**ARTIFICIAL INTELLIGENCE BASED BUSINESS STRATEGY FOR OPTIMIZED ADVERTISING**

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Project Proposal Report

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# **Declaration**

We declare that this is our own work and this proposal does not incorporate without acknowledgement any material previously submitted for a degree or diploma in any other university or Institute of higher learning and to the best of our knowledge and belief it does not contain any material previously published or written by another person except where the acknowledgement is made in the text.

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The above candidates are carrying out research for the undergraduate Dissertation under my supervision.

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# **Abstract**

Recommendation systems include technology and algorithms that can suggest "relevant" items to users. Ideally, the proposed items should be as relevant to the user as possible so that the user can interact with those items. There are a large number of instances in which this system is currently in use such as social media platforms, movie sites, etc. This mechanism has never been used for Television advertising. With the help of a theme of recommendation algorithm the system capability of selecting the most suitable and relevant ads for the user watching television.

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# **Introduction**

## **Background**

Marketing of a product, brand, or service to viewership to generate attention, interaction and sales is an advertisement (often shortened to advertising or ads). Ads come in many ways, interactive videos, and have grown to become a core aspect of the marketplace. Advertising varies from other marketing forms because it is paid for what is received.

The advertising industry is made up of advertising firms, advertising agencies, advertising media, and a host of people such as copy editors, visualizers, brand managers, researchers, creative heads, and designers who carry the customer or recipient to the last mile. An advertising agency is employed by a corporation that wants to promote itself and/or its products.[[1]](#_References) The business briefs the brand, its imagery, the beliefs and values behind it, the target segments, and so on to the agency.

Currently, there are more than billions of internet users, interact with Social networking, visiting a site, reading a blog, etc. The majority in the world today uses social media for advertising purposes. Advertising can be done using the internet or television, but it can also be done through conversations between people which is also known as recommendations.

A Recommendation System(RS) is a smart computer technique that forecasts the acceptance and use of users and helps them choose products from a wide body of knowledge online. Most internet users are sure to have happened to the RS in some way. For example, for future friends, Facebook recommends that YouTube recommend the videos accordingly, that Glassdoor advises us for matching jobs, that TripAdvisor recommends us appropriate holiday destinations, that Goodreads recommend us interesting books, etc. The RS has gained phenomenal acceptance in the e-business scenario. [[2]](#_References)RS has created a new dimension in the communication approach between users and online service providers. Nowadays, many companies are using RS techniques as an added value to enhance their client services. Although the implementation of the RS depends on the specific recommendation approach adopted by the application, the core work of the RS remains more or less the same for all applications. The main objective of RS is to support users in their decision-making processes to select an online item.

The potential of RS in different domains has attracted researchers to explore the possibilities exhaustively. Peoples from various disciplines such as data mining, information retrieval, knowledge discovery, artificial intelligence (AI), approximation theory, forecasting theory, information security and privacy, and business and marketing have contributed extensively with diverse research approaches. Several technological challenges were addressed by new methodologies and algorithms, including more precision recommendations while reducing computational time on-line. Several recommendation algorithms were proposed and implemented successfully in different fields. These algorithms mainly follow demographic filters, CBFs, hybrid approaches, and collaborative filters. RS has recently expanded its research into social networks and contextual information in the recommendation to generate the dynamic features

## **Literature Survey**

**Machine Learning algorithms for recommender systems – A comparative analysis[4]**

The recommendation system is one among the foremost popular applications of computing which attract many researchers everywhere in the world. the appearance of the web era has brought a wide implementation of recommendation systems in our everyday lives. There are many machine learning techniques that may be accustomed realize the recommendation system. Among these techniques we are addressing Content-Based Filtering, Collaborative Based Filtering, Hybrid Content-Collaborative Based Filtering, k-mean clustering, and Naive Bayes classifier. we've got exploited these algorithms to their extreme so as to attain the most effective possible precision and have presented a comprehensive comparative analysis. The strength of all these algorithms is often clearly realized by the significant enhancement within the accuracy, depicted by the experimental analysis taking the cold start problem into consideration.

