Load Time and Link Mapping: Enhancing SEO experience for Private University Websites in Maharashtra

Tiempo de Carga y Mapeo de Enlaces: Mejora de la Experiencia de SEO para Sitios Web de Universidades Privadas en Maharashtra

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ABSTRACT

This study focuses on evaluating the load time and link structure of the websites of private universities in Maharashtra. The objectives of the study include measuring the load time of the websites and comparing them to industry benchmarks, conducting a link mapping of the internal and external links and analyzing their structure and hierarchy, and providing recommendations for improving the load time and link structure based on the findings. Additionally, the study aims to analyze the structure and distribution of internal and external links on the websites of private universities in Maharashtra for search engine optimization. This study used python coding for data scraping. The findings of this study will help private universities in Maharashtra to enhance website performance, improve the user experience, and attract more potential students. By optimizing their websites for search engine optimization, these universities will be able to stay competitive and increase their online visibility. This study contributes to the body of knowledge on website optimization for private universities and provides practical recommendations for improving website performance and link structure.

Keywords: load time; link mapping; SEO; website.

RESUMEN

Este estudio se enfoca en evaluar el tiempo de carga y la estructura de enlaces de los sitios web de universidades privadas en Maharashtra. Los objetivos del estudio incluyen medir el tiempo de carga de los sitios web y compararlos con los puntos de referencia de la industria, realizar un mapeo de conexiones de los enlaces internos y externos y analizar su estructura y jerarquía, y brindar recomendaciones para mejorar el tiempo de carga y la estructura de enlaces en función de los resultados. Adicionalmente, el estudio tiene como objetivo analizar la estructura y distribución de los enlaces internos y externos en los sitios web de las universidades privadas de Maharashtra para la optimización de motores de búsqueda. Este estudio utilizó la codificación Python para el raspado de datos. Los hallazgos de este estudio ayudarán a las universidades privadas de Maharashtra a mejorar el rendimiento del sitio web, mejorar la experiencia del usuario y atraer a más estudiantes potenciales. Al optimizar sus sitios web para

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la optimización de motores de búsqueda, estas universidades podrán seguir siendo competitivas y aumentar su visibilidad en línea. Este estudio contribuye al conjunto de conocimientos sobre optimización de sitios web para universidades privadas y brinda recomendaciones prácticas para mejorar el rendimiento del sitio web y la estructura de enlaces.

Keywords: tiempo de carga; mapeo de enlaces; SEO; sitio web.

INTRODUCTION

Private universities in Maharashtra have gained significant importance in the higher education landscape of India. These institutions are rapidly expanding their programs and facilities to provide students with a diverse range of academic opportunities. With the increasing use of the internet for information and communication, university websites have become a vital source of information for students, faculty, and staff. Therefore, it is, crucial for these universities to ensure that their websites are not only accessible but also provide an optimal user experience (Lee & Park, 2012. One of the key factors influencing website user experience is website load time, which refers to the time it takes for a website to load in a user's browser (Vallez et al., 2022).

To understand the performance of private university websites in Maharashtra, measuring their load time can provide insights into their website speed and performance. In addition, mapping the links on these websites can help identify any issues with their website structure and navigation, which can impact the user experience (Patel et al., 2021). This research aims to measure the load time of a selected group of private university websites in Maharashtra and map their links to gain insights into their website structure and performance. This study can provide valuable insights for university web administrators and decision-makers to optimize their website design & content enhancer user satisfaction and ultimately support the goals of the institution (Torres-Samuel et al., 2018).

Internal links refer to links within a website that point to other pages within the same domain. They are also known as "inbound links" or "in-site links." Internal links are important for website navigation and user experience, as they allow users to easily access other relevant pages on the same website (Li et al., 2021). They also help search engine crawlers to understand the website structure and hierarchy.

External links, on the other hand, refer to links on a website that point to pages on other domains. They are also known as "outbound links" or "outgoing links." External links are important for providing additional information and resources to website users. They can also help improve website authority and search engine rankings by linking to high-quality and relevant external websites (Abassi, 2018).

Both internal and external links are important for website optimization and user experience. Internal links help users navigate the website and improve the overall structure and hierarchy of the website, while external links provide additional resources and help to establish website authority and credibility. It is important to balance both internal and external links on a website and ensure they are relevant, high-quality, and add value to the user experience.

