Predicting the Quality of a Website

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The main channel for disseminating information is now the Internet. Users have different expectations for the calibre of websites regarding the posted and presented content. The website's quality is influenced by up to 120 factors, each represented by two to fifteen attributes.

quality of website | completeness of a website | model learning to predict | expert system | predicting the quality of a website

1. Introduction

Information is widely disseminated through websites. When it comes to providing users with high-quality material, the quality of websites is the most crucial concern. By considering every factor impacting the quality of a website, more precise and pertinent information may be made available to consumers. To assess the actual condition of a website, it is crucial to identify the variables that affect website quality, utilizing models that aid in quantitative website quality computation.

More than 42 parameters are utilized to calculate website quality. A developed model is necessary to calculate a subfactor's quality. All subfactors' quality must be added and averaged to calculate a factor's quality.

Everyone now engages in the exchange of information via websites. A website's content is available in various formats, including sound, photographs, movies, audio, graphics, etc. Different material types are posted using multiple forms. Numerous new websites are launched every day. The real issue is the calibre of these websites. People depend on high-quality content. The most challenging task is evaluating quality. Customer happiness depends on how well-designed the website is when is searched or browsed for information. Numerous aspects must be considered to evaluate the quality of websites, including usability, connectivity, navigation, structure, safety, maintainability, dependability, functionality, privacy, portability, etc. Various tools, approaches, models, and procedures must be used to evaluate the calibre of a website. Most website businesses need many elements, such as a logo, animated graphics, colour schemes, mouse-over effects, graphics, art, database communication, and other requirements.

To assess a website's quality, it is necessary to employ several characteristics, either directly connected or unrelated. Some techniques used to evaluate the quality of websites are subjective and rely on user input. Statistical methods, usually called objective measurements, can be used to measure quality factors.

Different stakeholders have various quality standards. Other factors can be used to evaluate the quality of a website from various perspectives, including those of designers, management, consumers, developers, etc. End users think about usability, efficiency, credibility, and other things, whereas programmers think about maintainability, security, functionality, etc. Only after determining a website's demands from an actor's viewpoint can the quality criteria best satisfy those expectations.

Websites are becoming more complicated for those concerned with e-commerce, electronics, museums, etc. Due to the availability of more components and the interactions between the parameters, choosing relevant quality factors and building quality evaluation procedures to quantify the variables is becoming more complex. The relationship between traits, attributes, and websites must be considered. Websites must have an impartial, well-considered subjective inclusion and an objective evaluation. Given the criteria that necessitate those approaches for the evaluation, it is imperative to evaluate both procedures. Websites have become the most important mechanisms to disseminate information on different aspects the user focuses on. However, the reliability of the information posted on websites must be verified. The quality of websites is always crucial to users so that the dependability of the information posted on the site can be assessed.

Most assessment of the quality of a website is based on human–computer interaction through usability heuristics [1], design principles [2], and rules [3]. The quality of a website can be evaluated on different dimensions. As such, the formal framework has yet to be arrived at, even though several quality standards have been prescribed [4][5].

A website's quality has been described in various ways by different people. Most recently, many metrics have been used to determine a website's capacity to live up to its owners' and visitors' expectations [6]. There is no standard strategy, because every solution suggested in the literature uses distinct evaluation techniques [7]. Evaluating the quality of a website is different from doing so for other systems. A website's quality is evaluated using multidimensional modelling [8].

The quality of a website is computed from three different perspectives: functional [9], strategic [10], and experiential [11] perspectives. All the methods focus on some measures, attributes, characteristics, dimensions, etc. The methods are synonyms and explore distinctive features of the websites.

Different methodologies are used to compute a website's quality. The experimental, quasi-experimental, descriptive, observational, associative, qualitative, and subjective–objective methods are either participative (surveys, checklists) or non-participative (web analytics). The participative methods focus on user preferences and psychological responses [12]. The testing technique is frequently employed to compute quality indicators, including usability tests, A/B tests, ethnographic tests, think-aloud tests, diary studies, questionnaires, surveys, checklists, and interviews, to name a few [13].

The most recent method uses an expert system involving heuristic evaluation [14]. Experts judge the quality of a website by considering a chosen set of website features. The expert methods are evaluated manually or through

an automated software system. Some expert systems are also developed using artificial intelligence techniques and natural language processing [15].

