaming services a few months after they were released from theaters. The entire TV show season can be found on the web and viewed in pairs in just one weekend. With his new service, users are now eager for new content.
The media industry is similar to the printing industry where e-books first appear to be in line with this new approach. Long ago there were days when movie lovers started a DVD or VHS collection and showed it proudly to visitors. With online streaming technology and movies when you buy something that doesn't belong to you. Now everything stays within the cloud storage service where we have a false sense of existence

a) A real player

In 2000, over 85% of online streaming content was in Original Format. Without success, problems arose because Real's core business model relied on server sales, while Windows Media and QuickTime offered those products a way.
Consumers have begun to complain about the inaccessibility of free Real Player, which has incorporated many background processes and made itself the default player for all multimedia content while constantly asking the user to upgrade it.

b) Windows Media

Microsoft dominated computer programming, provided Windows Media Player with a large share of desktops and textbooks, and from the beginning of 2000 to about 2007, Windows Media was the most widely used Internet and multi-company intranet.

c) Flash

Web site design transitioned from HTML to Flash, which offered much greater interactivity and design flexibility. Though Flash had a video component, the initial codecs offered poor video quality and sketchy audio/video synchronization. Via VP6, Macromedia (and then Adobe, who acquired Macromedia in 2005), could match Microsoft's video quality in a brand able player that could be integrated with the rest of a Flash-based site, and was truly cross platform and near ubiquitous.

d) HTML

HTML5 is the latest specification of HTML (hypertext markup language), the language used to create websites. For HTML5 video to function, the user must have an HTML5-compatible browser, and that browser must support the codec used to compress the file. By the start of 2011, only about half of the installed base of browsers was HTML5 compatible. Though that will change with the release of Internet Explorer 9, HTML5 won't achieve the 96% penetration enjoyed by Flash for many years to come.

All of these technologies have similar components in their solutions. They include a player, a defined file format or formats that the player will play and a server component for digital and live streaming. To make large video files accessible, streaming technologies use compression to shrink the size of the audio and video files so they can be retrieved and played by remote viewers in real time. (Ozer, J. What is streaming?)

These technologies have been widely accepted by audiences, their high penetration on the consumer market have made watching movies on the Web easier and increasingly attractive. And while much of the traffic in streaming video was illegal –called: "Torrenting"- illegal file sharing is now going out of favor, Netflix and other legal content providers are gaining the upper hand.

3.1. A new way to tell stories

Whenever a new technology is introduced in the market, both industries and consumers make changes in order to adapt to it. Digital delivery of movies has affected the way we watch movies by transforming the living room into our own personal movie theatre. Social Media now influences how we promote, discuss or share our thoughts on the media industry new releases.

Now the screen has become mobile, individual spectators are now capable of watching their personal library of films, television shows and videos wherever they wish, from crowded subway trains to treadmills at the gym. We are entering an era of platform mobility where content can be accessed with a smart phone or tablet as long as wireless connection is available.netflix-streaming-ipad-2012

There are certainly "evangelists" that have embraced digital delivery with ease. They would probable list the benefits of this technology as mobility, flexibility and even convenience. Being able to do most of your tasks or chores with the help of

mobile devices makes things relatively easier, but how does this affect everything else?

Movies are shifting from a social experience to a mean to fill time in public spaces, to alleviate the boredom of waiting for time to pass, easing the potential discomfort of being alone in public. Are we perhaps sacrificing social interaction in order to consume more content? After all, it's not an odd sight to see people glued to the screen of mobile devices and wearing headphones. This digitization of the moving image has radically changed cinema, and that the characteristics of this transformation leave open an entirely new field of usual figuration.

This shift we are witnessing can be referred as an "Inter-media fragmentation". We are seeing the growth of new delivery platforms. These new delivery platforms not only facilitate the delivery of additional content options, but also multiply the platforms in which any piece of content can be accessed.

XboxSmartGlass590Unlike the early days of media where there was only a single dominant platform, we are witnessing the proliferation of platforms, devices and strategies. Content is always available and accessible, so the urgency of seeing a movie on the big screen diminishes, particularly if there is no compelling reason to do so. Technologies are becoming defensive in nature, trying to preserve shrinking shares of audience attention in an environment in which outlets for this attention are ever expanding

Nowadays, much media content can be stored and distributed digitally, reducing costs associated with making a wide range of content options available to consumers, increasing the incentives for providing such material. Because so much media content can today be stored and distributed digitally, the incentives for providing such material increase.

With all this available content are consumers just turning into isolated beings? After all, mobile device technologies are associated with the production of fragmented, often deeply individualized media consumers.

3.2. – The Audience

For some people, activities online have become more important that their "offline" lives; constant status updates and tweets seem to come first than other daily activities. We appear to be plugged-in; we are becoming more and more technological dependent as time goes by. The truth is that a life online is no life at

all. It is merely an informative stream – a content stream- manipulated as any media offering, no matter what the format.

Netflix-on-TV We may think that technology offers more options and even freedom of choice, but the increased amount of mediated interaction seems to threaten the sanctity of our personal relationships. When they are new, technologies affect how we see the world, our communities, our relationships and ourselves. They lead to cultural reorganization and reflection.

People seem willing to sacrifice social interaction when they have a new digital alternative. After all, if you can order a hit movie on your cable system or through the web, why would you patronize a theater?

By doing so, you don't wait to buy tickets at the box-office. You don't have to drive all the way to the theater or even sit behind someone who is talking all the way through the movie. For today's audiences, everything has to be instant, and everything has to be now or never. Mobile_Barcode_Closeup1

Despite continued perception of threats to movie going as a practice, such as television, home theater systems, and movie piracy, fans continue to attend movies particularly when that movie is promoted as an "event" that must be experienced in a theater.

Take for instance, the recent release of the super-hero movie "Captain America: The Winter Soldier" a recent release by Walt Disney Studios. According to the entertainment website Newsarama "The Winter Soldier…" did in fact post the largest April opening weekend of all time, pulling in an estimated $96.2 million at the box office, beating the record held by Fast Five by a full 10 million dollars. The film also already passed $207 million in overseas gross.

So even though audiences are transforming and changing, we can certainly say that box office receipts are not diminishing if the movie released is worth the attention. Moviegoers who own or subscribe to four or more home entertainment technologies are far more likely to be frequent moviegoers than those who do not, attending 10.5 movies per year, while those with fewer than four attend approximately seven movies per year in theaters.

The entertainment industry is always adapting to the audience's needs. Every so often a new video entertainment format will be released so movies can seek additional revenue after their theater-run. Who can forget flops like the laser disc

or even the High Definition VHS? They were removed just a few months after being replaced with better products. Apparently, the entertainment industry seems to struggle to find a product that will attract contemporary audiences.

As of today, audiences have become more and more autonomous. They have control over when, where, and how the consume media; and now they also have the power to affect the content they consume and to become producers and distributors in their own right.

A great example of this contribution culture is Kickstarter.com; where one of the most successful cases in crowd funding in recent years was the Veronica Mars movie. Based on a teen noir drama in the CW network, it was prematurely cancelled after its third season in 2007. Even though fans were outraged, the cancellation was final.

veronica-mars-kickstarterAfter years of behind the scenes chatter about a "Veronica Mars" movie, director Rob Thomas started a Kick Starter project last year aimed to collect 2 million dollars in pledges in a month. The goal was far exceeded in its first day. By 8:30 am, the tally stood at $2.5 m: the fans had spoken. (Holpuch, Veronica Mars's movie halfway to $2m goal)

Kick Starter and the Veronica Mars movie are clear examples that "Audience Autonomy" not only blurs the boundary between audiences and content producer (also affecting the monetization of audiences accordingly) –it also undermines established audience information systems while simultaneously providing the foundation for alternative audience information systems. (Napoli, 84)

People are now multi-tasking to meet the demands of today's world. They are now playing many roles and existing in many different worlds. (Baym 107) And it doesn't stop there; people are now being bombarded by more content than ever before. Watching a movie is now being turned into a process with multiple services to choose from. Now that the consumer is faced with decisions of an ever-expanding array of content options, it's understandable that they must feel confident in order to navigate this complex media environment. (Napoli, 60)

In order to navigate the complex media environment, users need to be equipped with the necessary tools so any extra expense associated with receiving these additional content options provide genuine value.

We see these tools in the new video streaming services like Hulu, the ITunes Store and Netflix. These tools may go from peer recommendations, site-generated recommendations, and robust, multidimensional search features. The user is just looking for an interface that makes things easier and rewarding in this environment of increased content abundance. This is how the digital audience uses streaming services and consumes additional content.

