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Title

QUALITY OF WEB SITES – A STUDY ON SOME STANDARD INDIAN UNIVERSITIES

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Abstract:

The main objective of this study is to investigate the websites of some standard Indian universities and their accessibility and utility to various users. Thus the main investigation is to analyze various characteristics connected with these websites to assess the quality. To begin with, it is attempted to investigate various faults occurring in the websites of 30 universities. The aim is to focus on these **faults (major or minor)** and to suggest corrections. The study has in depth analysis and categorizing the vital few major and minor faults which contribute to the confusion and wasting of precious time of users. The study is based on **"Pareto principle ".** The modules of the university web sites studied are various departments, courses offered, admission, administration, libraries, faculties etc.

KEYWORDS: Indian Universities, Pareto principle, Service quality, Websites.

INTRODUCTION:

WEB is a computer programming system created by Donald Knuth as the first implementation of which is called a "literate programming": the idea that one could create software has works of literature, by embedding source code inside descriptive test. In the present days the internet has quietly become the body of the business world with Web Applications as brain. The quality attributes of Web Application include reliability, availability, interoperability and security. The growth of internet users was multiplied year by year since 1990s.

Web consists of two primary programs:

(1)TANGLE which produce compliable code from source text.

(2)WEAVE of which produces nicely formatted printable documentation.

Definition of web site:

A web site is a collection of web pages containing text, images, audio and videos. The complete structure of the internet is made up of websites a mode of sharing information on the

internet. Web sites are designed and developed for a wide variety of organizations in areas such as education, business, research, web banking, stock exchange on the web, web games.

Introduction to Web Applications: Web Applications are software programs that operate on internet, interacting with user through Web Browser. The organization of Web Application is divided into three tiers. They are Web Browser, Web Server and Database Server. The information in the application is processed tier by tier. The user interacts through Web Browser, programming logic is performed in Web Server and database operations are completed in Database Server. Hence Web Application model is known as Three-Tier application architecture. All these tiers are communicated through HTTP protocol.

Web Browser: The Web Browser is capable of retrieving requested hypertext documents from the Web Server via HTTP protocol. The browser also embeds a Java Virtual Machine and JavaScript interpreter to execute the Java Applets or JavaScript's specified in the documents. Additional information processors such as Active X Controls are also embedded in the browser to extend its functionality.

Web Server: The contents of Web Applications (HTML documents, image files or program) are stored in Web Server. An HTTP protocol is placed at the Web Server to accept HTTP requests from the browsers. According to the Web Server's configuration, it may forward a request to

i. The document retriever serving stored HTML documents, Java Applets or multimedia files
ii. The other information processors on the Web Server such as CGI programs for dynamically generated HTML documents and contents.

Database server: Database access interfaces such as ODBC (Open Database

Connectivity) and JDBC (Java Database Connectivity) are used to connect Web applications with database servers. The communication between Web Application components may also flow through plain TCP sockets, Java RMI (Remote Method Invocation) or CORBA (Common Object Request Broker Architecture).

Methodology:

The World Wide Web consortium (W3C) a non profitable organization developed for setting or evolving the web standards under the chairmanship of inventor of web Sir Tim Berners-Lee. Thus the web application needs to oblige certain standard for the utility of the users. Therefore in this study a pilot survey of some universities web sites were considered to evolve quality norms of the web sites for the better accessibility criteria. Basically in this study it is motivated to consider few university web sites for verification and assurance of the quality in order to see the utility and accessibility of them to the end users. In this connection 30 web sites of the universities are investigated during October and December 2007.These university webs accessibility was evolved using world wide web consortium (W3C) guide lines and found the information such as faults in web pages which are categories as minor and major, the average down time per page of the web site etc. The data was collected on the 30 universities and tabulated and seen in table 1

The World Wide Web (W3C) defines a set of guidelines for quality web design. Some of the important guidelines are as follows.

