# ABSTRACT

Many students face problems in finding suitable accommodation after getting admission in university. A Hostel Recommender system that allows users to find hostels as per their requirements. It contains lists of hostels which are added by admins. This application will be collecting feedback by students who has already resided or currently residing there. It will calculate that how many students will like their hostels or how many students dislike and show in rating. Our system is recommending hostel to new students and show that this hostel is suitable for you. It helps users to find appropriate hostel rooms at distant places even before visiting. This kind of system reduces student's problem of accommodation. The best thing about this system is that, it allows users to provide a feedback, rating to hostel about their experience which helps other students. This system is beneficial to students and hostel owners. Hostel owners can also benefit from this system as their reach increases in city. In this system we used collaborative filtering algorithm which are make automatic predictions about a user's interests by compiling preferences from several users.

# CHAPTER 1: INTRODUCTION

## 1.1 Overview

The development and implementation of a recommendation system for benchmark student pad. This comprehensive system aims to streamline the accommodation process, enhance the student living experience, and provide efficient management solutions for the client. Finding suitable accommodation is a major change for many students, especially when moving to a new city or starting university. This project aims to develop a user-friendly recommendation system that simplifies the student accommodation search process.

Migration is the process of moving from one destination to another. People migrate for a number of reasons, such as the search for work, economic opportunities, or higher learning. There has been a large amount of migration throughout the nation, which is primarily being done by students/Employees in order to receive a better education/Job in another state. This is one of the oldest activities, wherein students travel a great distance to enable professional study or even to enjoy the benefits of the university's increased opportunities (Zain Jahan and Tariq Khurshed).

This duty is becoming increasingly tough since the majority of students go alone to entirely new places they have never been before. These students typically don't speak the regional language well and don't have any friends or acquaintances to help them with any tasks or issues they might encounter in that state.

The absence of support makes it difficult to carry out routine daily tasks, some of which may be relatively basic. Finding a suitable place to stay is one the difficult tasks as it requires understanding of the local language and their culture. It is hard to gain such information without being native or staying in the locality for few days. This creates a challenge for international students to seek subsidized housing that fulfils their requirements.

This creates a number of obstacles for people who need to stay anywhere for a long period of time, failing which they may be forced to return to the outside. The creation of an accommodation is required, which leads to the creation of a recommendation system that can assist these persons in finding an accommodation.

As a result, an effective strategy is necessary to propose a proper alternative for either a hospitality option based on the student's preferences. This sort of recommender system is uncommon and has been demonstrated to achieve extremely low accuracies.

This research article defines an appropriate approach to obtaining residence recommendation with the help of machine learning methodologies. As a result, an effective method is necessary for providing a reasonable solution for something like a hospitality option based on the student's preferences.

## 1.2 Background and Motivation

The development and implementation of a Student Accommodation System (using recommendation system). This comprehensive system aims to streamline the accommodation process, enhance the student living experience, and provide efficient management solutions for the client (Basayesh, etal 2023).

Furthermore, the main goal of this project is to effectively match preferred room and roommate using a recommendation system without making any hasty decisions. The user preferences are collected in the means of questions, importance of questions, tags, and location, based on which the suggestions are generated. By using nearest neighbors’ algorithm, it generates a best suitable matching for each data point. Then by using cosine similarity matrix i can able to determine list of suggestions for that particular data point. Whenever a new data point arrives it gets a suggestion by using the trained data. Then again for some strong learning i can fit new data points and store it in a pickle dump so that i don’t want to train again and again for each run with same data. The list of suggestions is sorted against probability scores of each datapoint and there will be a match percent is present in it. The strong 10 data points are given for suggestions for now, for getting strong recommendation.

## 1.3 Statement of the Problem

Student struggles to find suitable accommodation due to limited knowledge of options, information overload from various listings and difficulty matching their needs (budget, location, amenities) with available housing. This project proposes a recommendation system specifically designed for students, utilizing user profiles and data analysis to suggest the best fitting options, simplifying the student accommodation

## 1.4 Aim and Objectives

1. To develop a comprehensive and user-friendly software that assists student in finding suitable Accommodation
2. To create a booking and reservation system that allows users to secure their chosen Accommodation, manage bookings, and handle payment transactions securely.

3. To develop a user-friendly platform where students can create profiles specifying their accommodation requirements (location, amenities, lifestyle preferences).

## 1.5 Significance of the Project

The purpose of this project is to provide users a recommendation system which allows them to choose an accommodation based on their budget, amenities and proximity of location.

