

Design and Development of an online website tool to analyze the color visibility aspects for color blind people

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Abstract:

The web is one of the most revolutionary and global technique influencing every aspect of the people throughout the world. The web has become the most intelligible technique throughout the world which enables distribution of services through its websites. The increase in the web usage has given ample space for the web development being carried out in a planned and systematic manner. In design of web pages color combination is very important because it has a strong impact on the impression and accessibility of the information. The websites should be built in such a way that it should be equally accessible to all people of all ages. In this paper the author has analyzed various websites if they are visible to color blind people. For the sake of study author have selected a set of websites (commercial,government,educational, social networking and job portal)

which are most commonly accessed and the design for the same is equally accessible and viable to the color blind community as well.

Keywords: Color combination, web design, websites, color blindness.

Introduction:

According to a study conducted in May 2005, there were a total of over 11.5 billion pages [1], documents on the World Wide Web or Deep web. Same figure in March 2012 is around 55 billion pages [2]. There has been a significant increase in the number of Internet users. According to survey in year 2000 there were 394 million internet users and in year 2014 there are 2923 million internet users [3]. Because of this increasing number of Internet users, the development of websites and its accessibility to all the people around the world is becoming a major concern for organizations around the world. World Wide Web Consortium (W3C) published Web Content Accessibility Guidelines 1.0

in May 1999 [4]. The main aim of these guidelines is to make the content on the world wide web accessible to a wider range of people with disabilities including color blindness, complete blindness, low vision, deafness and hearing loss, learning disabilities, cognitive limitations, limited movement, speech disabilities, photo sensitivity or combinations of these [5]. Color blindness or color deficiency is the inability or decreased ability to see color, or perceive color differences under normal lighting conditions. Color blindness affects a significance percentage of population [6]. There is no actual blindness but there is a deficiency of color vision. The color blindness is of the following types: a) Monochromacy: If there is no cone or only one type of cone present at retina of eye then it is called Monochromacy. In Monochromacy, a person is unable to see any color. Everything seems to be black, white and gray. b) Protanopia: Protanopia is manifested as red-green color blindness which is caused by lack of retinal photoreceptors. c) Deuteranopia: Deuteranopia is similar to protanopia in that red and green are almost indistinguishable. However, the cause of the condition is slightly

different, in that it is the green receptors in the eye that are missing. d) Tritanopia: Tritanopia color blindness is manifested with a blue – yellow variation due to the lack of blue receptors [7].

Methodology:

Problem Identification:

According to the Web Content Accessibility Guidelines 1.0, foreground and background color combinations should provide sufficient contrast when viewed by someone having color deficits or when viewed on a black and white screen. On analyzing the various websites the authors have found that there are number of websites which violates certain set of guidelines which in turn makes these websites inaccessible to a certain section of society including color blind people. The authors have also found out that these websites have chosen such a color combination that makes color blind people not making proper access to these websites and hence they cannot make use of the information provided on these websites.

Online tool: Website Design Evaluator is a tool developed by us to help the web designer to analyze the

performance of a web page on the basis of color combination used. Since WebPages are accessed by a large group of globally distributed people with different kinds of requirements and disabilities. Therefore, the webpage developers and designers must take into account the various issues related to the user. Website Design Evaluator is of great use to the designers as it provides them with a handful of information regarding a webpage’s design. It helps them in shaping their websites as according to the standards provided so that it can be accessible to maximum of the users meaningfully.

Sample data: The authors have taken a sample of 100 websites, 20 from each category i.e. commercial websites, educational websites and government websites, social networking websites and job portal websites. Since these websites are the most accessed websites which involve heavy web traffic so they can be considered as the top most centers of knowledge and the analysis of these websites shall be the reflection of the performance evaluation of other websites in the region too.