- Provide a text equivalent for every non-text element
- Do not relay on color schemes only.
- Use mark up and style sheets instead of images to convey information.
- Clearly mention the text information of web page with natural language.
- Use tables properly in the web document.
- Ensure that web pages featuring new technologies transform gracefully.
- Ensure user control of time sensitive content changes.
- Ensure direct accessibility of embedded user interface.
- Design of device—independence.
- Provide context orientation information.
- Provide clear navigation mechanisms.
- Ensure that documents are clear and simple.

DATA & ANALYSIS:

During the investigation of web application the following characteristics are collected

a. No. Of pages of website

b. Total size of web sites (kbs)

c. Total down time (sec per kbs)

d. Total no. Of faults (minor and major)

e. No. Of broken links

f. Average no. of faults per web page

g. Average size in each web page (kbs)

h. Average down time per page

Table.1: Detailed information of web sites using W3C guide lines on some important characteristics.

S.No	University name	web site	(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)
1	Acharya Nagarjuna University	www.nagarjunauni.org	115	7176402	1987	4395	31	38.22	62403.5	17.28
2	Alagappa University	www.alagappauni.ac.in	127	8272036	2290	4216	36	33.19	65134.14	18.03
3	Anna university	www.annuni.edu	117	6187357	1713	2145	21	18.33	52883.39	14.64
4	Assam University	www.assamuni.in	58	3197361	885	3689	23	63.6	55126.91	15.26
5	Bangalore University	www.bub.ernet.in	659	18297162	5065	19555	117	29.67	27765.04	7.686
6	Bharathidasan University	www.bdu.ac.in	159	7263910	2011	4596	38	28.91	45684.97	12.65
7	Bharatiar University	www.b-u.ac.in	182	7571965	2096	5568	29	30.59	41604.2	11.52
8	Guru Jambeshwar University	www.giu.ernet.in	101	5112758	1415	4685	31	46.39	50621.37	14.01
9	I.G.N.open university	www.ignou.ac.in	252	9881675	2736	4573	56	18.15	39213	10.86
10	J.N.T.university	www.jntu.ac.in	91	5663958	1568	3885	28	42.69	62241.3	17.23
11	Jawaharlal Nehru University	www.jnu.ac.in	224	8749265	2422	8894	67	39.71	39059.22	10.81
12	Kakatiya University	www.kakatiya.ac.in	182	7928718	2195	6584	56	36.18	43564.38	12.06

13	University of Kerala	www.keralauni.edu	175	7762891	2149	5839	65	33.37	44359.38	12.28
14	Mangalore university	www.mangalore.ac.in	192	8256715	2286	6428	45	33.48	43003.72	11.91
15	Mumbai University	www.mu.ac.in	209	8528175	2361	6892	47	32.98	40804.67	11.3
16	Nagpur University	www.nagpuruni.org	155	6872167	1902	5481	67	35.36	44336.56	12.27
17	North Bengal University	www.nbu.ac.in	208	8321769	2304	5619	32	27.01	40008.5	11.08
18	North Gujarat University	www.ngu.ac.in	268	9528179	2638	5896	43	22	35552.91	9.843
19	North Maharashtra University	www.nmu.ac.in	97	5808462	1608	4017	28	41.41	59881.05	16.58
20	Osmania University	www.osmania.ac.in	283	9864729	2731	5789	28	20.46	34857.7	9.65
21	Pondichery University	www.pondiuni.org	229	9521763	2636	2299	11	10.04	41579.75	11.51
22	Punjab Technological University	www.ptu.ac.in	113	5607321	1552	3489	43	30.88	49622.31	13.73
23	Rajiv Gandhi University	www.rgu.ac.in	157	6082654	1684	5389	48	34.32	38743.02	10.73
24	R.S.Vidyapeetha	http://rsvuni.ac.in	63	3287466	910	2407	29	38.21	52182	14.44
25	Sri krishnadevaraya University	www.skuni.org	92	6173292	1709	3544	34	38.52	67101	18.58
26	Sri Venkateswara University	www.svuni.in	119	6248216	1730	3879	37	32.6	52506.02	14.54
27	University of Calcutta	www.caluni.ac.in	140	6478258	1793	4263	45	30.45	46273.27	12.81
28	University of Delhi	www.du.ac.in	489	12846398	3556	18266	87	37.35	26270.75	7.272
29	University of Hyderabad	www.uohyd.ernet.in	183	7826493	2167	4814	17	26.31	42767.72	11.84
30	University of Mysore	www.uni-mysore.ac.in	166	6483965	1795	4612	36	27.78	39060.03	10.81