Furthermore, the digital environment has raised some questions by those who had access to previous forms of entertainment. The biggest concern raised by people against "platform mobility" is that new generations may become "platform agnostic". This refers to people who consume media no matter the size or quality of the image. For them, there is no difference at all between watching a film on a big screen or staying home and watching a movie in a tablet or smartphone as long as they can find the movie they are looking for.

Are the digital delivery and movie streaming services just lowering our standards as an audience? Is this content abundance just making us less demanding as an audience?

3.3 – New Media for new generations

Six years ago, when the Apple IPhone was gaining momentum; there was an advertisement called "Calamari". In the ad, the narrator explains how easy it is to make the transition from watching Pirates of the Caribbean on this mobile device to looking for seafood restaurant options

The advertisement's intention was to explain audiences how easy it is to navigate through content when you have the appropriate tool, and audiences really listened to this message. The idea here, for instance, is that people will watch more DVD's when offered the easily searchable cornucopia of Netflix than when confronted with the more limited, and more difficult to navigate, selection at a video store.

This content cap is referred, as the "Bandwagon Effect" where consumers will gravitate to content they know is popular. The most popular items are shown first, so they are the most likely to be accessed. So popular content becomes even more popular and niche content becomes harder to find.

One can only wonder if our consumption decisions are becoming automatized? Is the whole process shortening audience's attention spam? Today's movie watching ritual may include pausing movies to take phone calls and then send e-mail while

hearing some music. Content abundance and Digital Delivery may be affecting us in ways deeper than we think of.

Digital Delivery is not an entirely new phenomenon. Video On-Demand and Pay-per View events you could order using a telephone line preceded streaming. The truth is that new technologies are providing audiences with more choice and control in terms of when, where and how they consume their media; now audiences have opportunities to interact with their media, to provide feedback and to influence outcomes.

Content libraries such as Netflix and Hulu provide users with access to numerous titles, changing how movies and television shows are distributed by altering the speed with which content is made available for repeat or catch up viewing.

HouseofCardsNETFLIX_large_verge_medium_landscapeTake for instance Netflix's original programming. Hit television series like "House of Cards", "Orange is the New Black" and "Hemlock Grove" have become popular with viewers because the whole season (12-13 episodes) for each series is released at a time. That completely challenges the model built by other networks where a season is longer (24 episodes) and is released on a weekly basis for months.

Netflix-Streaming-XboxNetflix's instant streaming service over the Internet is witnessing escalating growth. There are various devices worldwide that can stream content from Netflix instantly. These include the Microsoft Xbox 360, Nintendo Wii and Sony PS3 Consoles; Blu-Ray disc players, Internet-connected TVs, home theater systems, digital video recorders and Internet Video Players; Apple iPhone, iPad and iPod touch, Android devices, as well as Apple TV and Google TV. Devices such as the iPhone, iPad and iPod touch enable viewers to watch movies and TV shows while on the move. Netflix's business model provides customers with the most convenient way to view DVD's as they are delivered to their addresses and the subscribers can return them through pre-paid envelopes. (Netflix, Inc. SWOT Analysis)

Audiences are now part watching television shows and movies on their own time schedules. In case you missed an episode of your favorite show you can use your DVR (Digital Video Recorder), Apple TV; Netflix Account or even buy a DVD boxed set to watch it whenever you want to. It isn't just television, the time-span between a theatrical release and a DVD release is getting shorter so people don't have to worry if they missed a movie in the movie theater.

Digital delivery is clearly making changes in the film and television industry. Users are now part of a menu-driven viewing culture where channels have been rendered increasingly irrelevant. Portable media players like the iPod or smartphones have not served as substitute of the movie going experience but rather they have become supplements, tools where studios can disseminate trailers and other promotional materials associated with a film

netflixBeyond merely altering movie-going habits, portable media is frequently discussed in terms of the ways in which it alters -and even threatens- traditional social norms. Conservative commentator George Will, for example, offers an extreme version of this condition, worrying that the video iPod will contribute to a "social autism" in which bored youth become so caught up in their tiny screens that they have no notion of propriety when in the presence of other people, because they are not actually in the presence of other people, even when they are in public".

Consumers in this digital age are deeply affected by technology. They are no longer simply "consumers" but they are transformed into "Multipliers", people who treat the good, service or experience as a starting point. (Jenkins 124) With this audience, the conversation doesn't stop after credits roll. With digital technologies, audiences can boost entertainment products like never before as long as they can get an experience from it. If products don't offer anything new, people will surely get their voices noticed and then it's back to the drawing board.

The popularity of portable media player effects in some ways has led "to the self-sufficient family home." Portable media players offer the promise of perpetual, privatized entertainment, one that would seem to extend the possibility for further social isolation from a larger community. This "Anything, Anytime, Anywhere" mantra associated with convergence culture has led film critics around the world to worry about the potential demise of cinema

3.4 – Netflix: From Red Envelopes to Internet Mogul

netflixqueueIn 1998, Netflix launched its website. And while it only offered mailing services for DVD copies, the servers reached capacity in about ninety minutes after launch and crashed. In the first four months of service, the company's vault mailed out and got back twenty thousand rented DVD's; and Netflix hit $100,000 in revenue becoming in theory a million dollar company. (Keating, 35)

adNetflix is the world's largest subscription service sending DVD by mail and streaming movies and TV episodes over the Internet with over 40 million subscribers. The number of customers opting for Netflix over the traditional model is on the rise as it offers greater convenience. (Netflix, Inc. SWOT Analysis) A Netflix subscriber can choose from more than 100,000 DVD titles, something that may proof impossible for video rental stores, as they cannot stock such a large number of DVDs.

Based in Los Gatos California, Netflix is an online subscription service streaming television shows and movies. Initially attracting customers by offering a month-free trail, those who decide to subscribe can watch unlimited TV shows and movies streamed over the Internet to their TVs, computer and mobile devices, as well as receive digital versatile discs (DVDs) and Blu-Ray discs, delivered to their homes. (Netflix, Inc. SWOT Analysis)

netflix-HQ

With Netflix, customers pay a fixed monthly subscription fee, eliminating due dates, late payment fees, shipping fees and pay-per-view fees. (Netflix, Inc. SWOT Analysis) This business model has proven clearly beneficial, since it has driven consumers away from video rental stores and into Netflix's base of subscribers.

Customers stayed home and turned to Netflix for cheap entertainment and got hooked on a growing number of devices that could suddenly stream video-game consoles, cellphones and DVD Players. The Netflix application was everywhere, and consumers signed up at a rate of then thousand per day in the 2008 and early 2009. (Keating, 229)

Variety lauded 2008 as "the year when global revenues from digital media exceeded revenue generated by movie theaters and home video combined". (Keating, 231) The first-ever decline in pay TV subscriptions ignited a debate about whether recession-weary consumers were cancelling their pay TV services to watch videos online via Netflix and other Web-based sources. (Keating, 231)

By 2011, Netflix had 23.6 million subscribers, or more than 7% of all Americans. It had replaced Apple's ITunes Store as the top U.S. online seller of movies and T.V. show –its signature subscription service claiming 44% of total online movie business to 32% for Apple (Keating, 255)

NETFLIX, INC. HASTINGSNetflix has consolidated its lead on streaming downloads of films and television programs. Six out every ten digital movies streamed and originated from Netflix. (Keating, 241) By January 2012, its more than 20 million subscribers in 45 countries worldwide have streamed more than 2 billion hours of TV shows and movies, the average user consuming more than a gigabyte of data per day. (Dixon, 145)

Business is booming for Netflix. Thousands of users are subscribing daily to the video streaming service. But why is this tech-company on the rise? What makes it stand out among its competitors?

4. – Original Programming

For Netflix to stand out from the competition, they need to make an additional offer to customers besides renting other people's content. In March 2011, Netflix announced plans to begin acquiring original content, beginning with the hour-long political drama House of Cards, which debuted on February 2013. (Andreeva, Netflix picks up "House of Cards".)

Orange is new black netflix billboard

In late 2011, Netflix picked up two eight-episode seasons of Lilly hammer and a fourth season of Arrested Development. Other series like Hemlock Grove and the animated series Turbo FAST were up on the production schedule as well.