According to a survey by Morales-Vargas et al. [16], one of the three dimensions—strategic, functional, and experimental—is used to judge the quality of websites. The necessary method for evaluating the quality of a website is expert analysis. They looked at a website's qualities and categorized them into variables used to calculate its quality. Different approaches have been proposed to aid in quantifying the quality of a website.

2. Predicting the Quality of a Website

By considering several elements, including security, usability, sufficiency, and appearance, Fiaz Khawaja et al. [17] evaluated the website's quality. A good website is simple to use and offers learning opportunities. A website's quality increases when it is used more frequently. When consumers learn from high-quality websites, their experience might be rich and worthwhile. The "appearance" factor describes how a website looks and feels, including how appealing it is, how items and colours are arranged, how information is organized meaningfully, etc. A method for calculating website quality based on observations made while the website is being used has been presented by Kausar Fiaz Khawajal. Flexibility, safety, and usability are just a few of the elements that Sastry et al. [18] and Vijay Kumar Mantri et al. [19] considered while determining the website's quality. "Usability" refers to the website's usefulness, enjoyment, and efficacy. The user presence linked to the website or browsing is called the "safety" factor. There should never be public access to the user's connection to the website. The "flexibility" aspect is connected to the capability included in a website's design that enables adjustments to the website even while it is being used. Users can assess a website's quality using a Portal Data Quality Assessment Tool (PoDQA), which uses pre-set criteria.

Vassilis S. Moustakis et al. [20] indicated that assessing the quality of a website requires several elements, including navigation, content, structure, multimedia, appearance, and originality. The term "content" describes the data published on a website and made accessible to visitors via an interface. The "content" quality factor describes how general and specialized a domain possibly is.

Navigation refers to the aid created and offered to the user to assist in navigating the website. The ease of navigating a website, the accessibility of associated links, and its simplicity all affect its navigational quality. The "structure" quality aspect has to do with things like accessibility, organization of the content, and speed. The appearance and application of various multimedia and graphics forms can impact a website's overall feel and aesthetic. A website could be developed with a variety of styles in mind. A website's "uniqueness" relates to how distinct it is from other comparable websites. A high-quality website must be unique, and users frequent such websites frequently. Vassilis proposed a technique known as the Analytical Hierarchical Process (AHP), and they utilized it to determine the website's quality. Numerous additional factors must also be considered to determine the website's quality. Andrina Graniü et al.'s [21] assessment of the "portability" of content—the capacity to move it from one site to another without requiring any adjustments on either end—has considered this.

Tanya Singh et al. [22] have presented an evaluation system that considers a variety of variables, such as appearance, sufficiency, security, and privacy. They portrayed these elements in their literal sense. A website's usability should be calculated to represent its quality in terms of how easy it is to use and how much one can learn from it. The usability of a website refers to how easily users can utilize it. To a concerned user, some information published on the website can be private. The relevant information was made available to the qualified website users.

The exactness with which a user's privacy is preserved is the attribute "privacy"-related quality. Only those who have been verified and authorized should have access to the content. Users' information communicated with websites must be protected to prevent loss or corruption while in transit. The security level used during the data exchange can be used to evaluate the website's quality.

The "adequacy" factor, which deals with the correctness and completeness of the content hosted on the website, was also considered. Anusha et al. [23] evaluated similar traits while determining the websites' quality. The most important factor they considered was "portability". This is when content and code may be transferred from one machine to another without being modified or prepared for the target machine. Another critical element of websites is the dependability of the content users see each time they launch a browser window. When a user hits on a specific link on a website, it must always display the same content unless the content is continually changing. The dependability of a website is determined by the possibility that the desired page will not be accessible.

When improvements to the website are required, maintenance of the existing website is straightforward. The ease of website maintenance affects the quality of the website. When evaluating the quality of a website, taking the aspect of "maintainability" into account, several factors, such as changeability, testability, analysability, etc., must be considered. The capacity to modify the website while it is active is a crucial factor to consider regarding maintainability.

The website's capacity to be analysed is another crucial aspect that should be considered when evaluating a website's quality. The ability to read the information, relate the content, comprehend it, and locate and identify the website's navigational paths all fall under a website's analysability category. When there is no unfinished business, changes to the user interface, and no disorganized presentation of the display, a website can be called to be stable. A reliable website stays mostly the same. When designing a website, the problem of testing must be considered, and while the website is being used, updates should be able to be made. Nowadays, most websites still need to provide this feature.

