Soraya Sedkaoui · Mounia Khelfaoui
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Khalida Mohammed Belkebir *Editors*

International Conference on Managing Business Through Web Analytics

Springer

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Preface

The price of light is less than the cost of darkness.

(Arthur C. Nielsen)

Data is the raw material of the future – and this especially applies to business. Companies have increasingly incorporated data analysis into their overall strategy to understand their customers better and achieve greater success. Large companies such as Amazon, Google, Netflix, Facebook, Twitter, Walmart, and eBay, among others, are showing how future business decision-making can be automated and personalized on the basis of real-time and continuous data analysis.

Until a few years ago, data analytics machine learning and algorithms were exclusively a topic of scientific discussions, but today they are increasingly finding their way into everyday-life products. At the same time, the amount of data produced and available is growing due to increasing digitization, the integration of digital measurement and control systems, and the automatic exchange between devices (the Internet of Things).

Algorithms and data analysis, and thus the systematic collection, are increasingly forming the basis of the business playground. The potential of data-driven business is promising, but the professional handling of data raises many questions in practice. Technical requirements and data protection aspects, but, above all, the choice of the proper methods, present companies with major challenges.

Data is now being integrated into day-to-day operations rather than being used only for specific projects. This integration is driven by the business user and takes place in two ways: first, through big data capabilities on top of existing business applications; secondly, through the creation of new analytical tools designed explicitly for business units, with a graphical interface and intuitive handling.

The search for improved performance and positioning of organizations grows as the "digital presence" assumes strategic importance in regularly obtaining better visibility of specific audiences. Online business dominance continues to grow, and no business can afford to be absent today from the online universe. Having a website is much more than just putting the pages online. If companies want to generate

results for their business, they must constantly optimize. Therefore, the process of webpage analysis is essential in the digital world.

Choosing the right channels and content to build relevance in the recipient's eyes is a major challenge for companies. The growth of corporate use of the *Web* consolidates interactive sites with the growth of users of Facebook, Twitter, LinkedIn, Flicker, and others and sharing content with collaborative production via wikis and recommendation websites.

In this context, it is important to understand the attitudes of consumers who, with mobile access to the Web and connectivity in social media, share their shopping experiences and increase m-commerce and collective purchasing groups. In order to better understand, control, and improve online actions, metrics are essential analyses. Metrics are performance measures that must be aligned with the organization's strategy.

The development of metrics for multiple media increases the amount of useful information about the consumption profile, enabling the optimization of digital strategies for targeted audiences. The measurement and continuous monitoring of business actions lead to knowledge of consumer behavior, not only in variables such as frequency, recency, and purchase value but also in terms of engagement and interaction with the product and brand.

In order to measure the efficiency of the business performance, appropriate tools are required: the so-called "Web analytics" tools, which deal with the evaluation of business and marketing success. Metrics models and Web analytics provide a basis for developing digital strategies that keep an eye on consumption in real-time.

Web analytics is an emerging concept that reflects the increasing importance of data generated by the Web. It has been growing ever since the World Wide Web development. Over time, it has evolved from a simple HTTP (Hypertext Transfer Protocol) traffic logging function to a more comprehensive set of a usage data tracker, analyzer, and report functions.

Web analytics is the monitoring of websites so that companies can better understand the complex interactions between the actions of visitors and the offers that their websites have and provide information to increase customer loyalty and sales.

Web analytics is used for different business contexts, including traffic monitoring, e-commerce optimization, marketing/advertising, Web development, analyzing and improving online customer experience and website profitability, information architecture, website performance improvement, and Web-based campaigns/programs.

There are currently many unanswered questions in theory and practice that affect the intersection of professional data use and successful business presence. Best practice examples, understandable information on the legal basis, or Web analytics implementation in individual application areas are few and far between.

Cognitive applications and services, along with the evolution toward data-driven intelligence enabled by digital technologies, are positioned as the most relevant categories in future digital development. Against this background, the idea arose in early 2020 to bring together the perspectives of experienced representatives from

science and practice in an international event: The *International Conference on Managing Business through Web Analytics (ICMBWA 2021)*.