The results of this research can also inform best practices in website design and development for private universities in Maharashtra and other regions of India. By implementing these best practices, universities can improve their website performance and user experience, which can contribute to the overall success of the institution.

OBJECTIVES

1. To measure the load time of the websites of private universities in Maharashtra and compare them to industry benchmarks.
2. To conduct a link mapping of the internal and external links on the websites of private universities in Maharashtra and analyse their structure and hierarchy.
3. To provide recommendations for improving the load time and link structure of the websites of private universities in Maharashtra based on the findings of the study.
4. To analyse the structure and distribution of internal and external links on the websites of private universities in Maharashtra for search engine optimization.

Literature Review

Web visibility assessment is a method used to evaluate the effectiveness of a website's online presence, reach, and impact. It involves analysing web analytics data, search engine optimization (SEO) strategies, and social media metrics to identify strengths and weaknesses in a website's online presence and provide recommendations for improvement.

Several studies have been conducted on the effectiveness of university websites using web visibility assessment. This literature review examines six articles related to library and information science (LIS) research. The articles cover a variety of topics, including the use of altmetrics to trace the visibility of Swedish LIS research articles, the web impact of Indian library associations, data mining in LIS, evaluation of smart library portal websites based on link analysis, online visibility of LIS academia in central universities of North-East India, and growth and visibility of LIS journals.

Abbasi's (2018.) article focuses on the use of altmetrics to trace the visibility of Swedish LIS research articles. The study found that altmetrics can provide a valuable tool for assessing the impact of research articles and can be used as an alternative to traditional citation-based metrics.

Chandra (2015) explores the web impact of Indian library associations. The study analyzes the websites of various library associations in India and identifies the most popular websites based on their web impact. The study found that the websites of the Indian Library Association and the Delhi Library Association were the most popular.

Bajpai and Dwivedi (2014) provide an overview of the use of data mining in the field of LIS. The article discusses the various data mining techniques that can be used in LIS research, including association rule

mining, clustering, and classification. The authors also identify the potential benefits and limitations of using data mining in LIS research.

Li et al. (2021) evaluate the smart library portal website based on link analysis. The study found that the quality of the links on the website was positively correlated with user satisfaction. The authors suggest that libraries should focus on improving the quality of their links to enhance the user experience.

Maurya et al. (2018) evaluate the online visibility of LIS academia in central universities of North-East India. The study uses scientometric analysis to assess the research output and online visibility of LIS faculty members in the region. The authors found that the online visibility of the faculty members was relatively low and suggest that universities should take steps to improve the online presence of their faculty members.

Finally, Singh et al. (2014) examine the growth and visibility of LIS journals. The study analyzes the growth of LIS journals over time and identifies the most influential journals in the field. The authors found that the number of LIS journals has increased significantly over the years, and suggest that this growth may be due to the increasing demand for LIS research.

In conclusion, the six articles reviewed in this literature review cover a range of topics related to LIS research, including altmetrics, web impact, data mining, smart library portals, online visibility, and journal growth and visibility. These articles provide valuable insights into the current state of LIS research and highlight some of the key trends and issues in the field.

METHODOLOGY

To measure the load time and map the links of private university websites in Maharashtra, the research utilized Python for data scraping. Python is a popular programming language widely used for web scraping, and it has several libraries for web scraping, such as Requests and Beautiful Soup. The research used the Requests library to request the web page and obtain its HTML content (Wang & Xu, 2017). The HTML content was then parsed using the Beautiful Soup library to extract the website's title.

The research selected a group of private universities in Maharashtra, and the URLs of their websites were used as input for the data scraping process. For each website, the load time was measured by calculating the difference between the start and end times of the request (Thomas & Willet, 2000; Wang & Vaughn, 2014). The Beautiful Soup library was also used to map the links on each website to gain insights into the website structure and navigation.

The data obtained from the data scraping process were analyzed using Python. The methodology used in this research provides a comprehensive and systematic approach to measure the load time and map the links of private university websites in Maharashtra(Gori & Witten, 2005). The use of Python for data scraping and analysis enables efficient data processing and visualization, which can provide valuable

insights for university web administrators and decision-makers to optimize their website design and content.

