# Personalization Of An E-Business Website

**Khaled ELMenshawy , Haitham Rizk Fadallah , Marwa Hussien Mohamed**

**Abstract:** There has been a significant development in the use of consumer data since the industrial revolution, and the companies have been using them to develop their products according to the needs of each individual consumer using personalization technologies, which relied heavily on the development of information technology. Data is the key to personalization. Although there is difficulty in using data in the advertisement in the past, recently, the investment in data increases from 8% to 12% due to the evolution of information technology such as cloud storage and network bandwidth. By studying the consumer's purchase journey, a lot of valuable information about his desires can be collected and analyzed. Personalization technologies combine consumer data, rules, and algorithms through a process model for generating a personalized web page. Web designers typically build websites using a layered design approach called the n-tier architecture, which internally uses three different types of filters depending on business rules to classify and manage consumers.

**Index Terms**: Personalization, web architecture,Content management, Simple Filtering, Collaborative Filtering, Rules-based Filtering,

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## 1.    INTRODUCTION

THe engines of the industrial revolution were factories that used mass production technologies to increase efficiency in the production of goods. Over time, mass production was combined with mass marketing using mass media, starting with newspapers, then radio, followed by television and direct mail. The resulting economic system relied heavily on forecasting aggregate needs and then using factories to produce large quantities of items based on those forecasts. While this system has evolved to deliver many varieties of products (for example, over 150 models of cars and over 100 varieties of detergents), it is not really designed to satisfy the needs of any individual. In addition, Traditional media simply could not deliver any form of personalization. This was primarily due to interactivity and therefore has no way of registering user preferences, interests, etc. Because there is a fundamental asymmetry between production and consumption, consumption value is maximized by serving individual needs. One customer at a time leads to maximization of production efficiency. Personalization technologies enable firms to treat each customer as a unique person and serve that customer's possibly unique needs, so personalization is the combined use of technology and customer information to tailor interactions between a business and customers.

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- *Khaled ELMenshawy ,Information system department,October 6 university, Egypt. kmensh.csis @o6u.edu.eg.  ORCID ID: 0000-0002-7648-1328*
- *Haitham rizk fadl allah ,Information system department, October 6 university,Egypt. Haitham.rizk.csis @o6u.edu.eg   .ORCID ID: 0000-0002-6282-3382*
- *Marwa hussien mohamed ,Information system department, October 6 university,Egypt. Eng_maroo1 @yahoo.com, Marwa.hussien.csis @o6u.edu.eg.   ORCID ID:*

## 2.    FACTORS THAT FACILITATE PERSONALIZATION

### A.    Change in consumer behavior:
Sharing personal information, Social media has accelerated this trend, and people now share online anything and everything.

### B.    The rapid evolution of mobile devices:
Mobile devices have essentially served to be a sharing device. These devices have unleashed all kinds of data volunteered by users.

### C.    Evolution of information technology:
Computing power and bandwidth increased to a point where tasks that used to take several minutes to hours can now be done in milliseconds.

### D.    Cloud computing capabilities:
Cloud computing significantly reduced the costs of storing, retrieving, and processing the massive amounts of data needed to effectively personalize advertising.

### E.    Increase in the investments in data and analytics:
Likely to get marketing teams the kinds of information they can use and rely on to deliver personalized services to their customers.

## 3.    CUSTOMER JOURNEY THAT LEADS TO PURCHASE

the customer first became aware of the brand, then considered it, then established a preference over other similar brands, and finally purchased it [2]. The idea is that as the customer progresses through the purchase journey, he may be sharing valuable information about his desires. Sellers use the consumers information to show messages that predict what customer is likely to want to know next. It is not as much trying to predict and follow the customer purchase journey as trying to always be at the right time. (ideally at the point where the customer is making a purchase decision).

## 4.    DATA, EVENTS, AND RULES

The idea of personalized advertising is about combining three things; Data about individual preferences or their environment, rules, and Algorithms to process this data [3].

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**A.        Data about the individual:**

**1)        Profile data:**
Profile data includes data about users and the audience segments they belong to, such as males, females, age groups, purchasing habits, income, household metrics, etc. For example, an auto manufacturer like Mercedes could use profile data to show the Mercedes GL, a high-end SUV, to customers who live in higher-net-worth geographies while showing the entry-level CLA cars to younger males who are more likely buyers of the CLA.

**2)        CRM data:**
CRM data refers to data that brands usually record and store in customer relationship management software systems or databases when you directly interact with them. For example, Souq.com and nefsak.com have been running banner advertisements personalized with the preferences of their customers.

**3)        Environmental data:**
Data about the environment the user is in can be determined in real-time and used to deliver tailored messaging. Include local weather, temperature, geographic location, time of the day…etc. For example, automobile companies go through the process of allocating suitable markets around the world to suit their car models.