## 1.6 Project Risks Assessment

**RISKS**

|  |  |
| --- | --- |
| Inability to carry out research due to loss of hardware/software resources | Be aware of and observe school IT security procedures  Secure Android mobile phone when not in use |
| Loss of work due to equipment failure /loss | Daily Backup of data to multiple sources of storage such as flash drives, hard drives, google drive, etc. for multiplicity |
| Software availability (Unavailability of API’s) | Alternative API’s will be checked for. Software requirements will be identified in good time for possible contentious software. |

Add definition of terms section

## 1.7 Scope/Project Organization

This project was arranged into five chapters: Chapter one as an introduction to the general aim and objective of the project, and the ideas at focus presented. Chapter two deals with relevant literatures of components used in realizing this project while Chapter 3, is design methodology, Chapter 4, is implementation of the methodology and testing. Chapter 5 covered conclusions, limitations, and suggested improvements for the system.

**1,9 Summary**

In the recent years, there has been a rise in immigration. Most of these immigrants are students and employees. Most of these individuals require long-term, affordable accommodation based on their preference. When these individuals arrive at their destination, one of the major problems faced by them is accommodation. Due the language and cultural barrier they find it difficult to search a suitable Hostel. This project involves identifying accommodation for these students/Employees according to their choices for amenities, affordability and proximity using recommendation system.

**References**

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Zain Jahan, Tariq Khurshed Hostel Recommender System unpublished work final year project Department of Computer Science and IT Bahria University Lahore Campus, 2020.

# CHAPTER 2: LITERATURE REVIEW

## **Introduction**

This chapter is based on the literature review of the various techniques and technologies used in this project. Thereafter, section 2.2. is based on the Historical Overview of the student accommodation system (using recommendation system). Section 2.3 gives descriptions of some of the respective literature and nomenclature available with regards to the application in solving the student accommodation system. Finally, section 2.4 provides a comprehensive summary of the entire chapter.

## **Historical Overview**

According to the results of a examine of a large range of student accommodations, the complete complex and long development route of such buildings is conditionally dependent by means of the writer into five most important typological group (Popov, 2014). Regardless a few peculiarities, it's far possible to talk about a number of commonplace indicative architectural parameters within each selected organization. Student accommodation related to numerous typological agencies arose nonconsequential in various social formations and civilizations, relying on the nature of their improvement. The author proposes the following type: at historic (antique) secular high school:

• Student accommodation in a university which arose at religious establishment,

• Student accommodation at a medieval secular high school,

• Student accommodation in modern times - in the era of industrial revolution and industrialization,

• Student accommodation in the post-industrial era.

The above-mentioned types of the student accommodation are considered for various civilization development stages.

**2.2.1 Prerequisites of a student accommodation emergence was temporary accommodations for high schools in the ancient world**

The earliest social establishments beneath have a look at that may be considered as higher training institutions arose inside the polis of Ancient Greece in XII century B.C. - IV century B.C. (Academies of Plato, Mouseion of Pythagoras, Lyceum of Aristotle, colleges of: Hippocrates, Democritus, Zeno of Citium, Epicurus, etc.) and a touch later, in Alexandria in III century B.C. Historical Development Stages of the Student Youth Accommodation Architecture from Dormitories Prototypes to Post-Industrial University Campuses http://iaeme.Com/Home/journal/IJCIET 2528 editor@iaeme.Com - I century A.D. (Mouseion of Alexandria) (Bondarenko, 2012), (Karavaev, 2007), (Kireeva, 2012). However, up to the first century A.D., the level of clinical and technological progress development, monetary and social structure of society did no longer require a huge quantity of professionals with higher education, and the latter remained being a privilege of elites in the societies of sure international locations. Public establishments of such training had been no longer solid; they regarded and disappeared at the will of individual ancient personalities or situations. The lodging for college students and teachers during this period become shaped by way of homes that have been regular for that point and were located within the corresponding agreement. Sometimes they have been united in special quarters, e.g., at Mouseion of Alexandria. For the first time the need for a device training of employees with higher schooling arose on the quit of the I century A.D. Inside the ancient Rome social, monetary and cultural improvement of which led to formation of a system of better schooling institutions - Atheneum. Such better schools - grammatical, rhetorical, philosophical, medical, jurisprudence, architectural - had been similar to fashionable universities - they had authorized curricula and issued diplomas on education of the degree (Perfilova, 2004). The machine of higher training and, therefore, scholar accommodation had comparable organization within the heiress of the Roman Empire - Byzantine Empire, wherein Atheneum gadget changed into headed by way of the main college in Constantinople - Magnaura. Although the author did no longer locate any studies focused without delay at the regular life and accommodation of the ancient Roman and Byzantine pupil, circuitously they are cited inside the works of the current historians studying the ancient Roman and Byzantine higher pedagogy and association of the country institutions (Perfilova, 2004), (Valyanskij and Kalyuzhy, 2006). Based on those works, we will anticipate that pupil accommodation of the Ancient Rome become arranged as separate rooms inside the college complicated. As a rule, they were placed in a separate wing of the gallery space-making plans shape and designed for living, getting ready the homework, storing non-public belongings, and literature. Many students could afford provider workforce - the slaves. Higher schooling device of the Ancient Rome and Byzantium was destroyed with their fall and there have been no massive higher schooling institutions in Europe up to X century A.D. However, it may be anticipated as advanced one for that time, because it had a tremendous impact at the structure of the higher faculty buildings of subsequent historical periods.