DATA ANALYSIS AND INTERPRETATION

A code uses requests to send a GET request to the URL and fetch the HTML content, and then uses BeautifulSoup to parse the content and extract all the links on the page. It then classifies each link as either internal or external based on whether it contains the domain name or starts with a forward slash. Finally, it prints out the total number and lists of internal and external links.

```python
import requests
from bs4 import import BeautifulSoup
from urllib.parse import urlparse

# Function to count the number of internal and external links
def count_links(url):
    # Send a request to the URL
    response = requests.get(url)

    # Parse the HTML content of the response
    soup = BeautifulSoup(response.content, 'html.parser')

    # Get the domain of the URL
    domain = urlparse(url).netloc

    # Count the number of internal and external links
    internal_links = 0
    external_links = 0
    for link in soup.find_all('a'):
        href = link.get('href')
        if href:
            if domain in href:
                internal_links += 1
            else:
                external_links += 1

    # Print the results
    print(f"Internal links: {internal_links}")
    print(f"External links: {external_links}")

# Example usage
count_links('https://adypu.edu.in/')

Internal links: 198
External links: 99
```

Figure 1: Python code for data

The table 1: lists 22 private universities in the state of Maharashtra, India, along with their corresponding website links.

Table 1: Universities and link

Sr.	University	Link
1	Ajeenkya D.Y. Patil University	https://adypu.edu.in/
2	Amity University	NA
3	ATLAS SKILLTECH UNIVERSITY	https://atlasuniversity.edu.in/

4	Chhatrapati Shivaji Maharaj University	https://csmu.ac.in/
5	D Y Patil International University	https://www.dypiu.ac.in/
6	D. Y. Patil Agriculture and Technical University	https://www.dyp-atu.org/
7	D. Y. Patil University	http://www.dypatil.edu/
8	Dr. Vishwanath Karad MIT World Peace University	https://mitwpu.edu.in/
9	Flame University	https://www.flame.edu.in/
10	G.H.Raisoni University	https://ghru.edu.in/
11	Hyderabad (SIND) National Collegiate University	https://hsncb.com/
12	MGM University	https://mgmu.ac.in/
13	MIT Art Design and Technology University	https://mituniversity.ac.in/
14	NICMAR University	https://www.nicmar.ac.in/
15	Sandip University	https://www.sandipuniversity.edu.in/
16	Sanjay Ghodawat University	http://www.sanjayghodawatuniversity.ac.in/
17	Somaiya Vidyavihar University	https://www.somaiya.edu/en
18	Spicer Adventist University	https://sau.edu.in/
19	Sri Balaji University	https://sau.edu.in/
20	Symbiosis Skills and Professional University (Formerly Symbiosis Skill and Open University)	https://sspu.ac.in/
21	Vijaybhoomi University	https://www.vijaybhoomi.edu.in/
22	Vishwakarma University	https://www.vupune.ac.in/

The analysis provides the researcher with important insights into the effectiveness of private university websites in Maharashtra in terms of web visibility assessment. By measuring the internal and external links on the university websites, the researcher can assess how easily the websites can be found and navigated by potential students, faculty, and other stakeholders.

The descriptive statistics table provides an overview of the sample size, minimum and maximum values, range, median, mean, standard devation, and variance for the internal and external links data. These statistics can be used to understand the distribution of the data and identify any outliers or patterns in the data.

The researcher can use the findings from the analysis to identify areas where the university websites can be improved to increase their web visibility and effectiveness. For example, if a university has a low number of external links, they can focus on building partnerships with other websites or organizations to increase their online presence. Additionally, if a university has a high number of internal links, they may need to simplify their website structure to make it easier to navigate for users.

The analysis can help private universities in Maharashtra to optimize their websites for better visibility, which can ultimately lead to increased enrolment, greater engagement with stakeholders, and improved reputation in the academic community.