On the 13th of October 2021, in the Faculty of Economics at the University of Khemis Miliana, Algeria, we celebrated and shared knowledge on this exciting field. However, like many other conferences, we have had to adapt our practice in response to the impact of COVID-19.

This *International Conference* provided an important international forum to share knowledge, ideas, and results in theory, methodology, and applications manner, and discuss the role of Web analytics in formulating and orienting business strategies.

ICMBWA2021 was the meeting point for academics engaging in Web analytics and related fields to analyze all the opportunities offered by the new normal to implement measures based on data and algorithms. A space where a community was created, some solutions were discovered and discussed, and knowledge was shared. Throughout this day, many national and international academics participated in synthesizing, connecting the discussed ideas, and translating them into valuable knowledge.

Perspectives, technologies, and fields of application were presented in an implementation-oriented and theory-led manner – that was the ambitious idea. We are glad that we have been able to implement this project with many colleagues who (like us) stand equally for Web data and analytics.

All their contributions, presented in this book, provide an overview of the possibilities and limitations of Web analytics. Perspectives, technological aspects, and fields of application are explained and practically illuminated by economics, mathematics, and technology authors. In this way, decision makers receive a well-founded presentation of the current and future development of Web analytics as well as important basic reading.

This book provides the theoretical foundations and practical implications for the digital transformation of our economy, production, and customer relationships and thus offers a solid foundation for practitioners, academics, and scientists. The presentations are based on both business and technical aspects to provide a reference process model for structuring Web analytics in the company.

The basic Web analytics activities and dynamics, social network analysis and algorithms, management processes, marketing and implementation, and other special topics and application fields for Web analytics are explained. Numerous practical examples also inspire many activities in the digital world.

The book introduces the essential aspects of analyzing Web data using methods and algorithms for business in a condensed form, presents machine learning and the most important algorithms in a comprehensible form using the business analytics technology framework, and shows application scenarios from various industries.

The content of this book shows that there is no doubt that data has value and that some companies extract a better return than others on the data they have. However, value has many dimensions and is highly dependent on the context in which the data is or may be used. For this reason, it is necessary to think of data as an asset in

the same way that it is usual to consider others such as capital, human resources, or some intangibles such as patents, trademarks, and more.

The content of this book was wholly built based on the important contributions of all participants in this conference. For this, we would like to thank all the authors who actively contributed to this international conference, and the colleagues from university and practice who provided valuable impulses for this field. Special thanks also go to the Springer team, who has accompanied the book's creation in a competent and motivating manner.

Khemis Miliana, Algeria

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Mounia Khelfaoui
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About the Editors

Soraya Sedkaoui is a senior lecturer in econometrics, statistics, forecasting techniques, and probability at Khemis Miliana University. Her main areas of activity are big data analytics, computer science, machine learning, and the development of algorithms and models for business applications. She has many years of professional experience as a management consultant for strategic issues at SRY Consulting (Montpellier, France). She was a researcher at the University of Montpellier's TRIS lab in France (2011–2017), where she participated in a teaching and training program on big data and data mining. She contributed to the European project "Internet Economics: Methods, Models, and Management (2017)" in collaboration with Pr. Gottinger. She also contributed to creating many algorithms for business applications, such as the algorithm of Snail 2016. Dr. Sedkaoui's previous books and research have been published in several refereed editions and journals.

Mounia Khelfaoui is a professor at the University Djilali Bounaama Khemis Miliana in Algeria. She graduated from the University of Algiers 3 with a PhD in economics and HDR in environmental economics. With experience in research, she is a member of the research laboratory "Industry, Organizational Development of Enterprises and Innovation." Her research focuses on sustainable development, particularly CSR, the sharing economy, and the circular economy. She has written on CSR and sustainable development for several publications and conferences. She has published in various journals and conferences dealing with CSR and sustainable development.