**4)        Social media data:**
Data about users' actions within social media and topics being discussed (facebook, twitter,…etc). For example, Social media platforms often allow advertisers to pick interests (for example, sports fans), demographics (for example, single men), as well as friends of fans (who may likely have similar interests), and so on.

**5)        Site/cookie data:**
cookies on consumer websites for product-based retargeting can be triggers. Here are some examples of using cookie data;

People who buy a printer are likely to need ink cartridges in three months, people who shop for diapers are likely to shop for sippy cups, washcloths, and baby clothing, and people who booked an air ticket to a warm location are likely to shop for swimwear.

**6)        Search data:**
This refers to data obtained when users search for items or interests. Search data can be a very powerful source of personalization data because it is indicative of interest and perhaps even the timing of purchase. For example, Searching for a laptop of a specific brand result in showing ads of different laptop models of the same brand.

**7)        Real-time events:**
Other events that are occurring at the time—such as sporting events (world cup, CAF, national sporting events) , social events (mother day, valentine), national feasts (October 6 war, 25th April, revolutions "23rd of July, 25th Jan., and 30th June") and religions feasts ( Ramadan, feasts, eastern,….etc.). For example, bears and love shape toys are suitable for valentine's day.

**B.        Rules;**
Rules are necessary to ensure that a data signal is interpreted correctly in order to determine the conditions under which a particular message should be delivered. There are generally two kinds of rules used for matching data signals to determine what messaging or creative assets should be displayed in an ad: direct index (DI) and a dynamic rule [2].

**1)        Direct index (DI):**
A DI is a value that is calculated or looked up in order to create a mapping between a data signal and assets designated for that particular user. For example, a retailer may have product identifiers being used for retargeting users. In this case, the product identifier in the cookie will map directly to a specific product.

**2)        Dynamic rule:**
A more complex kind of matching, often referred to as a dynamic rule, is often required either a range may need to be established. If the data signal is temperature, it may be necessary to define a temperature range to determine the "hot" weather condition (e.g., temperature between 25 and 35 degrees or temperature greater than 25 degrees), or the data signal may be combined with other data signals, such as weather data being combined with gender data (e.g., if the weather is cold AND the user is male, show a particular men's jacket and if the user is female, show a women's coat instead).

**C.        Algorithms:**
We need very sophisticated algorithms that utilize machine learning, artificial intelligence that can use large data sets of input to make predictions about outcomes. In the world of computer science, this is often referred to as machine learning. Machine earning techniques:

**1)        Bayesian networks:**
A Bayesian network is a way of representing related variables in the form of a directed graph. Probabilities can be assigned to each node of the graph, and it is possible to predict outcomes by examining data and "learning" from data points.

**2)        Decision trees:**
A decision tree is a proper visual representation of how decisions influence outcomes and can be used to evaluate data and rules to determine the path to take when it comes to the best performance.

**3)        Association rule learning:**
This is a machine learning algorithm that is suited to working with vast data sets where the relationships between variables are not clear and have to be determined.

## 5.        PERSONALIZE A WEBSITE
The process of generating a personalized Web page in terms of a simple input-process-output model. This model consists of five essential components [4]:

**A.      Input components:**
1)      set of customer data (an input component)
2)      A set of Web site content

**B.      process component:**
1)      Business logic
2)      A set of dynamic scripts.
C.      A personalized Web page.

For example, when a visitor to an online book site chooses the Fiction category link, the request Uniform Resource Locator (URL) may appear as follows: http://www.books.com/ catalog.jsp?category=Fiction. This request will invoke a program or dynamic script called "category.jsp" and pass the parameter name-value pair "category-Fiction.".

This program will execute the logic defined by the Web site designer to generate the page corresponding to the Fiction category. The category.jsp program may execute additional logic as well, such as formatting or personalization logic.

Once the program has executed all the page generation logic, the resulting HTML page is delivered to the visitor.

# 6.      WEB ARCHITECTURE

To personalize your Web site, you need a thorough understanding of Web architectures. Web designers typically build Web sites using a layered design approach called the n-tier architecture. At the heart of such n-tier architectures is a set of dynamic scripting technologies, which generate HTML in response to user requests. Dynamic scripts usually run on a particular server called an application server. Whereas Web servers primarily manage connections to the site, application servers primarily manage the complexities of executing application logic, including managing memory, scheduling tasks, executing page generation logic, and managing connections to back-end services (e.g., database systems). Designers of modern Web sites typically use an n-tier architecture[5]. N-tier architecture is based on a layered design, which partitions application functionality into independent layers [6]. The layers in a typical n-tier architecture include the following:

**A.      Presentation Layer:**
The presentation layer is responsible for displaying information to users and includes formatting and transformation tasks. Presentation layer logic is usually handled by dynamic scripts.

**B.      Business Logic:**
The business logic layer handles the execution of business logic for the enterprise. Business logic is typically implemented using component technologies, such as Enterprise Java Beans (EJB) or COM. In many Java-based Web applications, servlets are used to invoke these components.