TABLE 1: Government Websites

S.NO	Total Tags	No. of VisibleTags	No. of non-visible tags
1	41	41	0
2	22	22	0
3	54	54	0
4	23	23	0
5	6	6	0
6	23	23	0
7	52	52	0
8	86	86	0
9	26	26	0
10	7	7	0
11	4	4	0
12	63	62	1
13	12	10	2
14	27	17	10
15	82	76	6
16	18	16	2
17	75	61	14
18	104	86	18
19	349	328	21
20	281	259	22

TABLE 2: Commercial Websites

S.NO	Total Tags	No. of Visible Tags	No. of non-visible tags
1	1	0	1
2	144	142	2
3	105	103	2
4	32	29	3
5	115	111	4
6	143	137	6
7	49	43	6
8	175	168	7
9	92	84	8
10	143	131	12
11	400	384	16
12	211	193	18
13	1057	1034	23
14	155	128	27
15	195	151	44
16	357	310	47
17	222	164	58
18	32	32	0
19	29	29	0
20	82	82	0

TABLE 3: Educational Websites

S.NO	Total Tags	No. of Visible Tags	No. of non-visible tags
1	13	13	0
2	484	484	0
3	247	247	0
4	24	24	0
5	11	11	0
6	47	47	0
7	84	84	0
8	104	104	0
9	20	20	0
10	79	79	0
11	425	420	5
12	174	169	5
13	92	85	7
14	109	101	8
15	248	235	13
16	193	179	14
17	340	323	17
18	102	83	19
19	321	299	22
20	140	117	23

TABLE 4: Social Networking Websites

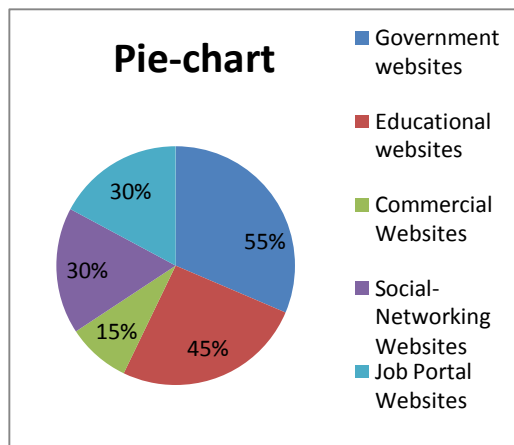
S.NO	Total Tags	No. of Visible Tags	No. of non-visible tags
1	11	11	0
2	19	19	0
3	11	11	0
4	55	55	0
5	11	11	0
6	59	59	0
7	12	11	1
8	52	50	2
9	28	24	4
10	101	95	6
11	65	56	9
12	216	203	13
13	156	140	16
14	60	42	18
15	282	265	17
16	323	304	19
17	113	90	23
18	165	139	26
19	394	329	65
20	428	328	100

TABLE 5: Job Portal Websites

S.NO	Total Tags	No. of Visible Tags	No. of non-visible tags
1	13	13	0
2	7	7	0
3	9	9	0
4	147	147	0
5	19	19	0
6	396	396	0
7	42	41	1
8	1	0	1
9	33	31	2
10	266	260	6
11	49	43	6
12	7	5	2
13	159	152	7
14	92	89	3
15	245	240	5
16	178	167	11
17	71	59	12
18	253	239	14
19	318	281	37
20	336	284	52

Results and Discussions:

By analyzing the statistics from the below table, the authors have found out that 11 out of 20 government websites are accessible to color blind people. Further, 9 out of educational websites are accessible to color blind people. And 6 out of 20 social networking and job portal websites are accessible to color blind people. And only 3 out of 20 commercial websites are developed after taking into consideration of color blind people.



Conclusion:

The investigations carried out in this paper are sufficient to find out that the websites are not developed by considering color blind people. From the above analysis, the authors have

found out that the websites are neglecting guidelines approved and recommended for the development of websites by W3C. Further the website developers must also be educated regarding the standards to be followed and the pros and cons of ignoring them.

Further Scope:

As a further work a larger set of websites can be evaluated for permissible color combinations. Further the website can also be evaluated for other parameters like page loading speed, text font size and browser compatibility etc. Moreover, the users are the best evaluators so they must be considered for taking feedbacks.

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