Table 2: Link Analysis Result (Internal Link and External Link)

Sr.	University	Link	Internal links	External links
1	Ajeenkya D.Y. Patil University	https://adypu.edu.in/	198	99
2	Amity University	NA	NA	NA
3	ATLAS SKILLTECH UNIVERSITY	https://atlasuniversity.edu.in/	198	99
4	Chhatrapati Shivaji Maharaj University	https://csmu.ac.in/	3	130
5	D Y Patil International University	https://www.dypiu.ac.in/	1	143
6	D. Y. Patil Agriculture and Technical University	https://www.dyp-atu.org/	137	36
7	D. Y. Patil University	http://www.dypatil.edu/	5	454
8	Dr. Vishwanath Karad MIT World Peace University	https://mitwpu.edu.in/	541	53
9	Flame University	https://www.flame.edu.in/	30	194
10	G.H.Raisoni University	https://ghru.edu.in/	0	0
11	Hyderabad (SIND) National Collegiate University	https://hsncb.com/	17	30
12	MGM University	https://mgmu.ac.in/	140	43
13	MIT Art Design and Technology University	https://mituniversity.ac.in/	0	0
14	NICMAR University	https://www.nicmar.ac.in/	119	37
15	Sandip University	https://www.sandipuniversity.edu.in/	113	52
16	Sanjay Ghodawat University	http://www.sanjayghodawatuniversity.ac.in/	1	405
17	Somaiya Vidyavihar University	https://www.somaiya.edu/en	97	71
18	Spicer Adventist University	https://sau.edu.in/	0	0
19	Sri Balaji University	https://www.sbup.edu.in/	233	85
20	Symbiosis Skills and Professional University (Formerly Symbiosis Skill and Open University)	https://sspu.ac.in/	181	47
21	Vijaybhoomi University	https://www.vijaybhoomi.edu.in/	57	36
22	Vishwakarma University	https://www.vupune.ac.in/	9	211

Table 2: Link Analysis

Table3: descriptive statistics for two variables - Internal links and External links - for a sample of 22 universities. For this study has excluded Amity University, because this university has an integrated link. "O" due to this university having an integrated link.

For the Internal links variable, the sample size (n) is 22, the minimum value is 0, and the maximum value is 541. The range, which is the difference between the maximum and minimum values, is 541. The median is 97, which indicates that 50% of the universities have less than 97 internal links and 50% have more than 97 internal links. The mean is 99.36, which is slightly higher than the median, suggesting that the distribution may be slightly skewed to the right. The standard deviation is 147.57, which is a measure of the spread of the data around the mean. The variance, which is the square of the standard deviation, is 21789.34.

For the External links variable, the sample size (n) is also 22, the minimum value is 0, and the maximum value is 454. The range is 454, which is the difference between the maximum and minimum values. The median is 43.5, which indicates that 50% of the universities have less than 43.5 external links and 50% have more than 43.5 external links. The mean is 77.27, which is higher than the median, suggesting that the distribution may be slightly skewed to the right. The standard deviation is 115.57, which is a measure of the spread of the data around the mean. The variance, which is the square of the standard deviation, is 13367.98

Descriptive Statistics	Internal Links	External Links
Sample size (n)	22	22
Minimum	0	0
Maximum	541	454
Range	541	454
Median	97	43.5
Mean	99.36	77.27
Standard deviation	147.57	115.57
Variance	21789.34	13367.98

Table 3: Link Calculation

This analysis provides readers with a clear understanding of the descriptive statistics for two variables - Internal links and External links - for a sample of 22 universities. It presents information on the range, median, mean, standard deviation, and variance for each variable (Craig, 1986).

For the Internal links variable, the data ranges from 0 to 541, with a median of 97, and a mean of 99.36. The standard deviation of 147.57 indicates that the data points are spread out quite a bit from the mean. On the other hand, the External links variable ranges from 0 to 454, with a median of 43.5 and a mean of 77.27. The standard deviation of 115.57 suggests that the data points are less dispersed than the Internal links variable(Lim & Park, 2013; Wang & Vaughan, 2014).

These descriptive statistics can help readers to understand the distribution of Internal and External links for the sample of 22 universities. The data suggests that internal links have a wider range and more dispersion compared to External links. All the universities present HEI (Higher Education of India), as these universities fall under state of Maharashtra, India.