Pareto analysis – A detailed study on various faults occurring in some Universities web sites:

Utilizing the data collected and seen in the table.1, Pareto analysis is carried and evolved the **vital few major and minor** and also **trivial many major and minor** design faults that are occurring in web pages reason wise & University wise respectively and tabulated and seen in tables 2 to 7.

Table .2: Minor web design faults reason wise in various web sites of 30 universities

S. No	Code	Reason of fault	No. of. faults
1	A	Table Tag	50526
2	B	Body Tag	16216
3	C	Image	23106
4	D	Frame	4585
5	E	Head Tag	5806
6	F	Font Tag	14160
7	G	Script	12635
8	H	Style	1867
9	I	Form Tag	4833
10	J	Link Tag	1312
11	K	Others Tag	10409

Table.3: Pareto analysis of Minor Web site faults – Reason wise:

S. No	Code	Reason of fault	# faults	Cumulative faults	Cumulative Relative faults	Cumulative faults Percentage
1	A	Table Tag	50526	50526	0.3474	34.737
2	C	Image	23106	73632	0.5062	50.622
3	B	Body Tag	16216	89848	0.6177	61.77
4	I	Font Tag	14160	104008	0.7151	71.505
5	G	Script	12635	116643	0.8019	80.192
6	K	Other Tag	10409	127052	0.8735	87.348
7	E	Head Tag	5806	132858	0.9134	91.34
8	I	Form Tag	4833	137691	0.9466	94.662
9	D	Frame	4585	142276	0.9781	97.814
10	H	Style	1867	144143	0.991	99.098
11	J	Link Tag	1312	145455	1	100