In November 2013, Netflix and Marvel television announced a five-season deal for four Marvel superheroes: Daredevil, Jessica Jones, Iron Fist, and Luke Cage. The deal involves the broadcast of four 13-episode seasons that culminate in a mini-series called The Defenders. Broadcasting is planned to commence in 2015. (BBC, Marvel Shows to Debut on Netflix)

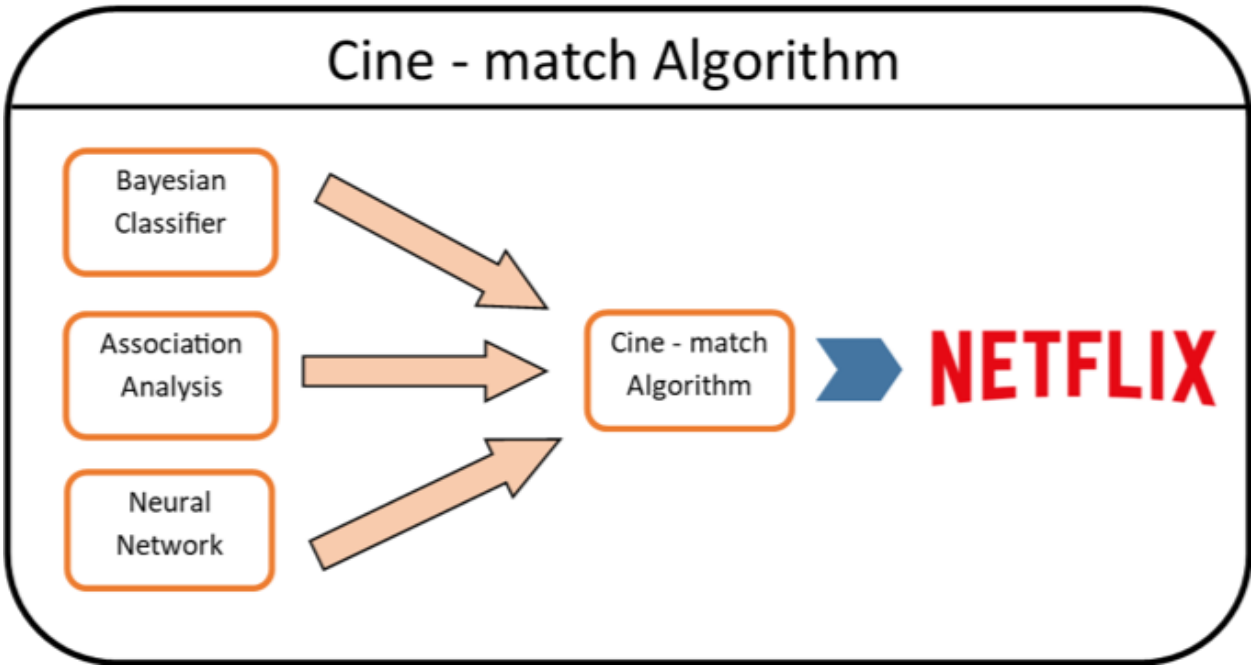
House of cards Emmy 2013 billboard

In addition to the Marvel Television deal with Netflix, The Walt Disney Company announced that the television series Star Wars: The Clone Wars would release its sixth and final season exclusively on Netflix, as well as the previous five seasons and the Clone Wars feature film.

This original content is just part of the equation. This only a piece of what makes Netflix so relevant to today's audiences and how it has achieved success so far.

But in order to really understand the company, we need to look at everything that has contributed to its success.

5. – The Cine-Match Algorithm



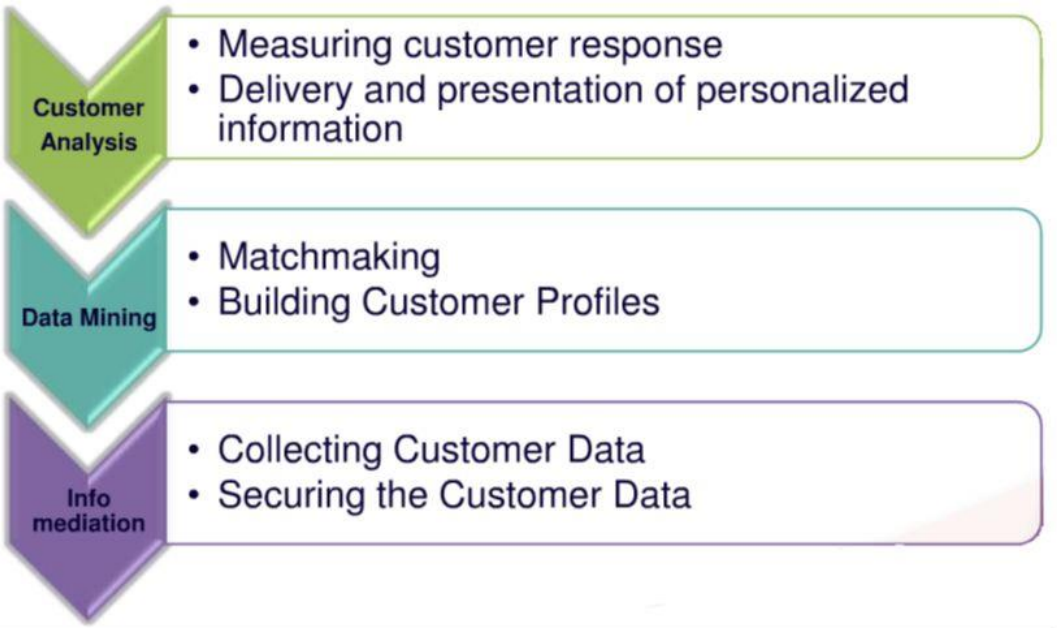
Part of Netflix's success is "The Cine-Match Algorithm". A computer algorithm, Cine-Match gives users movie and television show recommendations. A recommend system is a prime example of the mainstream applicability of large-scale data mining.

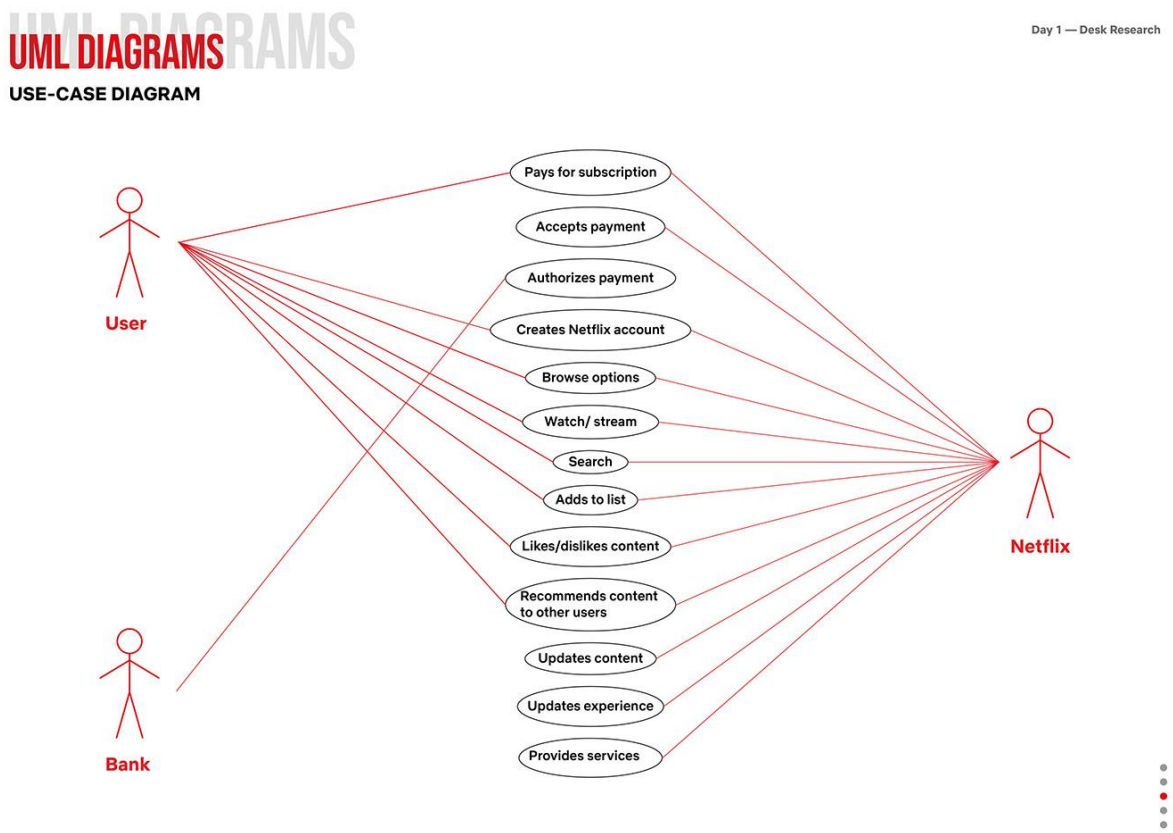
netflixRecommendationsBy giving out recommendations, Netflix has personalized the experience as much as possible. Most of the personalization in the site's interface is spread out in rows, what is included and what order those items are placed in. The system is not only optimizing for accuracy, but also for diversity and awareness. With all these elements falling into place, the users should be aware that the system is adapting to their tastes.

