

## A SURVEY OF RECOMMENDATION SYSTEM USING CLOUD ENVIRONMENT

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### ABSTRACT

*Recommender systems have made significant utility in daily routing life. Online shopping and Social networking sites are playing crucial role in routine life. Over 3.5 billion people uses internet for various purpose. Online shopping retail sales are predicted to grow steadily in upcoming years. Product recommendation is one of the major requirements of e-commerce portals. This feature can help to increase shopping value with minimum shopping time. Logical recommendation not only helps to customer for purchasing but also increases total sales value.*

*Generally, consumers need to search a lot to find a product of interest. Consequently, conventional recommender service systems often suffer from lack of scalability and efficiency problems when processing or analysis of this data on a large scale. To avoid these problems, a novel recommendations system using collaborative filtering algorithm and customer behavior is proposed to implement with cloud server in web service form. Proposed solution will attempt to recommend product based on similarity and popularity index of each product with respect to customer behavior. This project will attempt to develop own customer behavior analysis and classification algorithm to provide more perfect results. Amazon dataset will be used recommendation and evaluation purpose. Computation time for single and multimode cluster will be primary concern for performance measurement.*

**Keywords:** *CloudData, Amazon Dataset, Product Recommendation, Collaborative Filtering, Customized customer behavior analysis*

### 1. INTRODUCTION

The growing internet world and hectic schedule of daily life create so much difficulty for internet Users to find desired information. This situation becomes worse when user try to search information and get irrelevant information. Inadequate knowledge of search tool and large amount of data gives poor performance to retrieve or extract desire information. Recommendation systems offer intellectual practice based on user preference. Recommendation systems offer separate and specialized set of information. In recent years, Web personalization has received much attention to help Internet users with the problem of information overload.

The complete study concludes that “An extensive application or tool that involves user preference or self collected knowledge for predicting user desire and explores the best possibility of relevancy among information is known Recommendation System.” or it can be state that “Recommendation System is tool that provides pre specified knowledge based information”. Recommendation System may useful in various fields such as product,

marking, shopping, product search etc. Product recommendation system offers collection of relevant products based on previous transactions. They may offers Friends based on Friends popularity and visits. Friends ranking, priority, area, impact etc may be the core logic behind any Friends recommendation system according to;

1. Suggesting new product to active user based on a prediction of users interests.
2. Explore user lifestyle for offering customers of on-line retailer suggestions about what they might like to buy based on their past history of purchases and/or product searches.
3. Recommending relevant product and active clubs

## 2. RECOMMENDATION SYSTEM

A recommendation system can be classified according to their technique behind knowledge mapping and recommendation taught. They are explained as follows;

1. Knowledge based recommendation system
2. Content-based recommendation system
3. Collaborative-based recommendation system
4. Demographic recommender

### 1. Knowledge based recommendation system

Knowledge systems recommend suggestions or solution by generating manually or automatically a number of conclusions and decision rules. It emphasizes on explicit field knowledge about the requirements and user preference.

On the other hand, manually generated decision rules or drawn conclusions may be biased and not suitable for personalized systems. This system associated with different drawbacks such as bottleneck problem during knowledge processing and inherit problem during user profile creation and linking with existing information. A automatic knowledge based system is recommended where input of data may be subjective and can vary according to requirement.

### 2. Content based recommendation system

Traditional Content based recommendation system based on user preference and content exist at data source. It compares and extracts the information from web pages and data sources and match with user preference. It also uses popularity calculations and frequent uses to find most used and most demanding content. It uses this concept to evaluate and sort content according to demand and popularity. Generally, it observes the description associated with items or existing content and compare with user preference.

In many Web-based personalized applications such as e-commerce and e-learning sites, several techniques for document modeling, information filtering, and techniques for deriving information from the pages content are proposed. In such application, user profiles are generally described as vectors so that every entry of vectors represents a weight or an interest degree of each item in the Web pages.