**Application of machine learning in recommendation systems[5]**

The research provides fundamental knowledge and descriptions of machine learning and recommendation systems. The subject of machine learning algorithms, which are used in such programs, was more widely discussed. The paper focused mainly focuses on filtering algorithms based on users' or objects' demographics, and based on content. The overview of these algorithms includes similarities, drawbacks and advantages, algorithm evaluation steps, and the sample value estimation of the prediction of the evaluation. The architecture part of the work starts with the definition from the MovieLens portal of the databases used. The technologies and realistic application of the above-described algorithms are then discussed afterward. The next section includes an overview of the findings and assumptions based on the computer-based simulations to determine how the algorithms operate. At the conclusion of the work, there is a review, an assessment of the success of the suggestion systems and lessons learned from the research, as well as a plan for more work on the problem of those systems.

This study has focused on the same areas of function and research.

Many companies use big data to make super-relevant recommendations and revenue for growth. Data scientists need to select the right one according to the constraints and demands of an organization from a variety of recommendation algorithms.

**A Recommender System for Online Advertising[6]**

In the online advertising environment, recommendation systems are now evolving as essential marketing and decision-supporting tools, because many customers dealing with e-commerce and related domains are often overloaded with challenging and unprocessed data-driven by dynamic operations, processes, and business guidelines.

Recommendation systems will systematically analyze and filter complex data to provide clients with essential and useful information (in e-commerce). We have proposed an effective recommender algorithm based on user browsing behavior. This algorithm will understand the characteristics, interests, and other parameters of users when they browse the web to present relevant ad(s) to them. The Ad recommendation system uses feedback information about an advertisement and historical website visitation behavior to run dynamically. Advertising positioning and appearance are determined by these inputs. The algorithm solves the issue of "recommending more similar ad(s)" offering an incentive to produce greater user response, providing more value for time and resources with user satisfaction. Our tests and outcomes indicate that up to 92.47 percent of 1900 instances had the importance of the dynamically suggested Advertisements by the recommender system.

**Context-aware advertisement recommendation for high-speed social news feeding [7]**

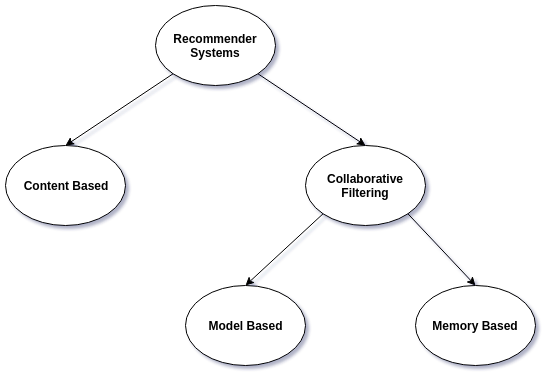
Ad on social media is a multi-billion dollar market that has been the main source of income for Facebook and Twitter. These social network systems learn a prediction model for and users based on their personal preferences in order to distribute advertisements to potentially interested users. However, the consumer can end up seeing repeat ads as user preferences sometimes change slowly. We suggest a context-aware advertisement system in this paper that takes into account the relatively static personal interests, as well as the diverse friends' news, feeds to drive ad click-through rate rise. To satisfy the real-time requirement, we first suggest an online retrieval technique that identifies the most appropriate advertisements that fit the complex context when a read operation is triggered. We suggest a protected area approach to rapidly decide when a user's top-k advertisements are altered to prevent repeated retrieval when the meaning changes marginally. Finally, by studying the dynamism of news streams to assess an acceptable retrieval approach, we consider a hybrid model to incorporate the merits of both approaches. The feasibility and robustness of our hybrid model have been confirmed by comprehensive research carried out on several actual social networks and ad datasets.

**Collaborative Filtering Systems (CF)[8]**

CF modifications are one of the most commonly used recommendation algorithms. Even data scientist beginners can use it to build their movie recommender system. There are two foundational methods in CF: collaborative user-based filtering and collaborative item-based filtering, respectively.