While building up recommendations, the Netflix system uses different data in order to build up a recommendation that tailors itself to every users needs. Among the key factors that come into place we may find some of the following: (Princeton, How does Netflix Recommend)

Film Quality: A fundamental component of all recommendation systems.
Genres & Movie Elements: How much users tend to like or dislike genres and detailed elements of films.
Anchoring: The idea behind anchoring is that the order a viewer watches movies in also matters. If a viewer watches several movies in a short period of time, the view will anchor his ratings around the first movie he watched.
Movie Fads Movies fluctuate widely in popularity, especially in response to news about the actors in the film or when sequels are released.
Rating If a viewer rates several movies at the same time; the ratings follow significantly different patterns than when movies are rated immediately after each movie is watched.
netflix-wrestlerBy explaining to the user how the system works, it encourages members to give feedback that will result in better recommendations. The system also explains to the user why a certain movie or TV show was recommended. It all works from the information the user gives out to the company, explicit taste preferences and ratings, viewing history or even friend's recommendations. This sense of transparency makes user feel somewhat safe and important, this is clearly a huge leap from asking the video clerk at the video rental store for recommendations.

NETFLIX CINEMATCH

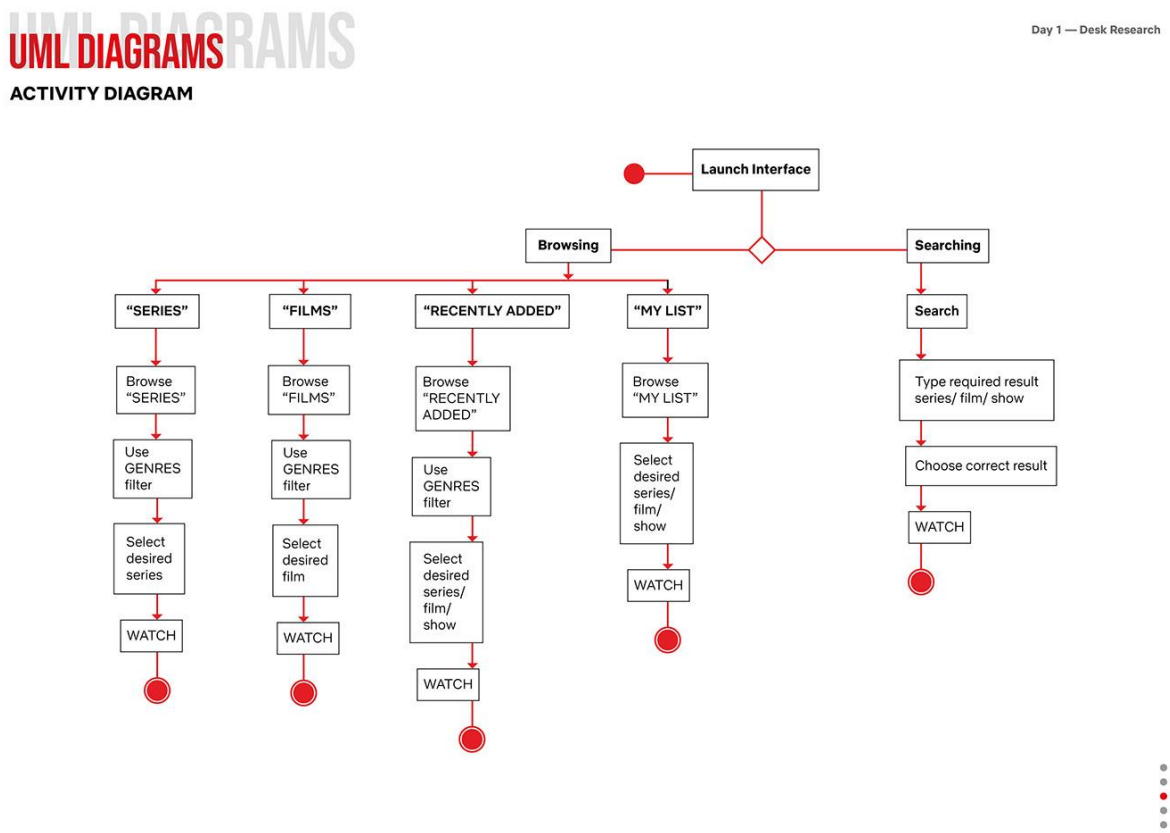




A use case diagram is a graphical depiction of a user's possible interactions with a system. A use case diagram shows various use cases and different types of users the system has and will often be accompanied by other types of diagrams as well. The use cases are represented by either circles or ellipses.

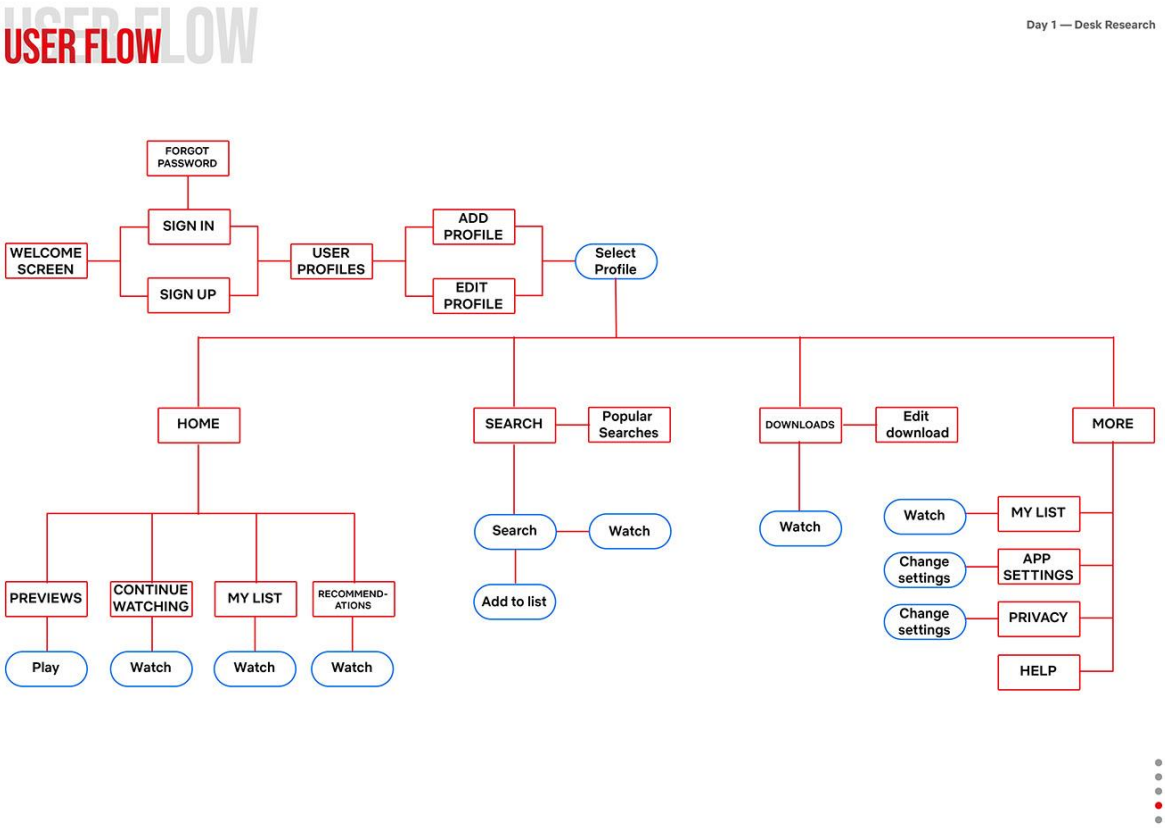
What is use case diagram used for?

Use-case diagrams describe the high-level functions and scope of a system. These diagrams also identify the interactions between the system and its actors. The use cases and actors in use-case diagrams describe what the system does and how the actors use it, but not how the system operates internally.