Table 4: Analysis of Load time

Sr.	University	Link	Load time
1	Ajeenkya D.Y. Patil University	https://adypu.edu.in/	1.61
2	Amity University	NA	NA
3	ATLAS SKILLTECH UNIVERSITY	https://atlasuniversity.edu.in/	0.15
4	Chhatrapati Shivaji Maharaj University	https://csmu.ac.in/	0.17
5	D Y Patil International University	https://www.dypiu.ac.in/	0.83
6	D. Y. Patil Agriculture and Technical University	https://www.dyp-atu.org/	0.4
7	D. Y. Patil University	http://www.dypatil.edu/	3.91
8	Dr. Vishwanath Karad MIT World Peace University	https://mitwpu.edu.in/	0.22
9	Flame University	https://www.flame.edu.in/	1.03
10	G.H.Raisoni University	https://ghru.edu.in/	0
11	Hyderabad (SIND) National Collegiate University	https://hsncb.com/	NA
12	MGM University	https://mgmu.ac.in/	0.35
13	MIT Art Design and Technology University	https://mituniversity.ac.in/	0.94
14	NICMAR University	https://www.nicmar.ac.in/	0.93
15	Sandip University	https://www.sandipuniversity.edu.in/	0.3
16	Sanjay Ghodawat University	http://www.sanjayghodawatuniversity.ac.in/	0.37
17	Somaiya Vidyavihar University	https://www.somaiya.edu/en	0.49
18	Spicer Adventist University	https://sau.edu.in/	0.24
19	Sri Balaji University	https://www.sbup.edu.in/	0.66
20	Symbiosis Skills and Professional University (Formerly Symbiosis Skill and Open University)	https://sspu.ac.in/	1.79
21	Vijaybhoomi University	https://www.vijaybhoomi.edu.in/	0.98
22	Vishwakarma University	https://www.vupune.ac.in/	0.76

Table 4: Load time

Figure 2: the provided code is a Python script that measures the load time of a website and prints the title of the website along with the time it took to load. The script uses the 'requests' library to send an HTTP request to the website and receive a response, and the 'BeautifulSoup' library to parse the HTML content of the website and extract the title. The load time is calculated by measuring the time it takes to receive the response and subtracting the time it took to send the request. The code could be useful for individuals or organizations interested in monitoring the performance of their own website or other websites.

```
In [14]: import requests
         from bs4 import BeautifulSoup
         import time

         websites = ['https://www.flame.edu.in/']

         for website in websites:
             start_time = time.time()
             response = requests.get(website)
             end_time = time.time()
             load_time = end_time - start_time
             soup = BeautifulSoup(response.content, 'html.parser')
             title = soup.title.string.strip()
             print(f'{title} took {load_time:.2f} seconds to load')

         FLAME University | The Pioneers of Liberal Education in India took 1.03 seconds to load
```

Figure 2: Python code for Load time retrieval

The table provides a list of universities along with their website links and load times. Load time refers to the time it takes for a website to load and become fully functional in a web browser. From the table, we can see that load times vary significantly across universities, with the fastest load time being 0.15 seconds for ATLAS SKILLTECH UNIVERSITY and the slowest load time being 3.91 seconds for D. Y. Patil University(Lim & Park, 2013).

It is important to note that some universities do not have load times listed in the table. This could be because the load time was not measured or reported, or it could be due to some other reason such as an error in data collection. The universities without listed load times are Amity University, G.H.Raisoni University, and Hyderabad (SIND) National Collegiate University.

The table appears to rank the universities based on their load time, with the fastest load time universities listed at the top and the slowest load time universities listed at the bottom. However, it is important to note that the table does not explicitly state the ranking criteria, so this interpretation is based on the assumption that load time is the determining factor for ranking.