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Part I
Web Analytics Activities and Dynamics

Web Data Conceptual Framework: Integration, Cleaning, Analysis, Visualization, and Security

Fethia Benhadj Djilali Magraoua and Saliha Hafifi

Abstract The rapid growth of the web in the last decade makes it the largest publicly accessible data source in the world. The amount of data/information on the web is huge and still growing. The web has many unique characteristics, making mining helpful information and knowledge fascinating and challenging. The coverage of the information is also extensive and diverse.

Keywords Web data · Integration · Cleaning · Analysis · Visualization · Security

1 Introduction

With millions of customers now online, the importance of websites in influencing their purchasing decisions is significant. With the company's website having the potential to ideally become a single all-encompassing access point to all the stakeholders – customers, investors, employees, and external partners, the management of their perceptions and the website has become important for business success. The unique characteristics of the Internet, such as intense competition, immediate access to product and service information, instant price comparisons, and the ease with which customers can leave an e-commerce website, force companies to concentrate on the management and measurement of this critical customer interface. Knowledge discovery is a term used in databases to describe the process of analyzing data (KDD). Discovery of useful patterns or knowledge from data sources is a common definition. Data mining is a multidisciplinary field involving machine learning, statistics, databases, artificial intelligence, information retrieval, and visualization. Numerous data-mining projects can be found in the market today. For example, supervised learning (also known as classification), unsupervised learning (also

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known as clustering), association rule mining, and sequential pattern mining are among the most common. The web data principles are not a specific set of technologies, but rather simple principles and patterns.

2 Ethical Issues in the Analysis of Web Data

As a result, data mining raises significant ethical concerns because individuals who aren't made aware of the collection and use of their personal information aren't given the option to give their consent or withhold it. On the Internet, it's common practice to gather data invisibly. When personal data is misused or used for a purpose other than the one for which it was provided, mining the web can put people at risk (secondary use). This knowledge, on the other hand, has numerous benefits. Planning and control applications benefit greatly from the knowledge gleaned through data mining. Web data mining has a number of specific advantages, such as enhancing the intelligence of search engines. Analyzing a web user's online behavior and turning it into marketing knowledge are other ways to use web data mining in the context of marketing intelligence.

There may be ethical concerns when mining web data that does not include personal information, such as data on automobiles or animals. This chapter, on the other hand, focuses on web data mining that includes some personal data. Only harm to individuals will be examined; any harm to organizations, animals, or other subjects is outside the scope of this investigation. For now, we'll focus on the private sector's web data mining applications. Because of this, personal data mining on the web will be analyzed from an ethical standpoint. This technique has a lot going for it, and we think it has a lot of good qualities and potential. Web data mining is appealing to businesses for a variety of reasons. Consumer data and government records, for example, could be used to determine who might be a new customer and other useful information. In the most general sense, it can increase profits by actually selling more products or services or minimizing costs. Marketing intelligence is needed to accomplish this. It's possible to use this intelligence to better your marketing strategies, competitor analyses, or interactions with clients and customers. The different kinds of web data related to customers will then be categorized and clustered to build detailed customer profiles. This helps companies retain current customers by providing more personalized services and contributes to the search for potential customers. That web data mining can be very beneficial to businesses is beyond dispute. To ensure that this technique will be further developed in a properly thought-out way, however, we shall focus on its possible objections. For a well-informed development and well-considered application, being aware of all the potential dangers is critical. The different ways in which privacy is threatened are the dangers of web data mining. To structurally analyze the many different ways to mine the web, it's important to distinguish between the various types of web data mining. Web structure data, such as hyperlink structure, can be distinguished from actual data on web pages and across web documents and weblog data regarding

the users who browsed web pages. We shall divide web data mining into three categories:

1. Analyzing content data found in web documents falls under the heading of "content mining." This can be anything from a picture to an audio file. Content mining, on the other hand, will only refer to text mining in this study.
2. Structure mining is a subcategory of link mining. Its goal is to examine the relationships between various web documents.
3. In the field of data mining, this is known as "usage mining." Data logged by users when they interact with the web is analyzed by usage mining.