An activity diagram is a behavioral diagram i.e. it depicts the behavior of a system. An activity diagram portrays the control flow from a start point to a finish point showing the various decision paths that exist while the activity is being executed.

What is purpose of activity diagram?
An activity diagram shows business and software processes as a progression of actions. These actions can be carried out by people, software components or computers. Activity diagrams are used to describe business processes and use cases as well as to document the implementation of system processes.



User flow diagrams are used primarily by product and UX teams to figure out the flow of a website or application after you've thought about the customer experience and user needs. User flow diagrams will help you: More easily communicate what the user flow should be.
User flows are also very important in communicating design to product managers, stakeholders, and developers. User flows provide a bird's-eye view of the product. When working in teams, it's easy to get lost in features, technical jargon or personal opinions and leave the user out of the product.

By openly explaining to the user how the system works, it encourages members to give feedback and that will result in better recommendations. Recommendations are given out by the information Netflix has from the user: your explicit taste preferences and ratings, your viewing history, or even your friend’s recommendations. Users may watch more content or rate more movies and TV shows in order to get better recommendations and explore the whole catalog.

The goal of any ranking system is to find the best possible ordering of a set of items for a user, within a specific context, in real-time. The goal the system wants to accomplish is to find a personalized ranking function that is better than item popularity, so everyone in a subscribing household may feel satisfied.

The algorithm also uses Social Data for personalization features. You may have noticed your Facebook account linking to your Netflix account. This set of interactions and information from friends and family improves the recommendation system and takes the conversation into the digital world.

Cine-Match is an important part of the process. But this is only one of the elements that make this brand so appealing for consumers. We have to dig deeper in order to understand what drives people to this website and why many of them choose this as their preferred content platform.

6. – Opening the black box: How Netflix works.

mystery-box-jpegOn March 2007, during a TED talk event director JJ Abrams came up on stage with a small Mystery Box. He explained to the audience that the box: "Represents infinite potential. It represents hope. It represents possibility. And what I love about this box and what I realize I sort of do in whatever it is that I do, is I find myself drawn to infinite possibility and that sense of potential".

The same thing happens with technological advancements. Sometimes we open the box and learn from what others have built, however sometimes we keep the lid close; afraid of awakening the giant. In this research, we will open the Netflix's black box. We will look at how it works in hopes of better understanding video streaming technology and how Netflix has risen in popularity through out the years.

7 – Video Streaming: How it works.

To fully understand the Netflix phenomenon we first have to look at the video streaming technology and how it delivers content into the user's home. In a streaming session, video content is transferred in two phases: a buffering phase followed by a steady state phase.

a) Buffering Phase: the data transfer rate is limited by the end-to-end bandwidth. The video player begins playback when a sufficient amount of data is available in its buffer. Video playback does not wait for the buffering phase to end.

b) Steady State: The average download rate is slightly larger than video encoding rate. We call the ratio of the average download rate during the steady state phase and the video encoding rate the accumulation ratio. The average download rate in the steady phase is achieved by periodically transferring one block of video content.

Netflix These periodic transfers produce cycles on ON-OFF periods. During each ON period, a block of data is transferred at the end-to-end available bandwidth that can be used by TCP; the TCP connection is idle during the OFF periods. We call the amount of data transferred in one cycle the block size.

The reduced transfer rate in the steady state phase ensures that the amount of video content does not overwhelm the video player while keeping the amount of buffered data during the buffering phase constant or increasing. The reduced data transfer rate is important for mobile devices, which may not be able to store the entire video. We observe the following three streaming strategies for Netflix and YouTube videos.

1) No ON-OFF Cycles: For this streaming strategy, all data is transferred during the buffering phase. The video streaming session can be considered as a simple file transfer session. One disadvantage of this strategy is that it can overwhelm the player and cause a large amount of unused bytes if users interrupt the video playback.

2) Short ON-OFF cycles: We define this streaming strategy as the periodic transfer of blocks of size less than 2.5 MB (called an ON period) followed by an idle period (called the OFF period). The goal of this streaming strategy is to maintain an accumulation ratio, which is slightly larger than one. This is achieved by a periodic transfer of a block of data followed by an OFF period. This strategy ensures that the client is not overwhelmed by the amount of data sent by the server.

3) Long ON-OFF cycles: This streaming strategy produces a traffic pattern that resembles the periodic execution of buffering phases following long idle periods. The primary difference between this strategy and the strategy of short ON-OFF cycles is the amount of data transferred in a cycle. The amount of data transferred during the ON periods for this strategy is larger than 2.5 MB.

8.2. – Creating the online movie experience.

Most people don't know it, but Netflix only uses its own IP address and hostname Netflix.com for two key functions.

Registration of new user accounts and capture of payment information (credit card or PayPal Account
Redirection of users to movies.netflix.com or signupnetflix.com based on whether the user is logged in or not respectively.
Netflix_architectureAfter the user signs up or registers a new account Netflix's system will usually tell the user to start download depending where they are trying to watch movies from. If they are a desktop user, they will have to download Microsoft Silver light; if they are using a mobile device they will have to download an app in order to star streaming.

Netflix's servers are based of the Amazon Cloud technology, where the data encoding/decoding process will begin for those who are trying to watch a movie or a TV show. So this video streaming website has risen to fame despite working with outsourced resources because it sells the audience and comfort.

Netflix's content is not stored in one single server, but instead it's distributed between multiple CDN´s (Content Delivery Networks) or a collection of ¨servers in different points that transfer content to the computer that made that request.

The requested content is divided into small chunks by ¨The Dash¨ protocol. The user's computer will request one chunk at a time, with "The Dash" determining the quality and size of each chunk. Silver light, the software that Netflix uses for desktop computers will collaborate with the Dash protocol constantly. Silver light will send information about the user's bandwidth as well as the point of consumption; adapting the content's streaming.

This means that the data transfer process for a mobile phone is very different from the data transfer process for a desktop unit.

8. – Content Regulation and the Open Internet

There has been some controversy surrounding Netflix's success, after all the company uses the network provided by another company in order to provide content to its customers. This constant debate over web content has sparked

controversy over “network neutrality” or the “the open internet” a topic you may have heard previously on the news.

The “network neutrality” discourse began in the technologist community in the early 2000’s to describe efficient network design encouraging technological innovation. By the mid 2000’s “net neutrality” became and advocacy issue for public interest groups such as Free Press, and it began to take on more political meanings related to freedom of expression, civic argument, and democratic participation.

Much of the conflict in the net neutrality debates, then, has been a struggle between the largest content providers like Google and Amazon and the largest access providers such as Verizon and Comcast over the latter ability to assert more control over the profit extraction from the products of the former

Many years has the Internet operated as an UN regulated, competitive free market. That was until residential Internet service providers demanded payment to deliver Netflix traffic to their own customers. After many months of public debate, Netflix has agreed to the demand of the North Americas largest broadband provider Comcast.

Apparently, the deal will transform the debate over network neutrality regulation. Comcast’s deal with Netflix is about interconnection, not traffic discrimination. Companies’ claim that by making this kind of deals “Net Neutrality” will not be violated.

However, if Netflix gave in to the demands by this Internet service providers, one can only wonder if smaller companies, even independent bloggers or news channels may be forced into a variation of this agreement in the near future.

9. Netflix and content licensing.

One of the biggest investments Netflix does over every year is regarding content licensing. In audiences are to have the most successful movie releases on their home menu, Netflix has to enter into a number of strategic partnerships.

Most recently, Netflix committed to pay an estimated $300 million a year for exclusive rights to stream Walt Disney Co. films after 2016. This gives the company rights to become exclusive US subscription television service provider for first-run live-action and animated feature films from The Walt Disney Studios.

(Barmes, B. Netflix Reaches Deal) Beginning with its 2016 theatrically released feature films, new Disney, Walt Disney Animation Studios, Pixar Animation Studios, Marvel Studios and Disney Nature titles will be made available for Netflix members to watch instantly in the pay TV window on multiple platforms.