This table could be useful for individuals who are interested in accessing these university websites quickly. However, it is important to keep in mind that load times can vary depending on various factors such as internet speed, device used, and server load, so the load times listed in this table may not be representative of all users' experiences.
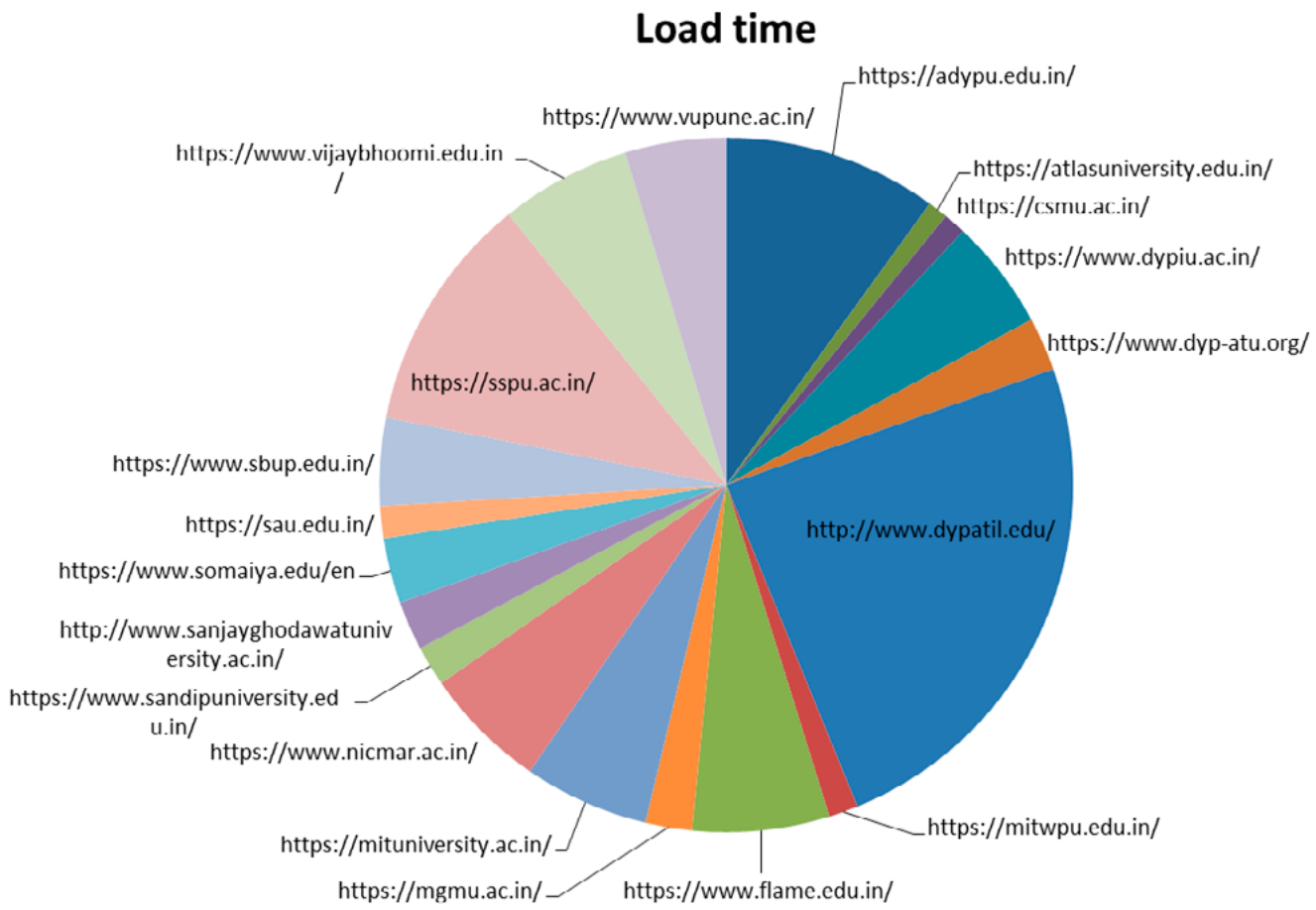
Figure 3: Load time

CONCLUSION

In general, measuring the load time and link mapping of a website can provide valuable insights into its performance and user experience. Load time is an important factor that affects a website's performance and user engagement. A slow-loading website can lead to a poor user experience, increase bounce rates, and negatively impact search engine rankings. Measuring load time can help website owners identify performance issues and optimize their website for faster loading times.

Link mapping, on the other hand, involves analysing the internal and external links on a website to understand its structure and hierarchy. This can help website owners identify areas for improvement in terms of user navigation and information architecture.

In conclusion, measuring the load time and link mapping of a private university website in Maharashtra can provide valuable insights into its performance and user experience. Website owners can use this information to identify areas for improvement and optimize their website for better user engagement and search engine rankings.

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