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Framework for Assessing the Quality of Multimedia objects Hosted on a WEB-Site

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ABSTRACT

WEB sites extensively used for information dissemination. The information posted on the WEB site is of different forms, which include Audio, Graphics, images, data text, animation, etc. The content on the WEB site rendered either dynamically or statically. Each type of multi-media object has different characteristics that play a vital role especially for reflecting the objects qualitatively. The quality of a web site is majorly dependent on the multimedia objects. Inferior quality multimedia objects, if posted on the web sites, users lose interested in such types of web sites, and the hit count of these sites would be at a low level. The multimedia objects rendered in such a way that the user need not have to input any extra data for the proper visualization of the multimedia objects. Presentation of multimedia objects in an integrated fashion, reflecting the meaning of such a combined presentation, is the real issue.

Customer satisfaction is mostly dependent on the quality of the multimedia presentation. Assessing the quality of multimedia objects is complicated due involvement of too many objects, too many combinations of the objects, and the need to consider too many features for each of the multi-media objects. In this paper, a framework presented used for computing the quality of a web site from a multimedia perspective.

Key words: Quality framework, Multimedia objects hosted on web sites, quality of web sites, rendering multimedia objects on the websites

1. INTRODUCTION

Everybody in the world is experiencing the way information dissemination is taking place using a variety of data/information. Businesses are being conducted using web sites. E-commerce is in practice in a big way. The use of multimedia-based objects is taking place for conducting e-commerce. Multimedia objects that include graphics, videos, images, animations are being used for product display, marketing, comparing products, etc. so that the customers will have complete information before they select the products for purchase. Some of the practices that we do with help cannot be achieved in conventional doing shopping etc. While numerous advantages can be realized using the web sites, the challenge still lies in making an available quality web site. If the websites are poor quality sites, it will instead lead to a negative effect, and as such there can be information blockade

For the survival of WEB sites, customer satisfaction is the key. Customers will only get satisfied when web sites are high-quality sites. Therefore there is a needed to assess the quality of the web sites from multiple dimensions, find the weaknesses if any, and improve the quality. Multi-media objects have a significant effect on the quality of the WEB sites and therefore require considerable attention to enhance the quality of those objects.

The purpose of the web sites will be lost if the content posted on the web is erroneous, disconnected, and lack relevancy. Many factors considered that have a reflection on the quality of the web sites. There are as many as 42 factors, which include Navigability, structure, usability, maintainability, reliability, adequacy, look and feel, content, safety, multimedia, etc. The quality of the web sites needs to be assessed, considering each factor independently and also studying a whole lot of the factors. Each factor involves the consideration of many elements individually found and combines using different formations to evaluate the quality of the WEB sites.

The quality of a web site can be computed manually, using tools by using different kinds of assessment methods that are subjective, objective, mathematical, or statistical. Sometimes it is necessary to combine different ways. Cognitive models if used for evaluation of the quality of web sites, one can achieve accurate results reflecting the real condition of the web sites. Many organizations are developing their content and also the way the content rendered. Most of the time, professional services are not availed, leading to poor quality web sites. The development of high-quality multimedia objects requires top skills and the use of advanced technology. It is difficult to get people having the expertise to develop high-quality Multimedia objects.

The quality issue considered varies a lot based on whether the web site is static or dynamic. The way quality computed plays a significant role. Quality, as such, is definable as there is no limit to describing what quality is. The quality requirements also keep changing from time to time. The methods presented in the literature classified into manual, objective-manual, mathematical, automatic, and semi-automatic. Subjective or objective assessments do reflect the real quality of the objects as there is an element of prejudice. In the case of objective evaluation, there is an issue of incompleteness. Especially these assessments will not yield proper quality assessment when it comes to multimedia objects.

Different people think about websites in different ways. The way quality of a web site realized varies from person to person. Each person has their perception of the quality of the web site. A programmer looks at design, functionality, security, privacy, structure, and the like for assessing the quality of the web sites. Users look at look and feel, navigation, reliability, adequacy, consistency, usability, and the like. Designers' looks ate the issues like structure, depth of the web sites, response time. The lookout for quality varies from person to person.