**Component Procedures of a Recommender System[8]**

* Candidate Generations: This method is responsible for generating smaller subsets of candidates to recommend to views, given a huge pool of thousands of advertisements.
* Scoring Systems: Candidate generations will be implemented by different generators, so we need to standardize each one and try to assign a score to each of the items in the sub-sets. The Scoring System does this.
* Re-Ranking Systems: After the scoring is finished, the system considers some external requirements to create the final rankings.



**Figure 1.1: Types of Recommender Systems**

## **Research Gap & Research Problem**

**Research Gap**

In today's world, social networking, word quest, online shops (Amazon, eBay, AliExpress), movies, and videos (Netflix, YouTube) are indispensable. That's why a lot of media associations are paying a lot of money for their advertisements. Many internet-based platforms are used for the display of advertisements.

The main reason for this is that when someone goes to the Internet base platforms to watch a product, service, video, or movie they proffer to be notified of the items they wish to buy. This occurs due to their preferences, Therefore, only people who view ads have to pay for advertising companies. It's not a waste of money for the advertising company. It also does not show ads to those who do not want ads. Only the ads that the user wants will be displayed. With the use of an RS, these platforms are capable of recommending relevant advertisements.

Although this feature is in use on social media, Video streams platforms, and e-commerce applications this is not currently available in television advertising.

**Research Problem**

How to view ads when not using internet platforms? Advertising companies have to use a traditional method. There is no internet but Television is a great medium for this.

On internet platforms, these companies can display something related to the user's preference, or if it shows up before searching for any item that the user is trying to buy. This RS delivers ads to users tailored to the individual's desires and age group to provide the most appropriate product or service.

TV and advertising agencies broadcast commercials. The advertisement industry even pays the TV channels a lot of money. The goal of this study is to reduce the amount of money that TV viewers and advertising companies pay for advertising and to show advertisements that are more realistic and relevant to the TV viewer with the aid of a Recommendation System.

# **Objectives**

## **Main Objectives**

The main aim of this project is to increase user preferences by optimizing user-preferred and user-centric advertisements. This means the audience is capable to view advertisements related to their interests. Here factors like age, gender, and peer groups are taken into consideration when determining the most suitable advertisement on the TV during a commercial break. This project will be beneficial for both the audience and the advertisement firm by letting the audience make an interest in interested goods which will be advertised and the ability to advertising firms to create advertisement content based on age, gender, and peer group which will directly affect the users in purchasing goods and services more effectively and efficiently.

## **Specific Objectives**

A system of recommendations using smart methods of video data analysis. We address the problem of converting an original dataset from a real component-based application to an optimized dataset to apply machine learning algorithms through the application of feature engineering techniques and methods of selection of features once we have gathered the interaction data and developed a dataset.

The recommender can also be used alone. a novel advertisement recommendation system, which alleviates users' efforts on finding the most relevant ads according to current viewings without a sufficient collection of TV viewers as required in traditional recommenders.

Advertisement tagging has become increasingly popular, offering an easy way for users to coordinate, manage, present, and search for different types of resources. These tagging systems provide a lot of useful information, such as tag, an expression of the preference of the advertisement to a particular resource, time, a denotation of the interests of an advertisement drift.

# **Methodology**

The proposed research component **“The Recommendation System**”. Explains the overview of the process;