**2.2.2 Features of student accommodation in the universities at religious buildings of the medieval Arab and Asian universities**

With the fall of the ancient civilization, the center of advanced science and education moved to Arabic East. University of Al Quaraouiyine in Fez, Morocco, founded in 859 A.D. Is the oldest university within the Arab global this is nevertheless operating. Initially, this university emerged as theological and turned into later extended with secular Departments, that is typical for plenty Arabic universities (Abazov and Abazova, 1996), (Popov, 2011), (Valyanskij and Kalyuzhny, 2006). Accordingly, the accommodation facilities for college kids were cells with allocated location for snoozing, reading, and storing few personal things. This became the manner the student accommodation changed into organized in Al Quaraouiyine, a well-known Arabic Al-Azhar college in Cairo, based in 988 A.D. And in lots of different Arabic universities. The above-referred to premises had been typically united via foot-stroll gallery and appeared out at the mosque courtyard which area turned into optimally arranged for instructions and talks, forming a ancient prototype of the recreational and conversation area of the modern campus.

**2.2.3 Peculiarity of accommodation at higher educational institutions in modern times - the era of industrial revolution and industrialization**

University of Al Quaraouiyine in Fez, Morocco, founded in 859 A.D. Is the oldest university inside the Arab world that is nevertheless working. Initially, this college emerged as theological and become later expanded with secular departments, which is regular for many Arabic universities (Abazov and Abazova, 1996), (Popov, 2011), (Valyanskij and Kalyuzhny, 2006). Accordingly, the accommodation centers for college kids had been cells with allocated location for sleeping, analyzing, and storing few private things. This changed into the manner the scholar accommodation was arranged in Al Quaraouiyine, a well-known Arabic Al-Azhar university in Cairo, based in 988 A.D. And in many different Arabic universities. The above-referred to premises were normally united via foot-walk gallery and looked out at the mosque courtyard which area became optimally organized for lessons and talks, forming a historic prototype of the leisure and verbal exchange area of the current campus.

Appearance of the student accommodation radically changes in modern times, in the epoch of industrial revolution and industrialization (end of XVI - beginning of XX century) (Valyanskij and Kalyuzhny, 2006); these changes are caused by abrupt change in society structure, production principles, and growing need for highly educated personnel. In that period, many new universities, institutes, academies were built, and the old high schools were expanded. The number of students increases significantly. The number of residents both in the building and in the room grows. The students settle in special halls of "barracks" kinds - dormitories, or in the rooms designed for 3-6 people. Such accommodation premises have almost no conveniences and are designed for large number of students.

**2.2.4 Features of accommodation at universities in the post-industrial epoch**

In the postindustrial epoch, the quality of individual training of experts starts prevailing over the mass nature of the personnel graduation. This is reflected in the student accommodation architecture. Living rooms are saturated with functionally essential appliances; there is a transition to a higher individualization of the student accommodation. The rooms are designed for one, less often - for two persons. The room living area increases to 10-16M2 - in single rooms, and 14-20 M2 - in double rooms. Most projects include a toilet, a shower, a wash basin, and often a built-in kitchen in a room. Student accommodation buildings are built according to individual projects and often feature a unique architectural and artistic value. Post-industrial period is generally marked by comprehensive enhancement of the comfort level of accommodation at the high school. In this period, buildings and accommodation complexes feature formation of special internal and external public spaces which architecture and facilities ensure comfortable accommodation of groups and individual students of various number and purposes, as well as efficient and comfortable arrangement of study, discussions, joint leisure, work of various kinds and nature, contacts.