Users have specific needs, WEB sites designed and implemented for implementing particular functionality. The gap between the user needs and the functionality supported must be determined and bridged.

The complexity of the web sites varies a lot from website to site. The web sites that deal with e-commerce, health services, animations, videos, audios, etc. are quite complicated. There is interplay between the objects. Computing the quality of such kind of complex websites is quite complicated — different types of approaches and methodologies used for calculating a variety of such sites. Indeed, there is a need to invent a quality assessment framework that addresses the complexity, interplay, extensibility, and implements ability.

May types of multimedia objects considered as part of the content posted on the websites. Different kinds of objects found for rendering content through web sites. The multimedia objects are interconnected. The display of one type of purpose has a bearing on objects. The content provided on the web sites is interleaved and sometimes interlinked as well. A composite model required for assessing the quality of web sites that have interconnected and interleaved objects. The composite model built using subjective, mathematical, and objective approaches. While some factors need the use of subjective assessments like text assessment, some require the use of accurate methods such as in the case of fonts, and multimedia objects require the use of mathematical processes.

The starting point to assess the quality of a web site is to find the expectations of the end-users and in the next step, the quality parameters that match the expectations determined. The determined quality factors will form the base for computing the quality of the web sites. The next step is to find the metrics used for measuring the quality of the web sites. Finally the techniques used for computing the variety of the websites must be determined and use the same to compute quality in terms of the metrics that are selected.

Thus there are several dimensions for evaluating the quality of a web site. Computing the quality of web sites when multimedia objects are most complex and complicate and requires mathematical approaches to calculating the quality of web sites involving multimedia objects. A framework that is extendable formulated on mathematical foundations is needed.

2. LITERATURE SURVEY

Many users have used many factors for computing the quality of WEB sites. Miss. Kausar Fiaz Khawaja1 et al. [1] have used Information appearance, adequacy of information, security, privacy, and usability as the criteria for assessing the quality of the WEB sites. They have defined the factor "Usability" as the learning ability of the objects displayed as content by the users. In a way, this factor expresses the experience of the user in qualitative terms. They have also defined another factor, "Appearance," as the look and feel or the visibility shown as presentation or appealing.

The factors that include flexibility, safety, and usability used by Vijay Kumar Mantri et al. 2] for computing the quality of the WEB sites. They have expressed that the web site must be active from the point of Usability, which must be valid and efficient. They have explained the factor "Safety" as a non-exposition of the interaction of the user with the web site to the outside world. They have considered the factor "Flexibility" that relates to the ability to add, update, remove the functionality without the need to bring the web site down. They have developed a tool (PoDQA) and a quality model (SPDQM) for assessing the quality of web sites

The factors Uniqueness, appearance, navigation, multimedia, content, design, and structure are used by Vassilis S. Moustakis et al. [3] for assessing the quality of the web sites. They have defined that the information provided on the web site is called the "content," and they expressed that the quality of a web site is related to the extent to which a web site is generalized, specialized, and reliable and completeness. They showed that the factor "content" alone is the deciding factor to assess the quality of the web site.

They have further deliberated on the issue of navigation, look, and feel.

Navigation is an issue related to the way a user moves around different pages by clicking on the links provided in the web pages. The navigations system implemented for a web site

reflects the quality of the web site. The navigation must be simple, and the links must be fully connected and functioning

The structure of a web site is the way the web pages are linked, which has an impact on the speed of navigating by the users across the pages. They have explained that the appearance of a web site is dependent on the way multimedia objects prorated on the web site. Look and feel will help to differentiate web site and make the website unique and distinct from others.
The factor "Portability" is used by Andrina Graniü et al., [4] for presenting the quality of web sites. The issue of portability is related to the maintainability of the web site. The web pages developed on one machine when moved on to a different computer, and the code still works is an issue presented through the "portability" factor.