### 3. Collaborative based recommendation system

Collaborative-based or so called social-based are an alternative approach to the previous approaches, aiming to improve the limitations of content-based approach. It exploits the other user's profiles in the same community and recommends new items not previously rated or seen by the user based on the assumption that similar users have similar interests in the same

community. Therefore, recommendations take places based on the user similarity and recommend items from the interesting list of other people in the same community.

#### **4. Demographic based recommendation system**

A demographic recommender system provides recommendations based on a user's demographic profile which involves user's demographic data such as gender, age, date of birth, education, and other personal features

### **3. CLOUD COMPUTING**

The growth of internet makes it most promising and significant part of this world. The cloud computing technology helps to provide integrated approach for organizing and managing services, infrastructure and resources into strategic and proper way. Cloud applications provide convenient method for resource pooling, infrastructure sharing for public and private environment. Open nature and common environment makes public network vulnerable, which leads to make cloud prone for several security threats. Thus, work observes that security is primary requirement to maintain trust and authenticity of information and services.

The NIST definition of cloud computing "Cloud computing is a model for enabling ubiquitous, convenient, on –demand network access to a shared pool of resources (e.g., networks, storage, applications and services) that can be rapidly provisioned and released with minimal management effort or service provider interaction"[1]. The term cloud computing is very promising and new technology of our time. It is more than a single product. Cloud computing is the combination of two fundamental technique utility computing and service oriented architecture. Cloud computing provides software and hardware by internet using any type of browser. It removes the requirement of setting higher cost devices for any organization and with the help of cloud computing the organization takes care of its functions work rather than to develop an expensive infrastructure.

This work observes that cloud environment is good source to outsource data and integrate external provider with existing applications. In any application data plays key role, so data is very responsible and important element for cloud environment. Since geographical location plays very important role to expand the scalability of application, cloud providers are used to interconnect multi located resources and applications with each others. Numerous cloud provider are explore in this work for commercial and personal purpose some of listed as Amazon's EC2 [2], Amazon's S3 [3], and IBM's Blue Cloud [4] are IaaS systems, while Google App Engine[5] represents PaaS systems, and Google's App[6] and Salesforce's Customer Relation Management (CRM) System[7] belong to SaaS systems.

Cloud computing environment integrates large number of networks and resources to take advantage of low cost scalable and robust system. It also produce sharing infrastructure in large pool manner to link various heavy loaded applications. Virtualization technique is used to create virtual environment of single unit and gives immense pleasure of transparent environment. Thus, user need not to worry about to fix the responsibility of individual serve for storage and computing purpose. This cloud model is composed of essential characteristics, service models and deployment models.

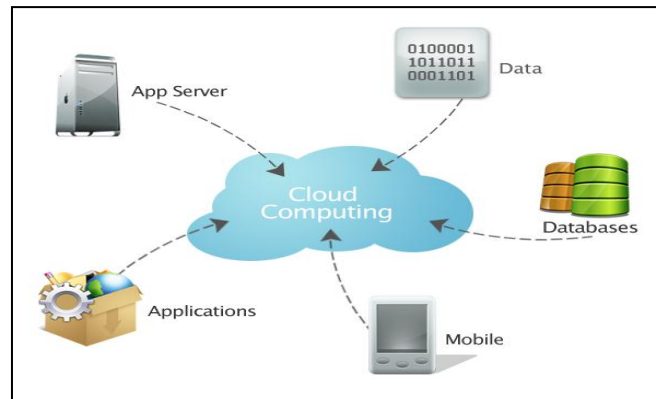


Figure 1.1: Cloud Computing

### Cloud Computing Services:

These Cloud services can be further comes under the three categories:

- Software as a Service (SaaS) - This type of service is a way of delivering application that is deployed over a network, accessible via a browser or program interface; referred to as on-demand software [8].
- Platform as a Service (PaaS)- A platform on which user can design, build and test applications using programming languages, libraries and tools that is supported by the provider [8].
- Infrastructure as a Service (IaaS) - This type of service provides processing and storage capacity, networking and computing resources where the user has control over operating system and deployed application; sometimes referred to as utility computing [8].