"Log mining" is a term used to describe the process of extracting data from web server logs. When used in conjunction with some form of content mining to decipher the contents of hyperlinks, structure mining can be even more valuable.

3 Security, Privacy, Access Control, and Sharing

Unlike other data mining techniques, web usage mining has a unique application. We'll talk about it separately because it has a different set of advantages and challenges values in a different way.

3.1 Privacy Threatened by Web Data Mining

The use of personal data in web data mining can disrupt some important normative values. This is what we are going to discuss in this section. People's (informational) privacy may be violated, which is a clear ethical concern. Protecting the privacy of users of the Internet is an important issue. Privacy, on the other hand, is conceptually weak. In today's society, the term "privacy" covers a wide range of social practices and concerns. The philosophical and legal debates surrounding privacy will be omitted from this chapter. We'll use a looser (and more common) definition of informational privacy for the purposes of this discussion. In order to maintain one's privacy online, one must be able to manage the information that is made public about oneself. Information about an individual's privacy is safeguarded using this term. When information about an individual is obtained, used, or disseminated without their knowledge or consent, their privacy may be violated. Web mining privacy concerns frequently fall into this category. As a result, we'll be focusing our attention on this section. It is in this context that the term "privacy" will be used throughout the rest of this chapter. However, the value of "individualism" may be violated if people are judged and treated based on patterns found through web data mining. To begin, let's examine the connection between privacy and individualism more closely. The privacy of an individual may be violated when data is gleaned from the web through web data mining. People's privacy may be violated if their

data is categorized and grouped into profiles before being used for decision-making. In this case, however, the discovered information is no longer linked to specific individuals, and no direct sense of privacy violation because the profiles do not contain "real" personal data is violated when the data is anonymized before being produced. Group profiles, on the other hand, can be used as if they were personal data, resulting in the unfair evaluation of individuals – known as individualization (see the following section). Privacy can be thought of as a stepping-stone to other fundamental values. As Vedder (2000: 452) puts it, "... privacy is a servant of many master values." Categorical privacy, which would allow group characteristics that are applied as if they were individual characteristics to be considered personal data, could be a solution. Such a solution, according to Tavani, is not appropriate because it may necessitate the creation of new privacy categories as new technologies are introduced.

3.2 Individuality

One way to describe the quality of individuality is to say that it is the quality of being an individual or of having a distinct personality from others. Individualism is a strong Western value. The core values of being an individual and expressing one's individuality are widely held in Western countries. A tendency to judge and treat people on the basis of group characteristics rather than their own individual characteristics and merits can result from profiling through web data mining. 10 A person's sense of self is jeopardized if group profiles are used as a basis for policymaking or if they are made public in some other way. As a result, individuals will be treated less like individuals and more like members of a group. The risk is heightened when profiles contain personal information that should be kept private and are, for example, used in allocation procedures to make decisions. People may be stigmatized or discriminated against simply because they are members of a group or because they have certain characteristics. The use of factors like race and religion in making decisions can be both inappropriate and discriminatory. Non-distributive group profiles pose an even greater threat because not every member of the group shares every characteristic of the group. Using probabilities, averages, and other statistical concepts, non-distributive group profiles often obscure personal information. It is no longer possible to identify an individual from the anonymized information because it no longer contains any data that can be used to identify them.

4 Web Analytics Features, Benefits, and Limitations

All of these advantages demonstrate that web data mining is an extremely valuable technique that is being developed and applied on a large and growing scale. However, there are some serious threats to some of the most important values in

the web data mining field, and this is likely to cause a lot of tension. Unfortunately, many business professionals who use web data mining do not see any ethical issues with it. Twenty web data miners were interviewed in order to get a better understanding of current practices and the attitudes of web data miners toward ethical issues. Using interviews and a literature review, we can conclude that people prefer to discuss the benefits of web data mining rather than the possible risks. According to them, web data mining does not pose a real threat to privacy and other values because of a variety of reasons. Arguments in favor of data mining's near-limitless use can be broken down into six categories, each of which contains valuable information. The purpose of this brief discussion is to demonstrate that the arguments presented here do not support the use of data mining indefinitely.