Tanya Singh et al. [5] have used appearance, adequacy, security, privacy, and usability as the factors most important based on which the quality of the web sites computed. They have explained that the quality of a web site based on the factor "Privacy," which is an issue related to making the content to those as defined by the owner of the original data. The information is made available to those users who are identified by the original data owners. The factor "Security" is related to preserving confidentially, the integrity of the data while the web content is on the move between the interacting customers and the web site providers. They have explained the issue of making complete fully connected and without loose ends within the content is related to the factor "Adequacy." They further explained that visibility, look, and feel are the factors related to the appearance of the web site.

The factors that include efficiency, maintainability, usability, functionality, and reliability considered by Anusha et al. [6] for assessing the quality of the web sites. They have defined the factor "Reliability" as the factor related to the correctness, completeness, and dependable. They have also explained the factor "consistence" that is related to the ability built into the web site that yields the display of the same information precisely similar every time the user surfs the content, especially when it comes to the static pages. They have explained the quality of the functionality built into the web sites in terms of the extent to which the user requirements met.

They have elaborated on the issues of maintainability of a web site, which defined as the ability to make a change and carry testing of the web sites. Maintainability is the ability to make changes to the web site with ease. A change made in one place should not affect other web pages. The factor "Analyzability" is related to the ability to trace the navigational paths and also the ability to read the content with ease, and also, one should be able to interpret content so that complete understanding of the content gained.

The factor "Stability" is related to the ability that no concurrent running systems will be able to make changes to the web pages inadvertently. Testability is the factor relating to the ability to test the pages while the web site is in use.

User-friendliness, content, design, and optimization processors used for building web sites must be considered for evaluating the quality as the web sites as presented by Filippo Ricca et al. [7]. They have explained that close attention made while organizing the web pages and the way the web pages are interlinked. The easiness with which the users can navigate is very much dependent on the organization of the web pages and the way the web pages are interlinked. They have also remarked that content presented in such a way that the website accessed in a user-friendly manner as per the preferences of the user.

Content Presentation levels and playfulness built-in web site dictates the quality of a web site, as explained by Saleh Alwahaishi et al. [8]. They explained that few of the frameworks presented in the literature had not provided any metrics for measuring the quality nor computational methods for evaluating the quality of the web sites.

Layla Hasan and Emad Abuelrub [9] have presented general criteria used for assessing the quality of a web site irrespective of the service it offers. They explained different dimensions considered for evaluating the quality of web sites. At the time of designing web sites, the designers must keep in view the dimensions, quality indicators, and checklists.

The quality of web sites, when computed mathematically, will represent the quality in a most meaningful manner. Kavindra Kumar Singh et al. [10] have used a tool for calculating the quality of a web site quantitatively. A method called WebQEM used for calculating the quality of the web site quantitatively. They have presented a strategy for evaluating the quality of the web site quantitatively. The model shown is quite sufficient and used for assessing attributes, sub-characteristics, and characteristics.

Social web sites are being extensively by many users for carrying extensive interactions among them. It has thus become essential that the quality of social websites computed. Long-Sheng Chen et al. [11] have attempted to figure out the quality factors that suit the computation of the quality of social sites. They have presented feature selection methods for selecting the features of the social sites that have to be measured to reflect the quality of social websites.

Naw Lay Wah et al. [12] have presented several metrics relating to computing the "usability" of the web site. The metrics considered by them include numbers of bytes of the content, number of words, number of pages, average link count, percentage of text in the content, etc. The metric most are useful to compute quality concerning the text posted on the web sites.

Analysis of contributions related to the assessment of the quality of the web sites reveals that many times, the authors focused on defining quality or elaborating on the nature of different factors, but no contribution witnessed relating to frameworks, metrics, and computational methods for computing the quality of the web sites.

Sastry et al., [13][14][15][16][17][18][19][20][21][22][23][24] have presented a number quality assessment frameworks that can be used for computing the quality of the content, usability, structure, look and feel, completeness. And they have also presented an overall framework used for calculating the quality of the web sites. They have given metrics for estimating the quality of web sites.