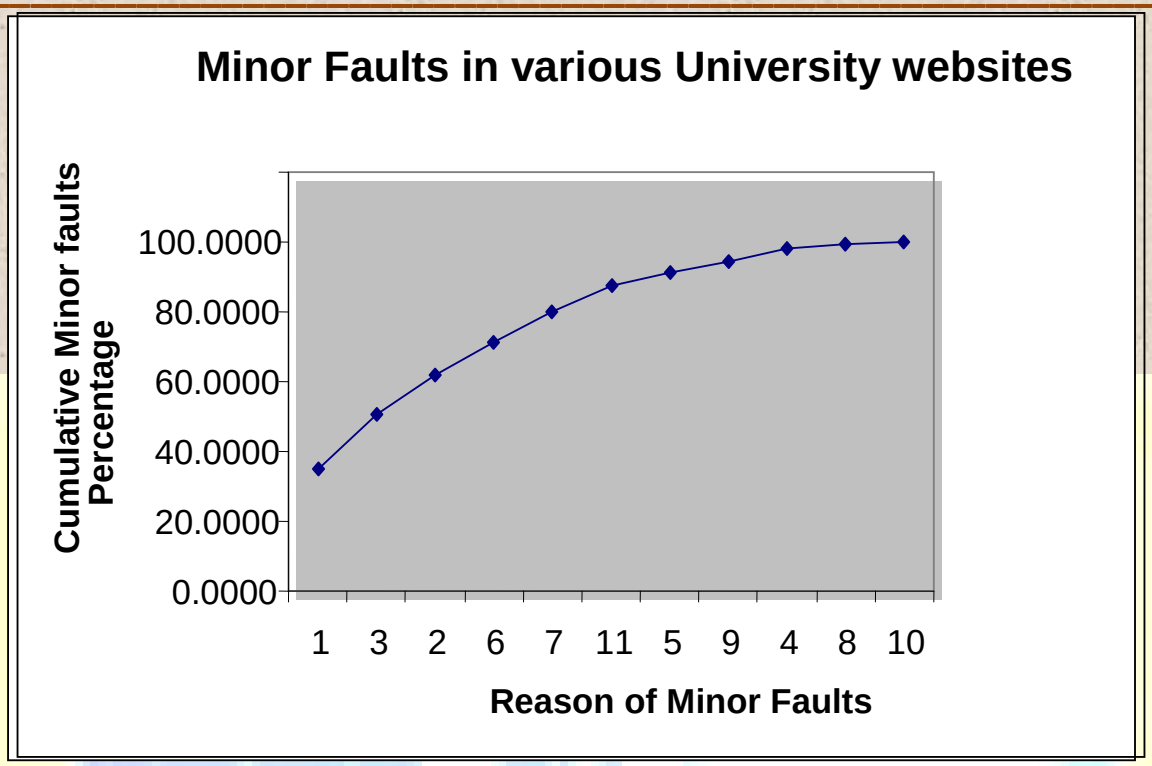

Fig.3 -- Minor faults in various University websites – Reason wise

Table.4: Major web design faults in various web sites of 30 universities – Reason wise:

S. No	Code	Reason of fault	No .of. faults
1	A	Title tag	4101
2	B	Document Applet	5234
3	C	Frames Tag	3896
4	D	Connectivity	1993
5	E	User Server	3352
6	F	Broken Linkage	1367
7	G	Image load	5052

Table.5: Pareto analysis of Major Web site faults – Reason wise:

S. No	Code	Reason of faults	# faults	Cumulative faults	Cumulative relative faults	Cumulative faults percentage
1	B	Document Applet	5234	5234	0.209402	20.94019
2	G	Image Load	5052	10286	0.411522	41.15223
3	A	Title Tag	4101	14387	0.575595	57.55951
4	C	Frames Tag	3896	18283	0.731466	73.14663
5	E	User Server	3352	21635	0.865573	86.55731
6	D	Connectivity	1993	23628	0.945309	94.53091
7	F	Broken Linkage	1367	24995	1	100