**C.      Data Access:**
The data access layer facilitates connections to the underlying data sources, such as database systems or legacy systems. It uses standard interfaces, such as JDBC or ODBC to access these data sources.

**D.      Back-end Systems:**
The back-end systems layer includes resources that provide such services as database systems, legacy systems, and directory servers.

# 7.      CONTENT MANAGEMENT

An important aspect to consider when deploying a personalization solution is content management. Many organizations use content management systems to manage Web content.Content management systems are software tools that enable efficient authoring, editing, and publishing of Web content, and it is the combination of rules, processes, and workflows used to create, edit, manage and publish Web content according to the organization's requirements.When the system receives a request from a user, the application server invokes the content management system to retrieve the appropriate content. The Desktop Content Management (CM) GUI box in the figure represents the user interface used to submit content to the system.

# 8.      FILTERING-BASED PERSONALIZATION

**A.      Simple Filtering:**
Simple filtering allows you to deliver content to users based on classes of users, and it works well for sites where users can be easily categorized into classes. For example, a Web site for research reports (Portal/Journal) might offer subscription-based services. Here, a non-subscribing user might be able to access abstracts of research reports, while a subscribing user would have access to the full text of research reports. Simple filtering is difficult in the context of a more complicated personalization scheme.

**B.      Collaborative Filtering:**
It works on the principle that visitors with similar interests can be clustered into groups. The behavior and opinions of users within an interest group can then be used to generate recommendations for other members of the same group. This type of personalization requires a particular type of software, specifically a collaborative filtering recommendation engine, and works well for sites having high traffic, a large user base. The ability to generate recommendations using collaborative filtering is dependent on having some knowledge of a user when he visits, i.e., the recommendation engine will not be able to generate meaningful recommendations for first-time visitors [7].

**C.      Rules-based Filtering:**
Rules-based personalization systems allow a site to specify how the site should respond to a particular user based on a set of rules. This type of personalization is particularly appropriate for merchandising efforts, such as cross-sells, up-sells, and promotions. Rules-based personalization allows a site's business logic to be specified as a set of business rules that will be applied at run time to build pages. These rules are simple if-then statements. The if portion of the rule specifies the conditions under which the rule will fire, while the then portion specifies the action which should take place when the condition is satisfied.

## 9. PERSONALIZATION TECHNOLOGY FOR FUTURE

### A. Assemble customer and prospect data from multiple sources into single, unified profiles[8]:

A typical personalization solution should be able to collect lots of data independently without having to bring in additional data from external resources. As a result, It should allow storing all relevant customer data in a single place, with a single unified profile for each person.

### B. Collect and analyze deep behavioral data[8]:

A typical personalization solution can collect data on its own; it shouldn't just depend on data from another resource. This allows it to bring a personalized experience to anonymous and/or first-time visitors who don't exist in any of the other systems. And it can operate on any data it collects about someone, including anonymous. Once it learns it, it should be able to associate behavioral data with contextual data and use a machine learning-driven model to bring an accurate indication of someone's affinities, interests, and intent.

### C. Personalize across channels from a single platform[8]:

The personalization umbrella covers product and content recommendations, account, and industry-specific experiences, web and mobile applications messages, push notifications, bulk and triggered emails, search, digital advertising, and more. And while individual solutions exist to personalize specific aspects of specific channels, a platform that can deliver personalization more broadly across many channels is recommended.

### D. Use machine learning to determine the best experience for each individual[8]:

A personalized experience can be delivered via rules and/or algorithms. With rules, they are defining which group (or segment) of people will see a specific experience. With algorithms, letting machine learning decides which experience to show each individual person. Using machine-learning algorithms can bring related product, content, or category recommendations; ensure lists and search results are sorted in a relevant way for each person; or pick the most relevant promotion that has the highest potential value to a specific company.

### E. Unmasking anonymous visitors [9]:

Collecting data is not specific to known visitors only. Still, the collecting data process should be expanded to include unknown or anonymous visitors since they increase the data collected and thus improve the personalization process.

### F. Integration with IoT devices [10]:

Internet of Things (IoT) is an ecosystem of intelligent devices capable of accessing the internet and communicate with each other. IoT is used in Supply Chain Management (SCM), smart homes, smart mobiles, Inventory Management, etc., enabling retailers to facilitate a more shopping experience for their consumers with a greater degree of personalization results.

## 10. CONCLUSION

The personalization is well underway. It can boost e-business sales, digital marketing, and branding efforts. Also, it helps to offer more relevant product recommendations, improves customer loyalty, a better understanding of customers' needs, and less wasted sales time. Next-generation Web 5.0 will create a new vision of personalization by adapting new emerging technologies such as AI and IoT, which will increase the shopping experience for consumers and accurate products recommendation.

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