3. ASSESSING THE QUALITY OF A WEB SITE BASED ON MULTIMEDIA OBJECTS

Various multimedia objects of type Images, Videos, Audio, Graphics, and Animations are mixed with text and data to deliver content to the users. The value of the content immensely increases with the use of Multimedia objects. The quality of the WEB sites is dependent on the condition of the Multimedia objects rendered on the WEB site. The resources files scanned, and all the location of the Multimedia objects can be determined, and the location references stored in 5 different vectors (Image[m], Video[n], Audio[o], Graphics[p], Animations[q]) and then each of the objects scanned and the quality of the multimedia objects assessed and then the overall quality of the WEB site considering all the objectives hosted on the WEB site is computed.

Assessing Quality of the Images

The quality of an image based on the resolution, format, intensity, size, and brightness. All these values determined by accessing the properties of the Image

The total quality of all the images taken together = QIMAGES = $\sum^{n}$ Qimages[i]

1

Where n = total number of images and Qvideo [i] = quality of the i^{th} video

Quality of each image is computed considering features that include resolution, format, intensity, size, and brightness

The following tables shows the evaluation of the quality of image objects considering different properties.

Table 1: Assessing Resolution of Images

Measurement	600 X 600	800 X 600	1100 X800	1100 X 1100
Quality value	0.25	0.50	0.75	1.00

The Quality considering the resolution of all the images = QIMAGESR = $\sum^{n}$ Qimr[i]

Where n = Total number of images and Qimr [i] = Quality of i^{th} Image

1The Quality considering brightness of all the images QIMAGEB = $\sum^{n}$ QimB[i]

Where n = total number of images and QimB[i] = quality of i^{th} Image

Table 2: Assessing the quality of the Images based on the format used

format	Non-Standard	JPEG	ZIP	BMP
Quality value	0.25	0.50	0.75	1.00

The Quality considering the format used for all the images

QIMAGEF = ΣQimf[i]n1

Where n = total number of images and Qimf[i] = quality of ith Image

Table 3 - Assessing Intensity

Intensity	100%	80% - 90%	70% - 80%	< 70%
Quality value	0.25	0.50	0.75	1.00

The Quality considering the intensity of all the images

QIMAGEI = $\sum^{n}$ QimI[i]

Where n = total number of images and Qimi[i] = quality of i^{th} Image

Table 4 - Assessing Brightness

Brightness	100%	80% - 90%	70% - 80%	< 70%
Quality value	0.25	0.50	0.75	1.00

The Quality considering brightness of all the images QIMAGEB = $\sum^{n}$ QimB[i]

Where n = total number of images and QimB[i] = quality of i^{th} Image

Table 5: Assessing Size of the Images

Size	>80K	60-80K	40 – 60K	20 – 40K	1 – 20K
Quality Value	0.25	0.50	0.75	1.00	0.25

The Quality considering sizes of all the images QIMAGES = $\sum^n$ QimS[i]

Where n = total number of images and QimS [i] = quality of i^{th} Image

Total Image quality TIMAGEQ = QIMAGESR + QIMAGEF + QIMAGEI + QIMAGEB+ QIMAGES

Assessing the quality of videos

Videos occasionally launched on to the WEB site. The quality of the video is dependent on several frames asserted per minute and the resolution used for displaying the video. The number of colors and the size of the Video are other factors that affect the quality of the Videos.