In February 2013, the company entered into an exclusive licensing agreement with Flavor Unit Entertainment, a production company owned by Queen Latifah and Shakim Compere, for the streaming of Flavor Unit Entertainment' s movies in the US. (Netflix Inc, Swot Analysis)

Further, in May 2013, Netflix and The Disney/ABC Television Group entered into a new multi-year licensing agreement, which makes the company an exclusive US subscription TV service for one of the popular shows on Disney Junior: Jake and the Never Land Pirates; and Tron: Uprising

Netflix will also be able to stream complete previous seasons of several Warner Bros.-produced shows, including several that debuted this season, starting a couple of months after each season ends. The deal is expected to be worth hundreds of millions of dollars, depending on how long each of the included shows stays on the air, a person familiar with the matter said. Netflix will pay more per episode for shows that stay on the air longer. It is the biggest deal struck by Time Warner with Netflix other than a 2011 agreement with the CW network, which is jointly owned by Time Warner and CBS Corp. (Jannarone, Netflix reaches deal with Time Warner)

Even before that deal was announced, Netflix had $5 billion in streaming content liabilities as of Sept. 30, up from $3.5 billion in 2012. Deals like these are what makes Netflix an exclusive and important company, the bring out entertainment so users can get most of their subscription service without ever wondering what is happening back-stage.

10. – **The Future of Video Streaming**

Video streaming doesn't stop with Netflix. There are other companies that are trying to get some of the business and subscribers Netflix has built over the years. Hopefully, this competitiveness will drive innovation and better services for users.

a) Aereo

aereo_antenna_array1Aereo is an $8-a-month service that lets you tune in to TV channels that are broadcast over the air, from the comfort of your own laptop or tablet. Anything that's being broadcast right now, you can watch live (actually, delayed about 6 seconds from real time). Aereo is basically capturing the networks' broadcasts for free and then collecting money from us to watch them. Aereo isn't paying licensing fees for those shows, the way a cable company must.

Aereo disagrees. Aereo says that it's simply an antenna-renting service. And indeed, it does maintain a separate tiny TV antenna for every single subscriber. The Supreme Court is set to hear the case. (Pogue, Aereo Delivers Great Local TV Service)

b) Amazon Fire TV

Amazon-Fire-TV-Homescreen-002Amazon unveiled new video-streaming hardware, a move that pits it against market leader Roku and Apple TV in a fight to be the entertainment engine in consumers' living rooms. The device costs $99 and features 2 gigabytes of RAM, Wi-Fi, a Bluetooth remote, and access to numerous content providers, including Hulu Plus, Watch ESPN, Showtime, MLB, Disney, YouTube, Netflix, and, of course, Amazon Instant Video. (Ytam)

c) XBOX Originals

1398700787000-xboxoriginalsMicrosoft announced that they are planning on releasing Xbox original programming beginning in June to current Xbox owners and Xbox Live subscribers. Lately streaming video services like Netflix, Hulu and Amazon have been increasingly able to dominate cable by creating original programming and offering a huge selection of movies, which is quickly becoming the cornerstone of how most households are receiving their entertainment. (Hillburn)

d) Netflix moves to cable

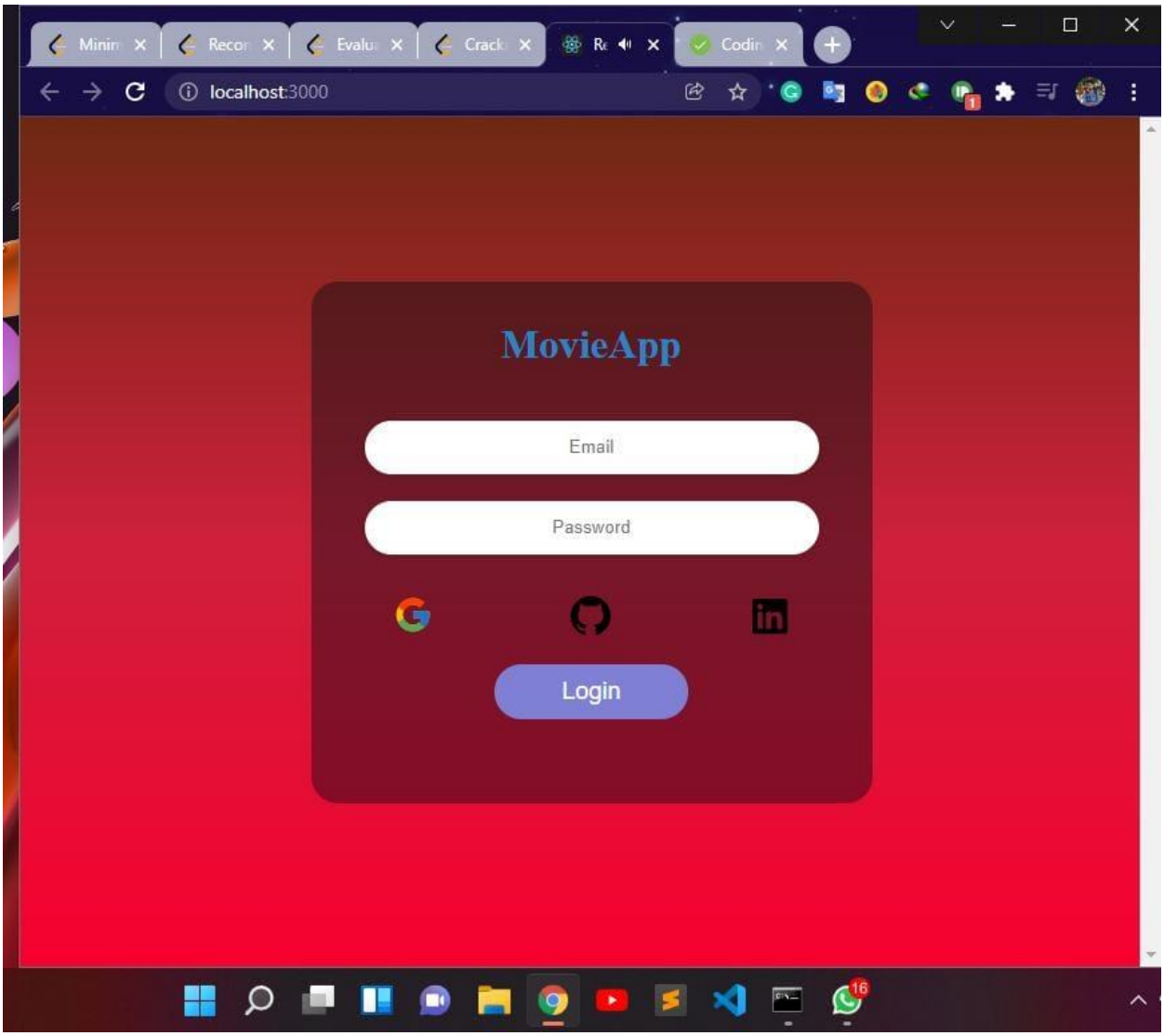
Netflix just announced it has inked a deal with three cable TV companies to make watching Netflix as easy changing the channel. Under the agreement, cable companies RCN, Grande Communications, and Atlantic Broadband will offer access to the Netflix service straight from their TV set-top boxes. Subscribers