## **2.3 Related Work**

There have been many works that are similar to mine and are used in some institutions, but I will add personal touches to make mine unique and stand out although the concept of providing questions and showing steps may be similar, I tend to add a more dynamic user interface acquiring ideas from other inspirations and modifying my own.

Recommend**ation** systems have intuitively come into play to help present the user with exactly what he had in mind to find by taking input parameters from the user that is used in some way to determine what he needs. Recommender systems have been studied and used to suggest items such as books, music, movies, news, and partner matching in dating sites, among others that are of matched interest to a particular user (Schafer et al, 1999, Pizzato et al 2010; Burke,2002).

Recommend**ation** systems give suggestions and recommendations when users need to make decisions while faced with different choices (Ojokoh et al, 2012). Access to information is readily increasing and likewise the information available, so typically on the hunt for information on a particular item, a bulk of information has to be perused to get to that item which the user particularly needs, and in scenarios where the users don’t know exactly what they are looking for, this scenario is now even more complicated and most of the time the user only usually finds that particular item by mistake. In order to find associations among items and users, a Recommender System (RS) analyzes data about items or about interactions between users and items (Omisore et al, 2013).

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Identified User-based CF which could be memory or model-based (Isinkaye et al, 2015) and Item-based collaborative filtering algorithms. One important step in the item-based collaborative filtering algorithm is the computation of the similarity between items and the selection of the most similar items. The basic idea in similarity computation between two items i and j is the isolation of the users who have rated both of the items and then the application of a similarity computation technique to determine the similarity si, j. Such similarity between items could be computed using cosine-based similarity, correlation-based similarity or adjusted-cosine similarity (Sarwar, 2001). Content-based recommendation does not use other people’s opinion to recommend but rather recommend items based on a description of an item and the profile of the user.

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In general, various candidate items are compared with items rated by the user and the best matching items are recommended. Event though, a content-based recommender makes its comparison with items the users have viewed previously, it solely remains with that particular user. The third type of recommender system is one that uses knowledge about users and products to pursue a knowledge-based approach to generating a recommendation, reasoning about what products meet the user’s requirements. Knowledge-based recommender systems are particularly useful in the context of items that are not purchased very often. Such cases include the recommendation of items such as real estate, automobiles, tourism requests, financial services, or expensive luxury goods. Usually, sufficient ratings may not be available for the recommendation process because of the fact that these items are not commonly purchased. In addition, they require different types of detailed options. For items in a knowledge-based recommender, the nature of consumer preferences may evolve over time as can be found in the example of a car model that may evolve significantly over a few years as a result the preferences may show a corresponding evolution. In other situations, to fully capture user interest with historical data such as ratings might be somewhat difficult. Essentially, in the Find Me system the collaborative filter is only used after the knowledge-based system has done its work (Lops et al, 2011). (Yuan et al., 2013).

Moreover, it may be that a particular item has some attributes associated with it that correspond to its various properties, and a user may be interested only in some items with specific properties. An instance is in cars that may have several models, color engine and interior options, and user interests that may be regulated by a very specific combination of these options. Thus, in these cases, the item domain tends to be complex in terms of its varied properties, and it is difficult to associate sufficient ratings with the existing large number of combinations (Lops et al, 2011). (Aggarwal, 2016). Knowledge-based recommender systems could be: Constraint-based recommender systems, where users typically specify requirements or constraints (for example, lower or upper limits) on the item attributes or Case-based recommender systems, where specific cases are specified by the user as targets or anchor points (Lorenzi et al, 2014). A number of works exist in any of the above- outlined approaches or a combination of one with another. For instance, (Shanmuganathan and Karthikeyan 2016), proposed a recommendation system for flats availability within Chennai city limits and its surroundings. The system employed the Analytical Hierarchy Process (AHP) for supporting product comparisons and evaluation of consumers. (Burke 2002), particularly tries to propose a system that excels above the drawbacks of both the knowledge-based and collaborative recommender system. He proposed a hybrid recommender system (Find Me) for choosing restaurants based on various parameters. The system particularly collects information from its users. It also develops a platform whereby similar ratings are derived from other users' actions in the system, then similarities are looked for from across other users, then these similarities are used to modify the options made available to the user during the tweaking process from the browsing behavior of other users. In (Daly et al, 2014), a multi-criteria system for recommending available houses for purchase or rent based on the location of the house, and other locations the user journeys to frequently while factoring the price the house goes for. The system computes travel time between the choice area and the frequently commuted locations, traffic congestions along the routes and recommends a house that gives the minimum travel time at best to locations that are important to the user and suits the user’s price range.