The quality of the videos hosted on the WEB is computed considering all the videos and the features with which a video display. Following tables and expressions can be used to calculate the quality of videos

The total quality of all the videos taken together = QVIDEOS = $\sum^n$ Qvideo[i]

Where n = total number of Videos and Qvideo [i] = quality of the i^{th} video

Quality of each video is computed considering features that include frames, resolution, colors, and size

Table 6: Assessing the quality of videos based on the number of frames asserted per Minute

Number of frames per minute	<=20	20-30K	30-40	40-50	50K
Quality value	0.25	0.50	0.75	1.00	0.25

The Quality of all videos = QVIDEOSF = $\sum^n$ Qvds[i]

Table 7: Assessing the resolution of videos

Number of frames per minute	<=20	20-30K	30-40	40-50	50K
Quality value	0.25	0.50	0.75	1.00	0.25

The Quality considering the resolution of all the videos = QVIDEOSR = $\sum^n$ Qvdr[i]

Where n = total number of videos and Qvdr[i] = quality of i^{th} video

Table 8: Assessing Size

Size of the Video	60-80K	40-60K	20K-40K	1-20K
Quality value	0.25	0.50	0.75	1.00

The Quality considering sizes of all the videos QVIDEOS = $\sum^n$ QvdrS[i]
Where n = total number of videos and QvdrS [i] = quality of i^{th} Video

Table 8: Assessing colors

Number of colors	40K	60K	80K	1 Million
Quality value	0.25	0.50	0.75	1.00

The Quality considering colors of all the videos QVIDEOC = $\sum^n$ QvdrC[i]

Where n = total number of videos and QvdrC[i] = quality of i^{th} Video

Total Quality considering all aspects of videos computed as

TVIDEOSQ = QVIDEOSF + QVIDEOSR + QVIDEOS + QVIDEOC

Assessing the Audio files

Audios occasionally launched on to the WEB site. The quality of the audio is dependent on several waves used, duration of the waves, and the frequency used for the waves. The echo of the sound used is also one of the quality parameters used. The quality of the audios hosted on the WEB is computed considering all the audios and the features with which audios played. Following tables and expressions can be used to calculate the quality of Audios

The total quality of all the Audios taken together = QAUDIOS = $\sum^n$ QAudio[i]

Where n = total number of Audios and Qaudio [i] = quality of i^{th} audio

Quality of each audio is computed considering features that include several waves, frequency of waves, the duration of the waves, and the echo of the sound

Table 10: Number Waves Asserted

Number of waves per Minute	20-30	30-40	40-50	50
Quality value	0.25	0.50	0.75	1.00

The Quality considering all audios considering the number of waves

QAUDIOW = $\sum^n$ Qaudw[i]

Table 11: Assessing the Frequency of the waves

Frequency	6Ghz	8Ghz	10Ghz	12Ghz
Quality value	0.25	0.50	0.75	1.00

The Quality considering the frequency of all audios = QAUDIOF = $\sum^{n}$ Qaudf[i]

Where n = total number of videos and Qaudf[i] = quality of i^{th} Audio

Table 12: Assessing Duration

Duration in Seconds	6	4	4	2
Quality value	0.25	0.50	0.75	1.00

The Quality considering duration of all the audios QAUDIOD= $\sum^{n}$ Qaudd[i]

Where n = total number of audio and Qaudd [i] = quality of i^{th} Audio

Table 12: Assessing Echo

Echo Size in db	16	14	12	10
Quality value	0.25	0.50	0.75	1.00

The quality of the wave files considering the Echo = QAUDIOE = $\sum^{n}$ Qaude[i]

Where n = total number of videos and Qaude [i] = quality of i^{th} Audio

Total Quality considering all the audio computed as

TAUDIOQ = QAUDIOW + QAUDIOF + QAUDIOD + QAUDIOE

Graphics used to show the trends, performance analysis, and dependencies between business parameters. Graphics represented as images, and therefore the quality computations of the same can be undertaken as in the cases of the images. Some web sites generate the graphs dynamically as graphics tools, and the graphs displayed in the display area. Computation of quality of the graphs in such case is complicated; the quality assessment of a Graph is dependent on the type of graphs and kind of data used for displaying the Graph. The following table provides a basis for the computation of the quality of the Graph.