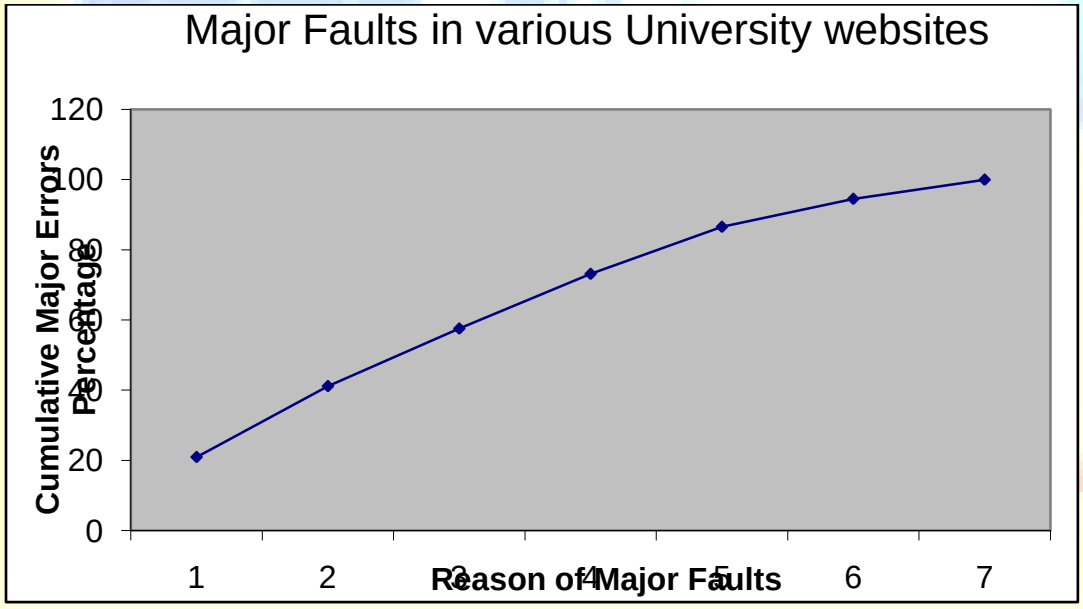

Fig.4 - Major faults in Various University websites – Reason wise

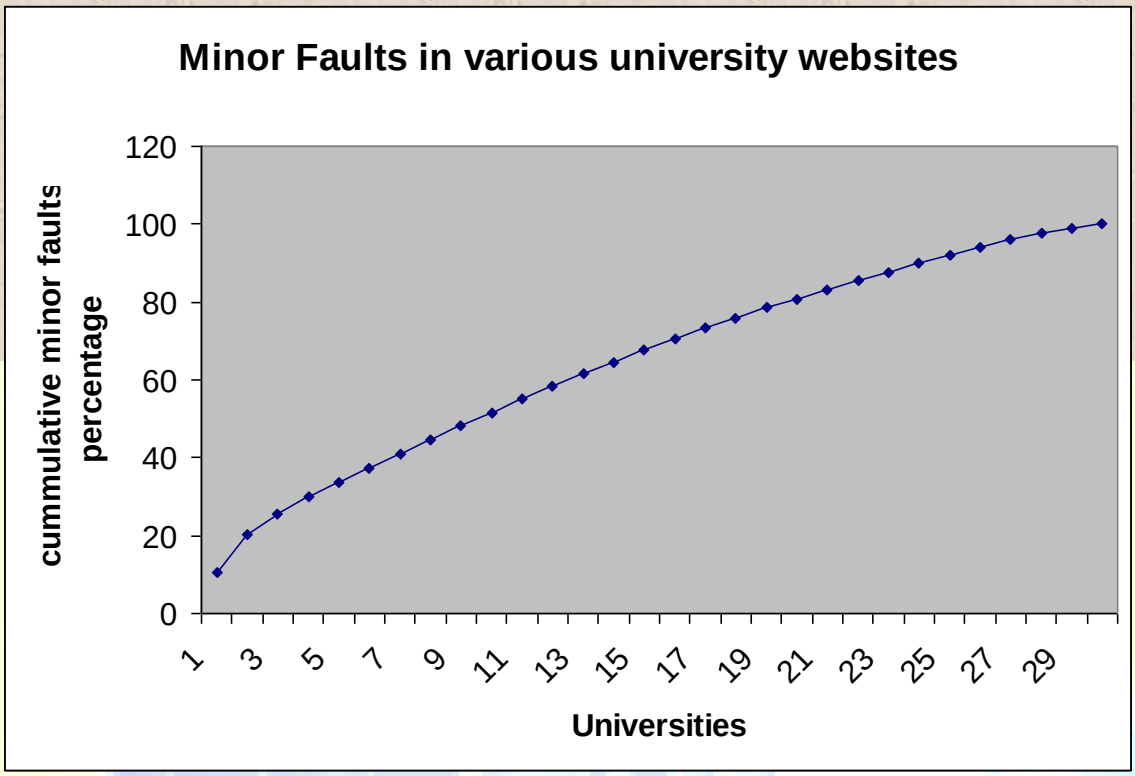

Fig.5 – Minor faults in various web sites – University wise

Table 6: Pareto Analysis on minor faults in 30 web sites - University wise:

S.No	University	# minor faults	Cumulative minor faults	Relative minor faults	Cumulative percentage of minor faults
1	University Of Hyderabad	15084	15084	0.1069	10.69
2	Bangalore University	13385	28469	0.2018	20.17
3	Jawaharlal Nehru University	7716	36185	0.2564	25.64
4	Nagpur University	5872	42057	0.298	29.8
5	Mumbai University	5494	47551	0.337	33.69
6	Mangalore University	5219	52770	0.374	37.39
7	Pondichery University	5135	57905	0.4104	41.033
8	North Gujarat University	5087	62992	0.4464	44.64