4.1 Limitation

Web data mining itself does not raise any new ethical issues for discussion or investigation.
Laws and online privacy statements guarantee the confidentiality of personal information.
Because so many people have opted to give up their privacy, why not make use of it?
Most of the information gathered is of a non-personal nature or is used to create anonymous profiles.
There are fewer unsolicited marketing approaches as a result of web data mining.
Personalization leads to individualization instead of de-individualization.

5 Information Diffusion on the Web

With the advent of web, social networks have become an important medium for the dissemination of information in the Internet. The process of information dissemination in social networks has been studied using a number of information diffusion models. Due to the collaborative nature of the networks and limited accountability of the users, the media is often misused for spread of rumors and misinformation. In this chapter, we have a proposed a novel information diffusion model for the spread of misinformation using evolutionary game theory and evolutionary graph theory. The proposed model could be used to analyze as well as predict the spread of misinformation. It also provides a framework to study the effects of multiple campaigns in the network which would enable us to estimate the efficacy of launching countercampaigns against the spread of misinformation. We have used extensive simulation to support our claim.

Sharing information, such as news and rumors, is a key feature of social networks. Using natural connections, information can be disseminated in written,

oral, or electronic form. With the widespread adoption of the Internet and the World Wide Web, the physics of information diffusion has changed. It used to be difficult for people to spread information in a large community because of the high costs associated with deploying the necessary technology to reach a large number of people. This stumbling block has been largely dismantled, thanks to the widespread availability of high-speed Internet. Due to its importance in social interactions and day-to-day life, information diffusion has been one of the primary research topics in the field of social network studies. It has only been in the last 20 to 30 years or so that there has been a shift toward actively participating in and shaping the flow of information and innovation. We can reason about the spread of information by modeling the diffusion of information in networks.

6 Important Approaches to Web Measurement

Businesses now view websites as more than just another channel or storefront or a simple informational portal for their customers. If you don't have an effective website, you're missing out on a lot of business opportunities. It is much easier for businesses to make adjustments and enhance their operations if they can get early and frequent feedback on how their website is performing from the point of view of its users. Several instruments and methodologies were developed to measure the website performance, usability, and quality in information systems, marketing, and operations management literature. This study reviews the literature in web quality measurement and employs a 25-item instrument developed by Aladwani and Palvia to measure the user-perceived web quality. It attempts to test the factorial validity of the instrument in Australian context using structural equation modeling technique. Analysis revealed that the data set do not fit the Aladwani and Palvia's model well enough.

6.1 Background and Literature Review

Many businesses are known only through their websites on the Internet. Whatever the size of a company, whether it's a sales brochure, or a customer contact point, or the sole distribution channel for the product, creating and maintaining an effective website is essential in today's business world. Though in the early days of Internet commerce, websites were expected to provide some entertainment to the customers, it is now considered irrelevant in today's business environment, except in some entertainment service websites. E-commerce websites' ultimate goal is to draw in potential customers and encourage them to make a purchase. In order to have a successful website, it must reflect the company's value proposition and meet the needs of its customers. If you think about it, the business strategy and operational policies of any given company are reflected in their website. Attracting

and converting visitors into customers begins with the quality of the website and the way it interacts with its users. Despite the fact that companies have spent a lot of money advertising their websites, only 3.5% of the unique visitors buy something. Customer loyalty and recurring revenue can be increased by providing a superior online experience. Order fulfillment is a top priority for customers who use the Internet to gather information or make a purchase. For companies that conduct business online, additional complexity is required in terms of security, backup, and redundancy. Quality support for various functions, such as information search, transactions for purchasing goods and services, and post-sale support, is critical to the effectiveness and overall quality of a website. Operations management literature's concept of quality as "fitness for use" and the role of users or consumers in determining it are adopted in information systems research as well.