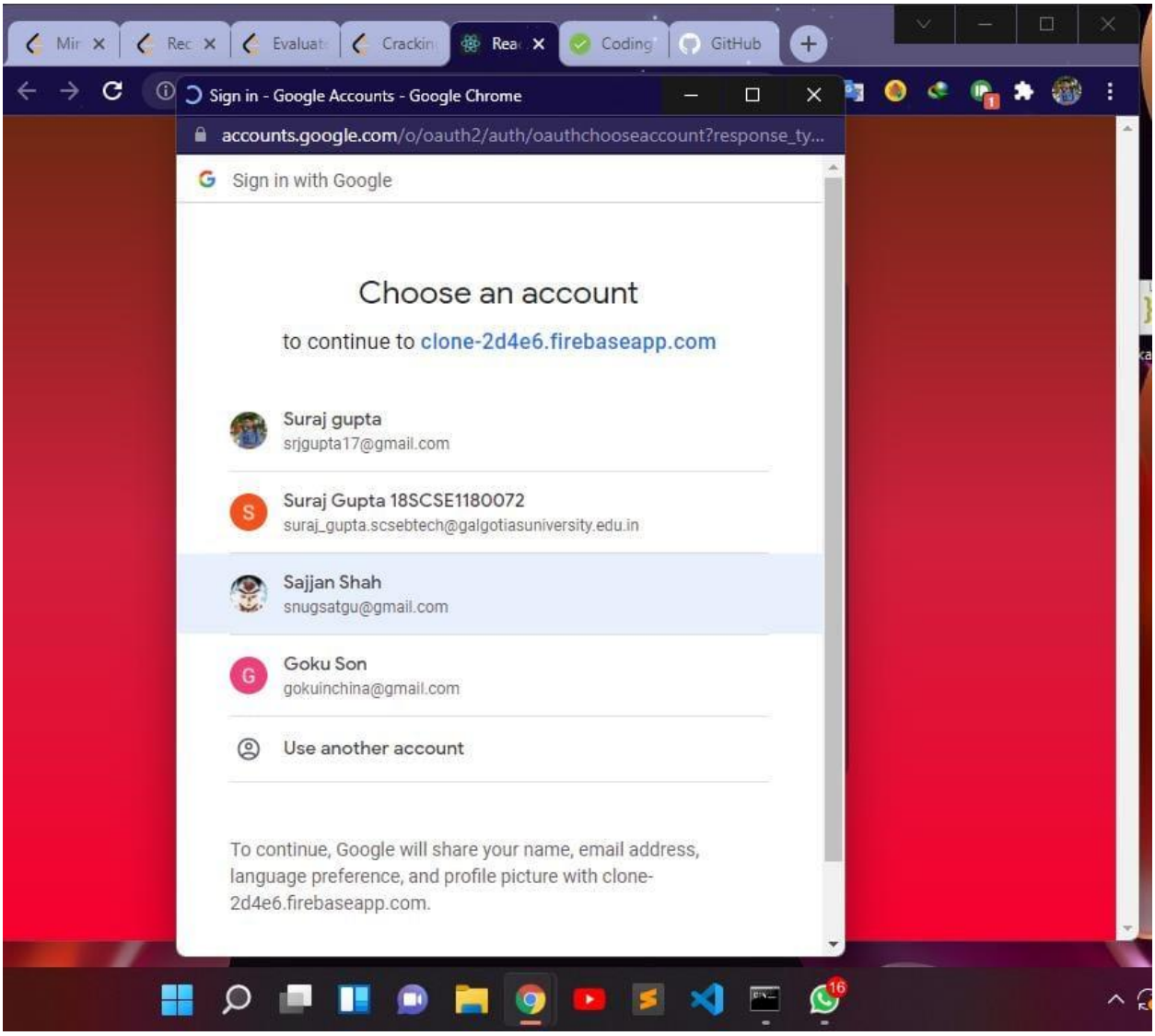
must have a specific TiVo box provided by the cable companies, and they must have a Netflix account, but once everything is up, the experience should be seamless. (Lapowsky, Netflix is getting its own cable channel)

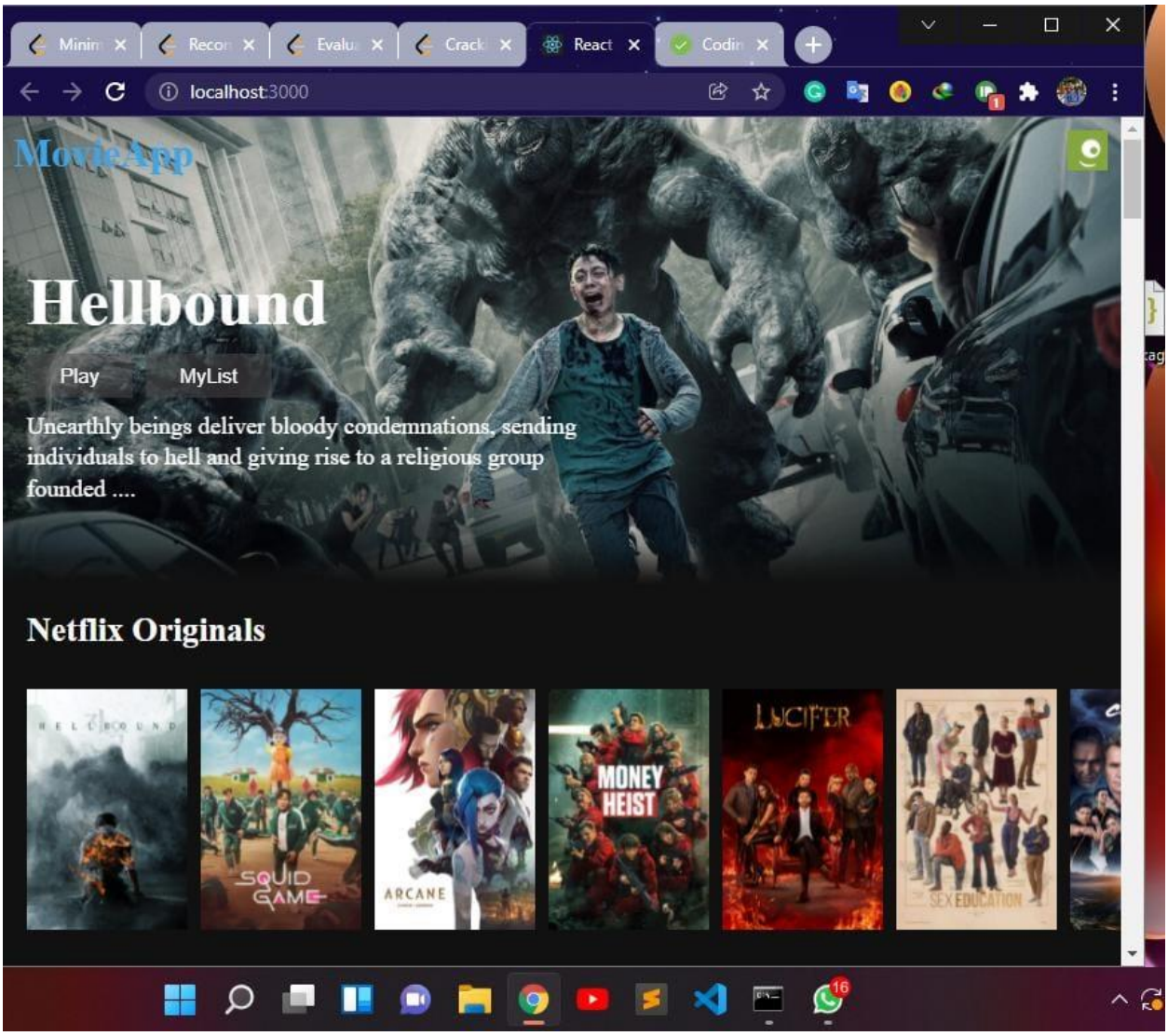
Video Streaming is here to stay. The Future of media entertainment is just beginning; more and more options will appear for users who want to enjoy a movie from their own living room. There is no way to guess how far video streaming technology will go.