**2.4 Recommendation System**

A recommendation system is a type of system learning machine that provides personalized recommendations to users based on their past behaviors, options, and styles. It is a subclass of information filtering systems that use algorithms to advise gadgets to users primarily based on their pastimes or behaviors.

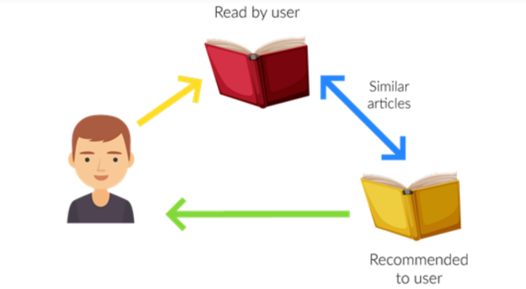


Fig.2.1 Recommendation system

Recommendation systems are widely used in e-commerce, social media, entertainment, and other online platforms to increase user engagement and retention, improve customer satisfaction, and drive sales and revenue.

**2.4.1 How Recommendation System Work**

There are four steps of ow recommendation system work:

**1. Collecting user data:**

The first step in building a recommendation system is to collect user data. This can include user ratings, reviews, clickstream data, purchase history, and other behavioral data. The data can be collected either explicitly, through user surveys or feedback forms, or implicitly, through user interactions with the platform (Utsav Desai 2023).

**2. Storing the data:**

Once the user data is collected, it needs to be stored in a database or data warehouse for analysis. The data can be stored in a structured or unstructured format, depending on the type and volume of the data.

**3. Analyzing the data:**

The next step is to analyze the user data to identify patterns and trends. This can be done using various data analysis techniques like clustering, classification, and regression. The goal is to understand the user’s preferences, behaviors, and interests, and to use this information to make personalized recommendations (Utsav Desai 2023).

**4. Filtering and Recommending:**

The final step is to filter the data and make recommendations to the user. This can be done using various recommendation algorithms, such as collaborative, content-based, and hybrid filtering. The algorithm uses the user data and the analysis results to generate a list of recommended items the user will likely be interested in. The recommendations are then presented to the user in a personalized way, such as through a recommendation widget, email, or push notification.

These four steps are the basic components of most recommendation systems, and the specific implementation details may vary depending on the type of system and the application domain.

**2.4.2 Types of Recommendation Systems**

There are three main types of recommendation systems

**2.4.2.1 Content-Based Filtering**

Content-based recommendation systems recommend items to users based on their past preferences and behaviors. This type of system analyzes the user’s historical data, such as their search history, browsing history, or purchase history, and recommends items that are similar to the ones the user has interacted with before.

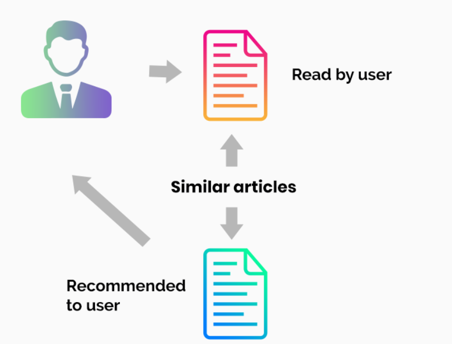


Fig.2.2Content-based filtering

For example, if a user has watched several action movies in the past, a content-based recommendation system might recommend similar action movies to the user. if a user likes to watch movies such as Iron Man, the recommender system recommends movies of the superhero genre or films describing Tony Stark.

**2.4.2.2 Collaborative Filtering**

Collaborative filtering recommendation systems recommend items to users based on the preferences and behaviors of other similar users. This type of system analyzes the user’s historical data, as well as the data of other users with similar preferences, and recommends items that similar users have liked or interacted with before. For example, if two users have similar purchase histories, a collaborative filtering recommendation system might recommend items that one user has purchased to the other user.