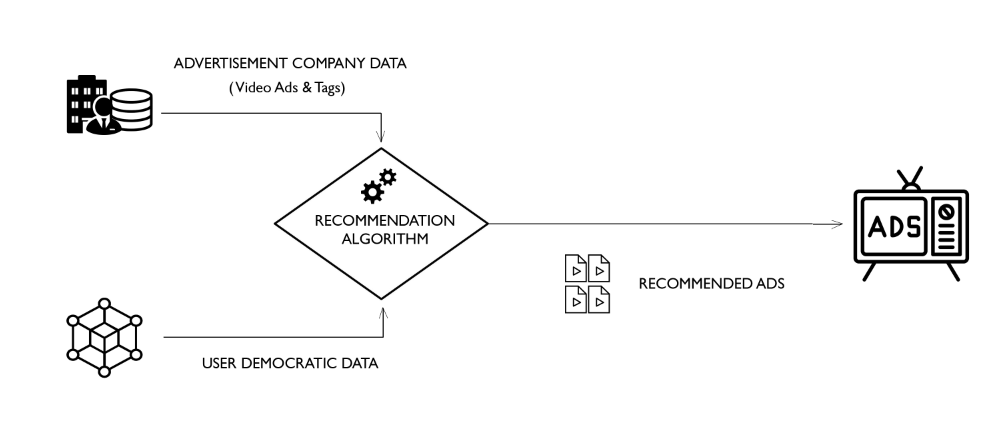
The initial step is to the collection of data from the results obtained from the human object detection and recognition using the implemented API(Application Programming Interface). The data related to the audience such as age, gender, and peer group will be considered in this phase. Moreover, the advertisements and the tags(a category to which the advertisement belongs) are also considered in this step.

The advertisements(ads) received from the advertising firms are been classified with the use of programming languages like Python and algorithms like CF(Collaborative Filtering). When classifying the Ads, user demographics ( age, gender, and peer group) are taken into account to analyze the user's preferences.

When further classifying, the advertisements are classified considering the tags which have been generated by taking into account the contents in the advertisement. For example, advertisements with food-related content will be given the tag as food.

Depending on the predictions and analysis of the above algorithm the most appropriate advertisement will be displayed on television.