6.2 Validity and Correlations

Aladwani and Palvia's four-dimensional construct of perceived web quality and its validity are examined by looking at the relationships between scale ratings and Amazon users' overall quality ratings (Table 1).

It can be seen from the table above that the correlations between all four factors range from 0.526 to 0.657 and are all significant. However, these four factors/constructs have a significant correlation with the Amazon website's overall quality rating (global quality), which ranges from 0.298 to 0.574. Users' perceived web quality (the sum of all 25 items' scores) has a strong correlation with each of the 4 factors, with coefficients ranging from 0.777 to 0.869. Additionally, there is a statistically significant correlation between the overall quality rating of the website and the perceived web quality index. As a result, the accuracy and reliability of the test are further supported by this research.

Table 1 Correlations among factors and statistics

Factors	Technical adequacy	Content quality	Specific content	Appearance	User-perceived web quality	Overall quality of Amazon
Standard deviation	0.76	0.916	0.98	0.96	0.76	1.02
Content quality	657					
Specific content	.601	621				
Appearance	619	.526	.526			
User-perceived web quality	.869	.823	.799	.777		
Overall quality of Amazon	.574	493	.412	.298	.517	
Mean	5.02	4.85	5.03	4.62	4.83	4.94

7 Conclusion

The web was a hot topic in some research fields, but it had yet to be popularized and become a common technology. Some areas of the Semantic Web are already taking advantage of its potential, such as search engines and the metadata embedded in the pages of websites that want to be better understood by robots. The Semantic Web is currently in an intermediate stage. The Semantic Web is still in its infancy, and the development of applications that can take advantage of this new model is just beginning. Massive data publishing is still going on, but only a small number of applications are taking advantage of it. The importance of applications, or apps, as they are known today, is undeniable in the world of mobile devices. It's no surprise that many people in big cities use published data mined by an app when they're looking for a cab.

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Web Analytics: Definition and Reality in Algeria

Sarra Bouguesri and Fatma Mana

Abstract By the rising of information technology tools, all business companies have their own website, but most of them only use it as advertisement tools or news tools. However, web analytics are designed to change that and help entrepreneurs in gathering useful data from their websites. The aim of this research is to investigate the concept of web analytics in Algeria. This chapter shows that data analytics is extremely important to the Algerian companies because it helps them to optimize their marketing campaigns. When it comes to measuring the success of a marketing campaign and determining which campaigns are most effective, Google provides an easy-to-use tool that generates a unique tracking code (URL) for any link to a website.

Keywords Web analytics · Algerian companies · Web analytics tools

1 Introduction

Companies today struggle to manage increasing levels of information, searching for ways to leverage this critical business data to empower their employees. Web analytics integrate data from operational systems and the web, turning data into critical knowledge about how to run their business more effectively and be more responsive to dynamic market conditions. Despite the fact that online marketing is no longer a new phenomenon, many entrepreneurs are still hesitant to use it to its full potential. Businesses have their own websites, but most use them only for marketing

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or news purposes. In order to remedy this, web analytics was developed in order to assist business owners in collecting useful information from their websites.[1]

Since the advent of the World Wide Web, web analytics has been on the rise. The web analytics market and industry are also booming, with a slew of tools, platforms, employment opportunities, and businesses. With an annual growth rate of more than 15%, the market was expected to reach 1 billion in 2014.[2]

Web analytics technologies are usually categorized into on-site and off-site web analytics: On-site web analytics refers to data collection on the current site, and off-site analytics is usually offered by third-party companies such as Twitalyzer (http://twitalyzer.com) or Sweetspot (http://www.sweetspotintelligence.com). Additionally, it incorporates information from a variety of other resources such as surveys, market research reports, competitor comparisons, and the like.