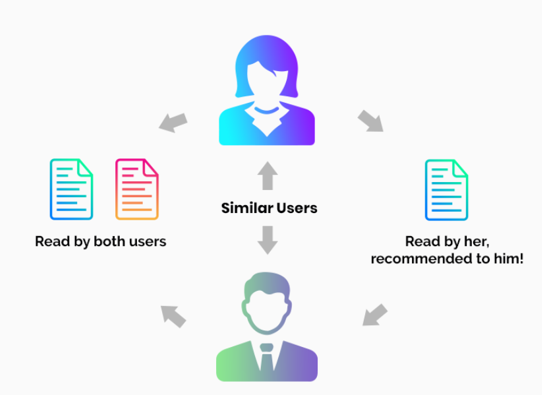


Fig.2.3 Collaborative filtering

For example, if user A likes Apples, Bananas, and Mango while user B likes Apples, Bananas, and Jackfruit, they have similar interests. So, it is highly likely that A would like Jackfruit and B would enjoy Mango. This is how collaborative filtering takes place.

Two kinds of collaborative filtering techniques used are:

User-User collaborative filtering

Item-Item collaborative filtering

**User-User collaborative filtering** is a type of recommendation system that makes predictions for a user based on the preferences of similar users. It works by finding users with similar tastes and recommending items they liked to the target user. **Item-Item collaborative filtering,**on the other hand, recommends items to a user based on the preferences for similar items. It works by identifying items that are similar to the ones a user has liked in the past and recommending them to the user (Utsav Desai 2023).

**2.4.2.3 Hybrid Recommendation Systems**

Hybrid recommendation systems combine both content-based and collaborative filtering techniques to provide more accurate and diverse recommendations. This type of system uses a combination of user data, item data, and other contextual information to generate recommendations. Hybrid recommendation system might use content-based filtering to recommend items that are similar to the ones the user has interacted with before, and collaborative filtering to recommend items that other similar users have liked or interacted with. By combining the strengths of both approaches, hybrid recommendation systems can provide more accurate and diverse recommendations than either content-based or collaborative filtering alone.

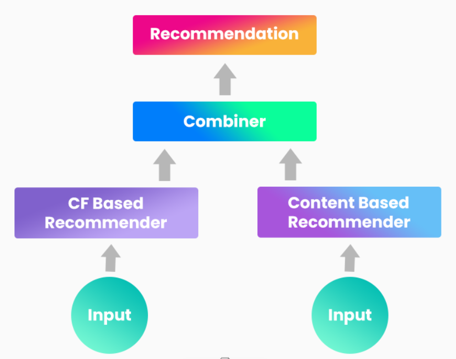


Fig.2.4 hybrid recommendation system

Netflix is an excellent case in point for a hybrid recommendation system. It makes recommendations by juxtaposing users’ watching and searching habits and finding similar users on that platform. This way, Netflix uses collaborative filtering.

By recommending such shows/movies that share similar traits with those rated highly by the user, Netflix uses content-based filtering. They can also veto the common issues in recommendation systems, such as cold start and data insufficiency issues.

**2.4.2.4 How YouTube algorithm work**

The YouTube recommendation algorithm is a complex system that uses a combination of collaborative filtering, deep learning, and other techniques to personalize video recommendations for each user (Utsav Desai 2023).

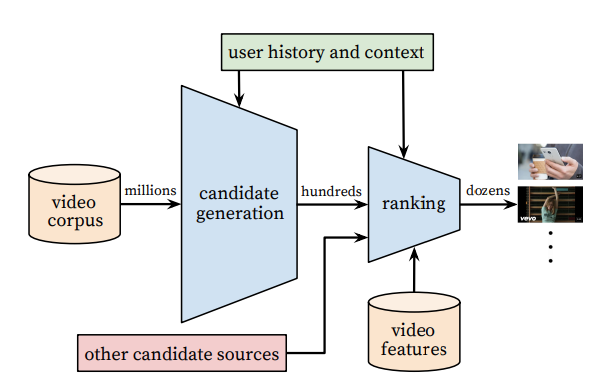


Fig.2.5 How YouTube algorithm work

Here are some key factors that the algorithm takes into account:

**User engagement:** The algorithm considers the videos a user has watched, liked, commented on, or shared to understand their preferences and interests.

**Similarity:** The algorithm identifies videos that are similar to the user’s viewing history, such as videos from the same channel or related topics.

**Popularity:** The algorithm takes into account the overall popularity of a video, such as the number of views, likes, and comments.

**Freshness:** The algorithm also considers the recency of the video to ensure that users are recommended the latest and most relevant content.

**Diversity:** The algorithm tries to recommend a diverse range of content to ensure that users are exposed to new and interesting videos outside of their typical viewing habits.

Overall, the YouTube algorithm is designed to provide personalized and engaging recommendations to each user while keeping them engaged and active on the platform (Utsav Desai 2023).

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