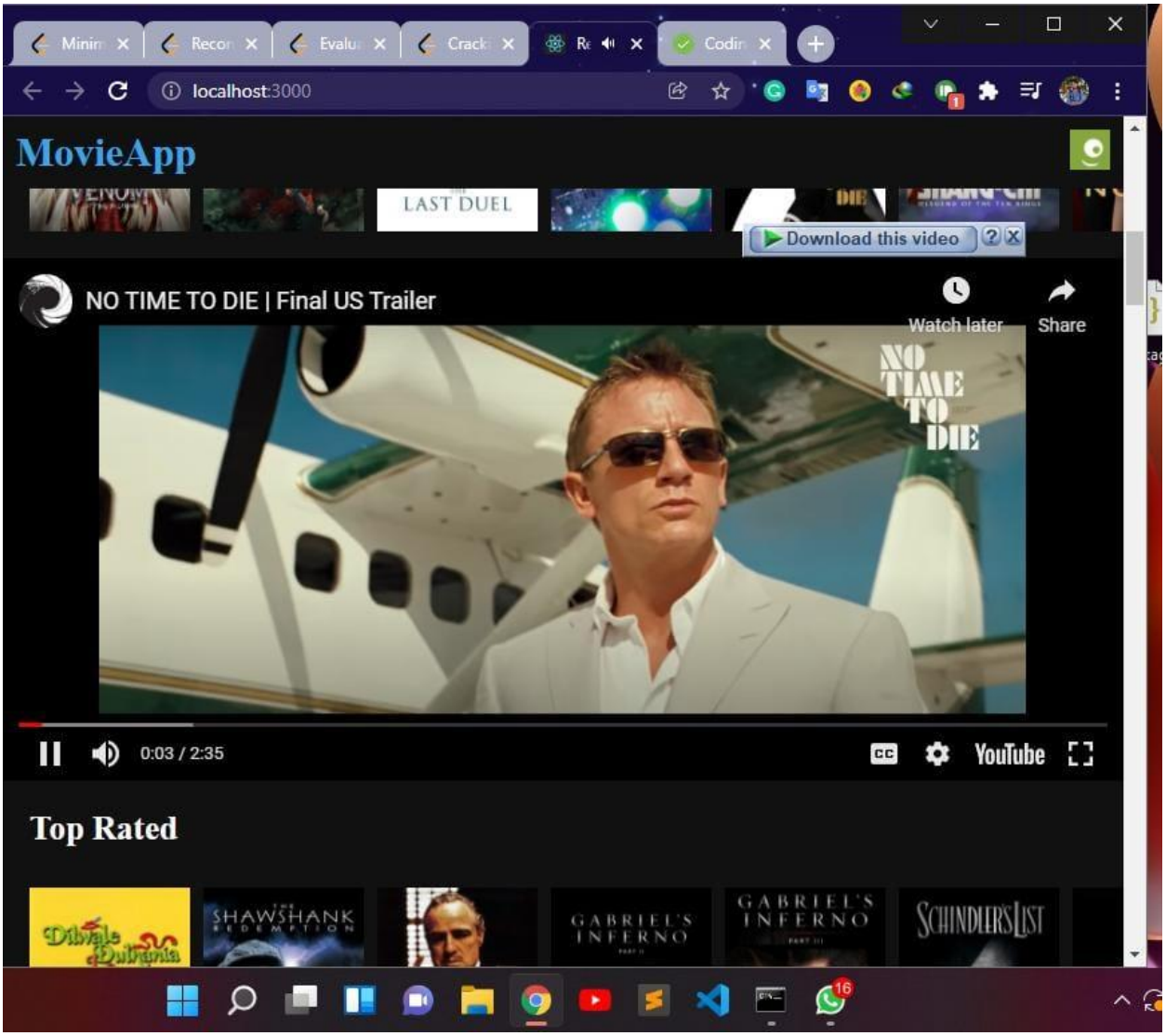
Chapter: 4

Results and Discussion




Sign in - Google Accounts - Google Chrome
accounts.google.com/o/oauth2/auth/oauthchooseaccount?response_ty...
Sign in with Google
Choose an account
to continue to clone-2d4e6.firebaseapp.com
Suraj gupta
srjgupta17@gmail.com
Suraj Gupta 18SCSE1180072
suraj_gupta.scsebtech@galgotiasuniversity.edu.in
Sajjan Shah
snugsatgu@gmail.com
Goku Son
gokuinchina@gmail.com
Use another account
To continue, Google will share your name, email address, language preference, and profile picture with clone-2d4e6.firebaseapp.com.


localhost:3000
MovieApp
Hellbound
Play
MyList
Unearthly beings deliver bloody condemnations, sending individuals to hell and giving rise to a religious group founded ....
Netflix Originals
SQUID GAME
ARCANE
MONEY HEIST
LUCIFER
SEX EDUCATION


localhost:3000
MovieApp
LAST DUEL
Download this video
NO TIME TO DIE | Final US Trailer
Watch later
Share
NO TIME TO DIE
0:03 / 2:35
YouTube
Top Rated
SHAWSHANK REDEMPTION
GABRIEL'S INFERNO
GABRIEL'S INFERNO
SCHINDLER'S LIST

Chapter : 5
Conclusion and Future Scope

Conclusion:

Video streaming is a technology that has completely transformed the entertainment industry and models used among audience members. Much has changed since the first transfer of Real Player in 1995. Since then, technology has been constantly evolving, making content delivery and access easier even if the platform is trying to access it. Netflix, Inc. is one of the best examples of video streaming commercial applications. With millions subscribing to this service worldwide, the company has found a way to use it with services using title stock and outsourced infrastructure. Recently, Netflix sparked controversy over the topic of "open internet". Some companies complain that Netflix earns money through third-party Internet services. And while the conversation seems to have been resolved, Net Neutrality and Open Internet are now on everyone's mind. We've seen some results appear in connection with video streaming. Filmmakers fear that the audience may use content that eats "platform agnostic" regardless of screen size or image quality. However, audiences have indicated that they are willing to return to the movies if the movie is worth the price. However, the abundance of content has made the audience "social autistic". It is always connected to the device and somehow stays isolated from others. Obviously the audience is willing to sacrifice the "offline" public experience for personalized content.

Refrences:

1. Jeong WH, Kim SJ, Park DS, Kwak J (2013) Performance improvement of a movie recommendation system based on personal propensity and secure collaborative filtering. J Inf Process Syst 9:157–172
2. Viana P, Pinto JP (2017) A collaborative approach for semantic time-based video annotation using gamification. Hum Cent Comput Inf Sci 7:13
3. Desrosiers C, Karypis G (2011) A comprehensive survey of neighborhood based recommendation methods. In: Ricci F, Rokach L, Shapira B, Kantor P (eds) Recommender systems handbook. Springer, Boston, pp 107–144
4. Bagci H, Karagoz P (2016) Context aware location recommendation by using a random walk-based approach. Knowl Inf Syst 47:241–260
5. Wong F, Lee S, Wong Q, Lee S (2015) Points of interest recommendation based on context-aware. Int J Hybrid Inf Technol 8:55–62
6. Lee D (2015) Personalizing information using users' online social networks: a case study of CiteULike. J Inf Process Syst 11:1–21
7. Zou HT, He Y, Zheng S, Yu HL, Hu C (2018) Online group recommendation with local optimization. CMES: 217–231
8. Hui P, Crowcroft J (2008) Human mobility models and opportunistic communications system design. Phil Trans R Soc A. https://doi.org/10.1098/rsta.2008.0010:20 05-2016
9. Hao F, Park DS, Pei Z (2018) When social computing meets soft computing: opportunities and insights. Hum Cent Comput Inf Sci 1:8
10. Hao F, Park DS, Min G, Jeong YS, Park JH (2016) k-cliques mining in dynamic social networks based on triadic formal concept analysis. Neurocomputing 209:57–66 11. Ryu PM

(2018) Predicting the unemployment rate using social media analysis. J Inf Process Syst 14:904–915
12. Hao F, Sim DS, Park DS, Seo HS (2017) Similarity evolution between graphs: a formal concept analysis approach. J Inf Process Syst 13:1158– 1167
13. Carlos P, Alberto CL, Juan BM, Alvaro TL, Enrique HV (2017) Fuzzy linguistic recommender systems for the selective diffusion of information in digital libraries. J Inf Process Syst 13:653–667
14. Hao F, Park DS, Pei Z (2017) Detecting bases of maximal cliques in social networks. MUE2017 1–1
15. Ricci F, Rokach L, Shapira B (2011) Introduction to recommender systems handbook, recommender systems handbook. Springer, Berlin, pp 1–35
16. Jafarkarimi H, Sim ATH, Saadatdoost R (2012) A naïve recommendation model for large databases. Int J Inf Educ Technol 2:216– 219
17. Linden, Gregory D, Smith BR, Zada KN (2015) Automated detection and exposure of behavior-based relationships between browsable items U.S. Patent 9,070,156
18. Neil R, Mehdi E, Masashi S, Dain K (2016) Active learning in recommender systems handbook, 2nd edn. Springer, US. ISBN 978-1-4899-7637-6
19. Hao F, Min G, Pei Z, Park DS, Yang LT (2015) K-clique communities detection in social networks based on formal concept analysis. IEEE Syst J. https://doi.org/10.1109/jsyst.2433294
20. Gregori E, Lenzini L, Mainardi S (2013) Parallel (k)-clique community detection on large-scale networks. IEEE Trans Parallel Distrib Syst 24:1651–1660
21. Palla G, Derenyi I, Farksa I, Vicsek T (2005) Uncovering the overlapping community structure of complex networks in nature and society. Nature 435:814–818
22. Kumpula J, Kivela M, Kaski K, Saramaki J (2008) Sequential algorithm for fast clique percolation. Phys Rev E 78:026109
23. Adamcsek B, Palla G, Farkas I, Derenyi I, Vicsek T (2006) CFinder: locating cliques and overlapping modules in biological networks. Bioinformatics 22:1021–1023
24. Saito K, Yamada T, Kazama K (2009) The k-dense method to extract communities from complex networks. In: Zighed DA, Tsumoto S, Ras ZW, Hacid H (eds) Mining complex data Studies in computational intelligence, vol 165. Springer, Berlin, Heidelberg, pp 243–257 25. Farkas I, Abel D, Palla G, Vicsek T (2007) Weighted network modules. New J Phys 9:180 26. Duan D, Li Y, Li R, Lu Z (2011) Incremental k-clique clustering in dynamic social networks. Artif Intell Rev 38:129–14