According to **Guangzhi Zheng and Svetlana Peltsverger (**2015**)**, web analytics has different usages:

It improves website/application design and user experience by helping to identify user interest/attention areas and improving web application features.
It optimizes e-commerce and improves e-CRM on customer orientation, acquisition, and retention.
It tracks and measures success of actions and programs such as commercial campaigns; web analytics must differentiate between a wide variety of traffic sources, marketing channels, and visitor types.
It identifies problems and improves performance of web applications.

However, the problem of this research is to investigate the concept of web analytics in Algeria. So, the aims of this research are:

To define the concept of web analytics
To determine the different processes of web analytics
To investigate the most used tools in the web analytics
To examine the use of web analytics in Algeria

The hypothesis of this study is as follows: There is a weak use of web analytics in the Algerian companies.

[1]Cao Truong, Hoang Phuong Nguyen Thi and Huyen Trang, ***Web analytics tools and benefits for enterprise***. Lahti University of Applied Sciences Degree programme in Business Information Technology (2017), Bachelor's Thesis in Business Information Technology, 79 pages.

[2]Guangzhi Zheng and Svetlana Peltsverger (2015), ***Web Analytics Overview***, Encyclopedia of Information Science and Technology, Third Edition, IGI, p. 2

2 Definition of Web Analytics

The researchers define web analytics in different ways; the most important are as follows:

Web analytics is the methodological study of **online/offline** patterns and trends. It is a technique that you can employ to collect, measure, report, and analyze your website data. It is normally carried out to analyze the performance of a website and optimize its web usage.[3]

As defined by Ivan Bekavac and Daniela Garbin Praničević, web analytics encompasses all four components listed above in an effort to better understand and optimize user experience on a website.[4]

An understanding of how to generate revenue from a website, how to create an appropriate user experience, and how to improve a company's competitive advantage is provided by web analytics.[5]

In order to improve the online experience of visitors, web analytics is a tool that analyzes qualitative and quantitative data on the website. This helps the company achieve its goals more efficiently and effectively. Web analytics is an information technology tool that collects, stores, analyzes, and graphically presents data collected from websites. Web analytics techniques are being applied to find and organize information from the web that is useful for data visualization and dashboarding.

Nabil Alghalith (2015) said that web analytics is a technology that helps organization in managerial planning and decision-making and helps it to gain a competitive advantage.[6]

Web analytics is the study of user behavior on web pages. In other words, web analytics are techniques that assess quantitative data such as web traffic, surveys, sales transactions, and others to improve the performance of marketing activities. Web analytics is the measurement, collection, analysis, and reporting of web data for the purpose of understanding and optimizing web use.

Web analytics provides data about the website as well as the visitors. The web analytics will provide businesses with information about the audience like number of visitors to the site, audience behavior ("What did they see when they visited the site?" and "How did they get to the site?"), and campaign-related data ("Which marketing campaign is more effective?" and "Which campaign brings more visitors to the site?").[7]

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[3]Tutorials Point (I) p. 2, 2015, www.tutorialsPoint.com

[4]Ivan Bekavac and Daniela Garbin Praničević. (2015), ***Web analytics tools and web metrics tools: An overview and comparative analysis***, Croatian Operational Research Review, CRORR 6374.

[5]Ivan Bekavac and Daniela Garbin Praničević, Opcit, p. 375.

[6]Nabil Alghalith (2015), ***Web Analytics: Enhancing Customer Relationship Management***, Journal of Strategic Innovation and Sustainability Vol. 10(2), p. 12.

[7]Cao Truong, Hoang Phuong Nguyen Thi. Opcit, p. 79.

In general, we can say that web analytics is the process of collecting, processing, and analyzing website data.

3 Web Analytics Process

Waisberg and Kaushik identified the following steps in a web analytics process:[8]

2-1 **Objective (goal) determination** which differs according to the company, for example, for the commercial objectives, the goal of a website is to help customers buy products by providing them with all the information they need to make an informed decision.
2-2 **KPIs (key performance indicators) definition**: that show the particular progress or detect lagging in achieving goals.
2-3 **Data collection** in a database for subsequent data analyses.
2-4 **Data analysis**: it includes observing and transforming previously collected data in order to discover useful information that supports future decisions.
2-5 **Change implementation**: Refers to the save of information and makes change if it is.