9	Rashtriya Sanskrit Vidyapeetha	4978	67970	0.4817	48.17
10	North Maharashtra University	4947	72917	0.5167	51.67
11	Bharatiar University	4915	77832	0.5516	55.15
12	Kakatiya University	4667	82499	0.5846	58.46
13	North Bengal University	4633	87132	0.6175	61.74
14	University of Mysore	4106	91238	0.6466	64.657
15	University of Kerala	4059	95297	0.6753	67.534
16	Indira Gandhi national Open University	4055	99352	0.7041	70.407
17	Bharathidasan University	3959	103311	0.7321	73.213
18	Guru Jambeshwar University	3936	107247	0.76	76.002
19	University of Delhi	3614	110861	0.7856	78.56
20	Acharya Nagarjuna University	3258	114119	0.8087	80.87
21	Jawaharlal Nehru Technological	3248	117367	0.8317	83.17
22	University of Calcutta	3242	120609	0.8547	85.47
23	Osmania University	3127	123736	0.8769	87.68
24	Alagappa University	3078	126814	0.8987	89.86
25	Assam University	3063	129877	0.9204	92.04
26	Sri Venkateswara University	2980	132857	0.9415	94.15
27	Rajeev Gandhi University	2886	135743	0.962	96.19
28	Anna university	1910	137653	0.9755	97.55
29	Sri krishnadevaraya University	1864	139517	0.9887	98.87
30	Punjab Technological University	1593	141110	1	100
	Total	141110			

Table .7: Pareto Analysis on major faults in 30 web sites – University wise

S. No	University	# faults	Cumulative faults	Cumulative Relative faults	Cumulative faults percentage
1	University of Delhi	3182	3182	0.1273	12.73055
2	Mumbai University	1917	5099	0.204	20.40008
3	Mangalore University	1178	6277	0.2511	25.11302
4	Assam University	1138	7415	0.2967	29.66593
5	Anna university	1137	8552	0.3421	34.21484
6	Pondichery University	949	9501	0.3801	38.0116
7	North Bengal University	934	10435	0.4175	41.74835
8	North Gujarat University	934	11369	0.4549	45.4851
9	Punjab Technological University	890	12259	0.4905	49.04581
10	North Maharashtra University	848	13107	0.5244	52.43849
11	University of Kerala	755	13862	0.5546	55.45909
12	Jawaharlal Nehru Technological	749	14611	0.5846	58.45569
13	Rashtriya Sanskrit Vidyapeetha	706	15317	0.6128	61.28026
14	Rajeev Gandhi University	654	15971	0.639	63.89678
15	Bharatiar University	653	16624	0.6651	66.5093
16	Indira Gandhi national Open University	653	17277	0.6912	69.12182
17	University of Hyderabad	649	17926	0.7172	71.71834
18	Guru Jambeshwar University	637	18563	0.7427	74.26685
19	Kakatiya University	637	19200	0.7682	76.81536
20	University of Calcutta	637	19837	0.7936	79.36387
21	Bharathidasan University	626	20463	0.8187	81.86837
22	Nagpur University	620	21083	0.8435	84.34887
23	Sri krishnadevaraya University	603	21686	0.8676	86.76135
24	Alagappa University	564	22250	0.8902	89.0178
25	Acharya Nagarjuna University	543	22793	0.9119	91.19024

26	Osmania University	532	23325	0.9332	93.31866
27	Jawaharlal Nehru University	518	23843	0.9539	95.39108
28	University of Mysore	506	24349	0.9742	97.41548
29	Sri Venkateswara University	411	24760	0.9906	99.05981
30	Bangalore University	235	24995	1	100
	Total	24995			