Table 14: Assessing Graphics

Type of Graph	Type of data	Features				
		X Coordinate	Y Coordinate	Number of Bars	Bar width	Radius
XY plot	Continuous	√	√	-	-	-
Scatter Diagram	Discrete	√	√			
Pie Diagram	Percentile	√	-	-	-	√
Bar Diagram	Continuous	√	√			√

The resources files are scanned to determine the number of graphics files, the type of data used for generating the graphics and the features used for in respect of each of the Graph. The details collected for each of the Graph compared with the entries in the table, and the quality is assessed as 100% if everything tallies or otherwise quality computed as zero

% of Graphs with salient features = Total Graphs with all the features / Total Graphs featured in the web site

The Quality of the Graphs Is Computed As Per the Table Below

Table 15: Quality of the Graphs based on the number of features supported

% of graphs with salient features	40	60	80	100
Quality Value	0.25	0.50	0.75	1.00

Total quality of the Graphics compute as TGRAPHICSQ = $\sum^{n}$ Graphicsqi
Where n = featured Graphics Assessing Quality of Animations

Animations rarely used for displaying the meaning of web content. Animations used for showing some special effects of an occurrence. The quality of animation assessed in terms of frames used, duration of the animation, and the rate of streaming of the animations. The quality of the animations hosted on the WEB is computed considering all the animations and the features with which animation displayed. Following tables and expressions can be used to calculate the quality of videos

The total quality of all the videos taken together = QANIMATIONS = $\sum^{n}$ Qanimations[i]

Where n = total number of Animations and Animation [i] = quality of i^{th} Animation

The quality of each animation is computed, considering features that include frames, duration, and rate of animation.

Table 16: Number of Frames Used

Number of frames	20-30	30-40	40 -50	> 50
Quality Value	0.25	0.50	0.75	1.00

The Quality considering all animations considering the number Frames = QANIMATIONSF = $\sum^{n}$ Qanif[i]

Table 17: Assessing Duration of Animations

Duration in Secs	6	5	4	3
Quality Value	0,25	0.50	0.75	1.00

The Quality considering the duration of the Animations = QANID = $\sum^{n}$ Qanid[i]

Where n = total number of videos and Qanid[i] = quality of i^{th} animation

Table 18: Assessing Animation Rate

Animation rate	4	6	8	10
Quality Value	0,25	0.50	0.75	1.00

The Quality considering sizes of all the Animations QANIRATE = $\sum^{n}$ QaniR[i]

Where n = total number of videos and QaniR [i] = quality of i^{th} Animations

Total Quality considering all the animations computed as

TANIMATIONQ = QANIF + QANID + QANIRATE

Total quality of the entire Multimedia hosted on the WEB represented as

TMULTIMEDIA = TIMAGESQ * TVIDEOSQ * TAUDIOQ * TGRAPHICSQ * TANIMATIONSQ

4. CONCLUSION

The main of any website is information dissemination. The whole world is dependent on the content hosted on a web site. The content hosted on the web must be readable, complete, consistent, usable, and easily navigable. The content must be of high quality. In the case of lax on the quality of the content, the importance of the content lost, and the user will tend to not surf through the site anymore.

Most of the web sites are developed using most advanced technologies, and the content presented in different styles that attract the user by making the content more readable and understandable.

Multimedia objects are being used to present the content so that users understand the meaning of those objects. But the quality of these multi-media objects is an issue as many aspects considered in building the object. Any lapse on any of the features of the multimedia object will lose the sanctity of even looking at those objects.

The quality of a multimedia object dependent on many factors and each element must be graded on the inference engine to detect the level and score relating to the quality of each multimedia object. On any web site, there could be many multimedia objects. The quality of each object must be determined and combined with every other purpose to get the overall quality considering all the multimedia objects in total.

In this paper, a framework is presented using which the quality of a web site can be from the perspective of multimedia objects — the framework used for computing the quality of any web site. The structure also helps the web site developer to find the multimedia objects which are inferior in quality and, therefore, can work on the objects to improve the quality. In the framework, multimedia objects, which are images, videos, graphics, audios, and animations considered, and the structure can be extended to include other kinds of purposes.

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