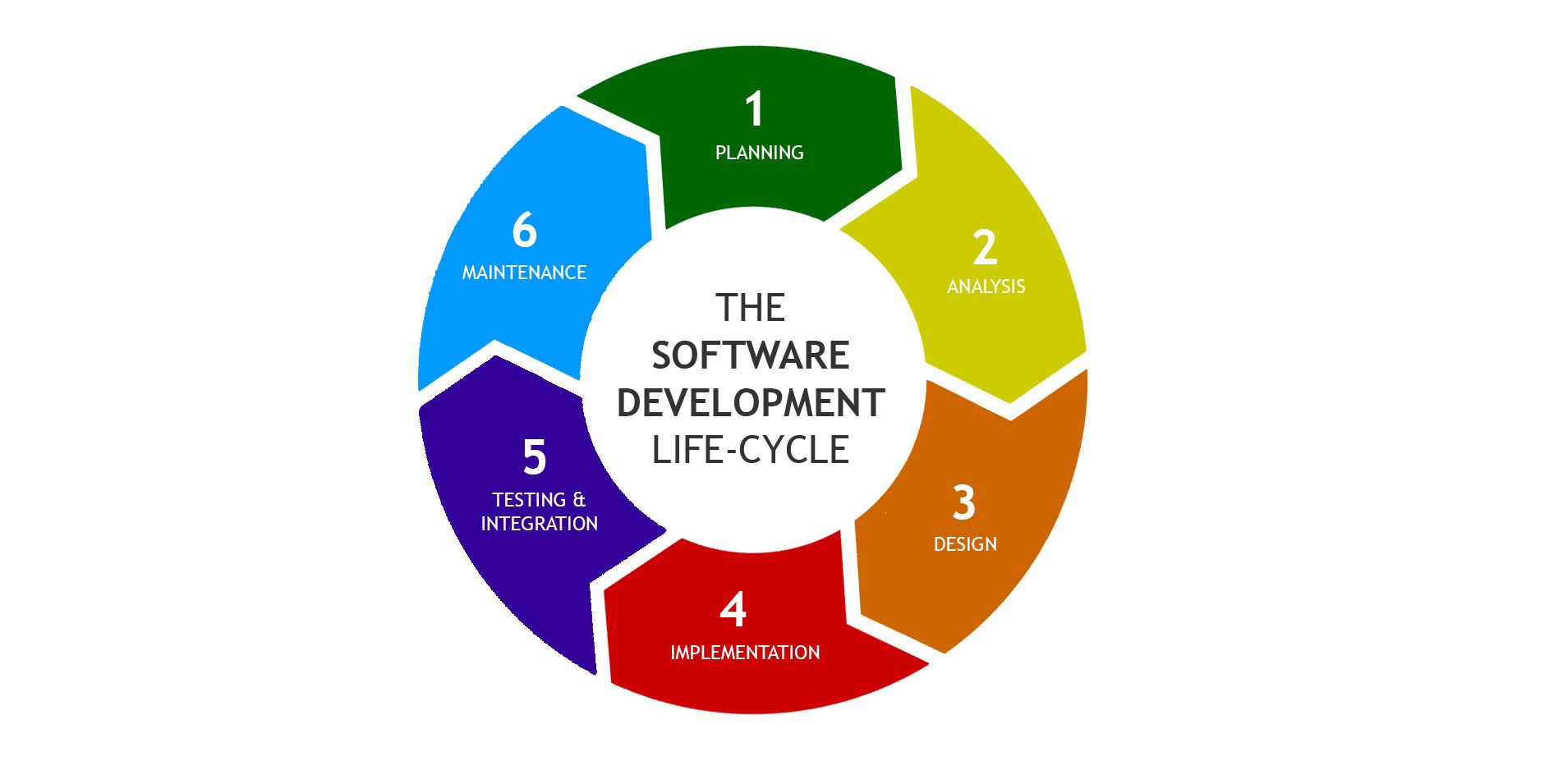
## **System Architecture**



**Figure 3.1: System Architecture**

## **Software Solution**

Choosing the most appropriate and effective software development approach is the first challenge to face when designing designing any software solution. More things need to be considered before choosing the technique, such as the nature of the project, the defined duration, and the possible risks that will be faced during the implementation period. There is a comparatively broad scope for the proposed system and it can be defined as a high-risk project because it involves many complicated algorithms and technologies. The agile approach of software development is therefore the best and the most applicable. The structure of the agile approach is basic, but it is sufficiently efficient to complete the specified timeline with the proposed artifact. Scrum is used as the agile approach in this scheme, since it can be applied to handle and monitor any iterative and gradual project in wider frameworks. The main stages of the technique for agile growth and what will be achieved during each process are as follows:



**Figure 3.4: Software Development Life Cycle**

**Requirement Gathering and Analysis**

Requirement selection is the first step after choosing the subject and the scope. By exchanging a questionnaire with the television audiences and advertising agencies who are the future consumers of the proposed artifact, the initial criteria selection would be conducted. The key features will be tested by the users during this stage and adjustments will be made accordingly after considering their responses.

**Design and Development**

All mock-ups, case diagrams and other structural diagrams will be designed to minimize the complexity of the project structure during this step..

**Testing**

Before the development phase, each component will be tested, and even after the development process, the entire system will be tested with connecting components to ensure the system works as expected.

**Testing Plan**

The agile methodology in software testing involves testing as quickly as possible in the software development lifecycle. It represents one of the main client engagement and testing code as soon as it becomes available. The code should be stable appropriately to take it to device testing. Rigorous regression testing may be performed to ensure the bugs are patched and checked.