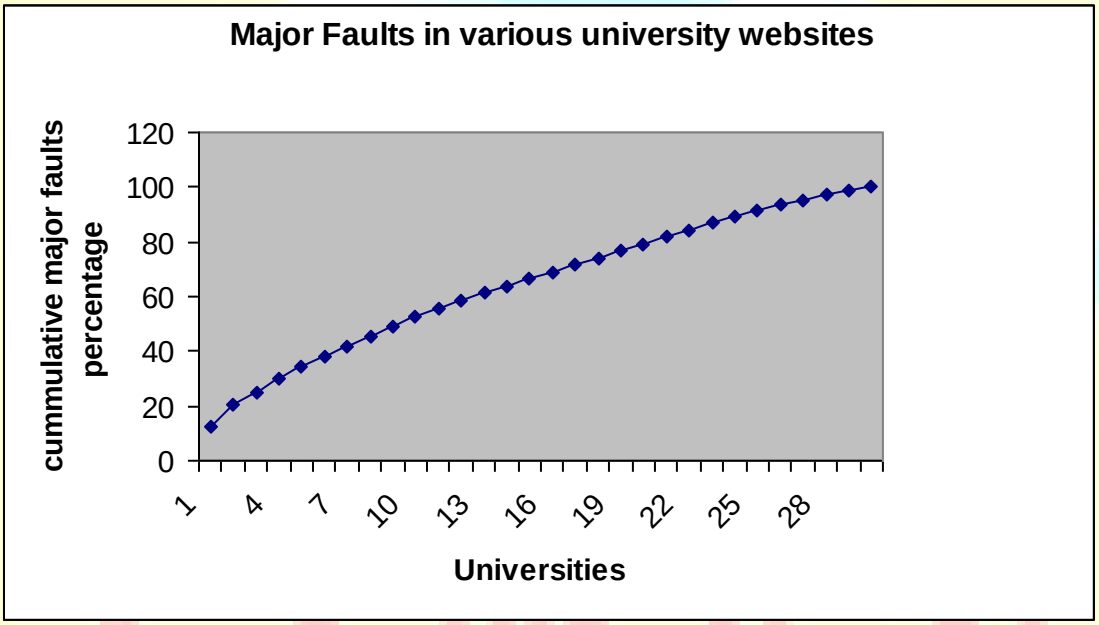

Fig.6 .Major faults in Web sites – University wise:

Conclusion and observations:

This study concerned with observing and analyzing the occurrence of different web design faults reason wise in the pages of University web sites using standard web tools W3C and Pareto principle.

(1) It is observed that 11 minor faults and 7 major faults are occurring in the various university web sites.

(2) Among these faults it is further found from Pareto principle that **4 minor faults** namely

- Table Tag
- Image
- Body Tag
- Font Tag

are found to be the **vital** and occurring with high intensity say 70% among the total faults. Thus these are the reasons vital few to contribute majority of the faults. Further the other 7 minor reasons are occurring with just 30% of the total faults are hence treated to be **trivial many**. Thus the 4 minor faults which are indicated above are vital reasons few to be attend to do away with them. The web designer in general is suggested to consider necessary remedial action in order to reduce them to a minimal level. Of course, this would improve considerably the web sites, so that they become more versatile and accessible to the satisfaction of the users with lowest quality of down time.

(3) Similarly it is found that **three major** faults namely

- Document Applet
- Image Load
- Title Tag

Committed predominantly by the web designers, which appear almost with 60% intensity. Therefore it is felt that these **three major faults** are treated to be vitals need much attention to review the design these web sites. This can improve the utility and accessibility of these web sites in a way the down time per page may significantly get improved.

(4) Also the study analyses the occurrence of faults in web sites universities wise. Thus it is observed that approximately 50% of total Universities considered for the study have accounted 70% of major and minor faults. The list of such universities is seen in S.NO 1 to 16 of table 6 & 7.

(5) The Universities sited in the list are those, which are contributing more no. of **minor and major faults**. Therefore it is suggested that these Universities shall make note of the fact and review the respective web sites in order to remove the so called major and minor faults occurring in these sites. This would bring check their University web sites to be better utility and accessibility to the users.

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