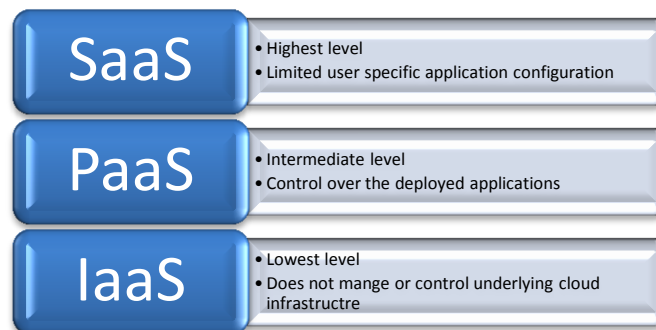


Figure 1.2 : Cloud Services model

Table 1.1: Comparison between Different Service

Model	Target user	Use	Provider	Services
SaaS	End user	Consume/Buy	Salesforce.com, Google Apps	CRM, Email
PaaS	Developer	Build/Deploy	Windows Azure, Net suite	Development Tools

**Cloud Computing Deployment Models:**

IaaS	Operators/IT	Migrate your data	Amazon Web Services, Rackspace	Storage, virtual machine
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Cloud computing services are typically made available to its user via a private, public, community and hybrid cloud.

- *Private Cloud* - It is owned, supervised and operated by the single organization and the services are used by their internal users. Users within the organization can use the data, available services and other application.
- *Public Cloud* – It is owned and supervised by a single organization, but its services and application are publicly accessible and available for general public use. In this any user can get those services by paying appropriate amount.
- *Community Cloud* – Community cloud is managed by an organization for a specific community. This cloud could be shared by many organizations for any specific need; possibly it managed by internally or externally. In terms of cost it is cheaper than private but costlier than public.
- *Hybrid Cloud* - This type of cloud is an integration of two or more than two clouds (for example combining public and community clouds).

**4. PROBLEM STATEMENT**

Online data is the collection of structured and unstructured data organized into relational or non-relational ways. It comes with very large volume and velocity with variety of types. Massive nature makes it complex to analyze and derive relevant conclusions. . Data is becoming one of the most important technology trends that have the potential for dramatically changing the way organizations. Subsequently, growing of e-commerce portals creates a huge attention of users on online shopping and it change the trend of business. Big investors are trying to get into this market and launching their online shopping apps and web applications.

E-Commerce based online shopping portals concentrate to allow huge range of product variety and simplify the way of purchasing. Consumers do not need to worry to visit various shops, compare and buy a product. Although, this sites provide wide range of shopping feature but also increase the consumer expectations. Now a day’s consumer wants to purchase lots of product in minimum shopping time. This generates the demand of personalization of shopping portals and recommends products or customized product view based of consumer interest. Customer behavior can play very crucial role in this dimension. Subsequently, previous shopping transactions can also help to observe the shopping demand and consumer interest.

The survey on customer analytics revealed that various algorithms are derived to analyze the customer behavior for Discovering Hidden Relationships of customers, Cause/ Effect analysis, predictive and data visualization behavior. In the same line various product recommendation plug-in are developed for ease of product view and smooth shopping phenomena. Collaborative filtering, Content Mining, Ranking algorithms are integrated with mining solutions to recommend more accurate and perfect results.

The study of existing solutions observes that most of the product recommendations implement ranking and popularity index value estimated by consumer view and ranking

algorithms. Analysis of product category and classification of shopping is still a big challenge. Subsequently, e-portals provide web personalization based on product sale not the product nature. Although, limited work has been done in this field and a wide range of improvement is expected. The most important challenge into existing field is small scale data analysis. All the traditional recommendation work has been evaluated and created for small data size. Huge data size not only change the data nature but also increase lots of hurdle during mining work. Another ways, integration of customer behavior analysis and product nature is also absent into existing solutions.

The complete problem statement concludes into following points:

1. Enhancement in product recommendation algorithm for large volume dataset.
2. Integration of customer behavior with Product nature

A solution based on based on similarity, popularity and customer nature index for product recommendation is big challenge to overcome all the above situations.

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