**SDLC Test Elements and Tasks**

Test Strategy

* Planning and Test Schedules
* Resource Planning

Test Development

* Unit testing
* Test of data

Managing Defects

* Bug Tracking
* Fixing

Integration Testing

* Combination Testing
* Installation Testing
* Requirement testing

**Feedback**

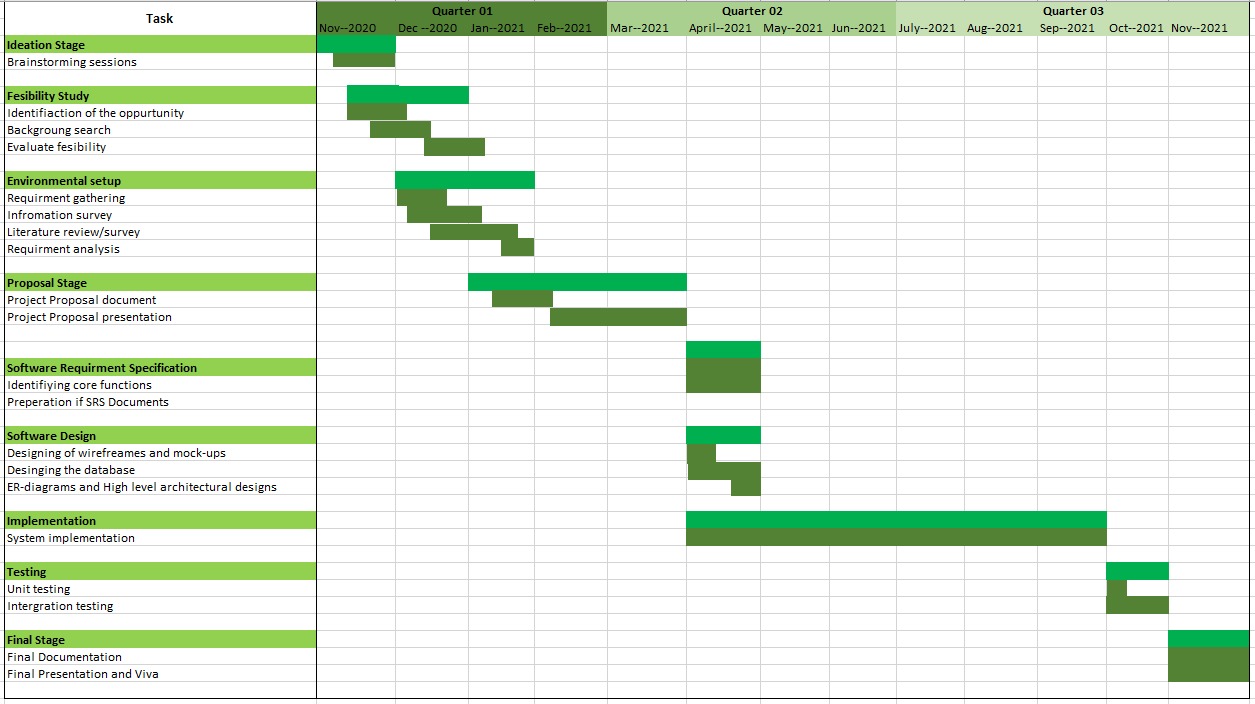
The software component will be installed during this process to encourage users to use it for usability testing and get their input. From there on, if necessary, improvements will be made.

## **Functional requirements**

* The should provide feedback report by considering the user’s engagement towards the advertisements
* The system should be secured in a way that protects the user’s privacy.
* The system should detect human objects and at the same time should detect static objects and disregard them.

## **Non-functional requirements**

# **Task and Estimated Project Plan**



**Figure 4.1:Gann Chart**

# **Description of Personal and Facilities**

|  |  |  |
| --- | --- | --- |
| **IT number** | **Member** | **Task** |
| IT18085686 | Recommend the most relevant advertisement for the user | Considering the TV viewers interests |
| Build new tags and review the advertising information used |
| Finding special key points and choosing similar ads |
| Stop the tendency to repeat the same ads play |

**Table 5.1 Description of personal and facilities**

# **Budget and Budget Justification**

## **Cost of Product**

## **Business Plan**

The business model is a major factor that should be considered when creating the business plan. As per the proposed research, the business model of the proposed research software comprises the ability to optimize advertisements that are displayed on the TV. Here the technology of Artificial Intelligence and other related technologies are used to achieve the goal. This business model caters to both the advertising firms and the users.

Our marketing strategy is to provide our service to the advertising firms which includes a trial period of 3 months, based on the satisfaction they are capable to purchase our product depending on our schemes available.

The business opportunity benefits both the advertising firms and the audience. Our proposed system is capable to display user-centric and user-preferred advertisements which will increase enthusiasm and engagement which will directly affect the higher sales conversions on the point of the advertising firm. As all businesses aim is to maximize their profits, this opportunity will reflect higher profits and incomes to advertising firms and their campaigns.

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