Filippo Ricca et al. [24] have considered numerous other parameters to calculate website quality. The website's design, organization, user-friendliness, and organizational structure are among the elements considered. Web pages and their interlinking are part of the website's organization. The practical accessibility of the web pages is directly impacted by how they are linked. When creating websites, it is essential to consider user preferences. It is necessary to render the anticipated content.

According to Saleh Alwahaishi et al. [25], the levels at which the content is created and the playfulness with which the content is accessible are the two most important factors to consider when evaluating a website's quality. Although they have established the structure, more sophisticated computational methods are still required to evaluate the websites' quality. They contend that a broad criterion is required to assess the value of any website that provides any services or material supported by the website. The many elements influencing a website's quality have been discussed. In their presentation, Layla Hasan and Emad Abuelrub [26] stressed that web designers and developers should consider these factors in addition to quality indicators and checklists.

The amount of information being shared over the Internet is rising frighteningly. Websites and web apps have expanded quickly. Websites must be of a high standard if they are often utilized for obtaining the information required for various purposes. Kavindra Kumar Singh et al. [27] have created a methodology known as the Web Quality Evaluation Method (WebQEM) for computing the quality of websites based on objective evaluation. However, judging the quality of websites based on subjective evaluation might be more accurate. They have quantitatively evaluated the website's quality based on an impartial review. They included the qualities, characteristics, and sub-characteristics in their method.

People communicate with one another online, especially on social media sites. It has become essential that these social media platforms offer top-notch user experiences. Long-Sheng Chen et al. [28] attempted to define the standards for judging social media site quality. They used feature selection methodologies to determine the quality of social networking sites. Metric evolution is required for the calculation of website quality.

According to the metrics provided by Naw Lay Wah et al. [29], website usability was calculated using sixteen parameters, including the number of total pages, the proportion of words in body text, the number of text links, the overall website size in bytes, etc. Support vectors were used to predict the quality of web pages.

Sastry JKR et al. [30] assert that various factors determine a product's quality, including content, structure, navigation, multimedia, and usability. To provide new viewpoints for website evaluation, website quality is discussed from several angles [31][32][33][34][35][36][37][38][39][40][41][42][43][44]. However, none of the research has addressed how to gauge the websites' content's quality comprehensiveness.

A hierarchical framework of several elements that allow quality assessment of websites has been developed by Vassilis S. Moustakis et al. [20]. The framework considers the features and characteristics of an organization. The model does not account for computational measurements of either factors or sub-factors.

Oon-it, S [45] conducted a survey to find out from the users the factors that they consider to reflect the quality of health-related websites. The users have opined that trust in health websites will increase when it is perceived that the quality of the content hosted on the website is high, considering the correctness, simplicity, etc. Allison R et al. [46] have reviewed the existing methodologies and techniques relating to evaluating the quality of websites, and then presented a framework of factors and attributes. No computational methods have been covered in this presentation.

Barnes, Stuart et al. [47] conducted a questionnaire survey. He developed a method of computing the quality based on responses by various participants' computed t-scores. Based on the t-score, the questions were classified, with each class representing the website quality.

Sasi Bhanu et al. [48] have presented a manually defined expert model for assessing website quality. The factors related to the completeness of a website have also been measured manually. The computations have been reflected considering a single website. No example set is used. The accuracy of prediction varied from website to website.

Rim Rekik et al. [49] have used a text mining technique to extract the features of websites and a reduction technique to filter out the most relevant features of websites. An example set is constructed, considering different sites. They have applied the apriori algorithm to the example set to find associations between the criteria and find frequent measures. The quality of the website is computed considering the applicability of the association rule given by a website.

Several soft computing models have been used for computing the quality of a website, which include Fuzzy-hierarchical [50], Fuzzy Linguistic [51][52], Fuzzy-E-MEANS [53], Bayesian [54], Fuzzy-neutral [55], SVM [56], and Genetic Algorithm [57]. Most of these techniques focused on filtering out the website features and creating the example sets mined to predict the overall website quality. No generalized model is learned that can indicate the quality of a website when given a new website.

Michal Kakol et al. [58] have presented a predictive model to find the credibility of content hosted on the website based on human evaluations, considering the comprehensive set of independent factors. The classification is limited to a binary classification of the content, but scaled prediction is the need of the hour.

The expert systems referred to in the literature depend on human beings who are considered experts and through experimentation, which is a complicated process. No models as such existed that attempted to compute the website's features give the web application code. No model that learns the website quality is presented based on the measurement of website elements.

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