These steps are summarized in the Fig. 1.

4 Benefits of Web Analytics

There are different benefits of web analytics, most of which are illustrated as follows:[9]

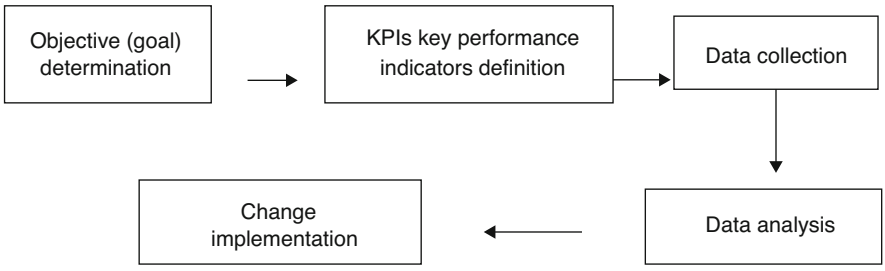

Fig. 1 Web analytics process

[8] Ivan Bekavac and Daniela Garbin Praničević, Opcit, p. 376.

[9] https://www.linkedin.com/pulse/5-key-benefits-using-website-analytics-business-shekhar-pawar/visited 7/06/2020.

Knowing the Visitors: Measure online traffic by measuring the number of users and visitors the company has on its website at any given time, the cause to use the website, and the time spending on the website. An easy-to-understand breakdown of all sources of traffic and website conversions will be provided by the analytics.

Tracking Bounce Rate: In web analytics, a "bounce rate" refers to the percentage of visitors who leave a website without taking any action. When a website has a high bounce rate, it means that users aren't finding what they're looking for and that the company needs to work on improving the user experience.

Optimizing and Tracking of Marketing Campaigns: In order to track the success of different marketing campaigns, either online or offline, unique and specific links are created for each campaign. Tracking offline-to-online campaigns is now possible with the help of Google Campaign URL Builder. If a company wanted to track the results of an event or mailing campaign, for example, it could share its unique link.

Identifying the Right Audience and Capitalizing on That Audience: Companies can use web analytics to identify and target the most appropriate audiences for their products and services.

With this information, companies will be able to craft effective marketing campaigns that make their customers feel good.

Optimizes and Enhances Websites and Web Services: The company will find potential problems on its website and its services.

Conversion Rate Optimization (CRO): The goal of CRO is to get people to do what they've been asked to do. "CRO" is calculated by dividing the number of users by the number of goals received. Examples about these conversions are as follows:

- Every stage of the sales process (add to carts, purchases, product views, etc.)
- Leads
- Newsletter signups
- Registrations
- Video views
- Brochure downloads
- Clicks on text links
- Bids and offers
- Event registrations
- Spent time on a website
- Shares on social media
- Contacts from contact forms

The improvement of conversion rates with web analytics allows the company the improvement of its website's profitability and return on investment.

Tracking Business Goals Online: Companies can use web analytics to set and monitor specific goals. By actively tracking goals, you can respond more quickly to certain events by using data.

Improve the Results from Google Ads and Facebook Ads: Google ads and Facebook ads are tools that enable the company to improve its results and

increase the efficiency of its ads. Using analytic data, a company can see how many clicks, conversions, and how the ads are being received by the target audience are generated by online advertising. Use of remarketing in advertising is made possible by web analytics.

Starting is Easy: For many businesses and websites, the use of Google Analytics is easy because it is simple to install on any platform. It gives the company quickly an overview of how its online business is performing.

New Creative Ideas: By the analyzing data, it is possible to find new perspectives within the business model. Tracking the data will provide more insights about trends and customer experiences within the business of the company.

Find Out How to Optimize Your Website: Observe what type of device and browser are being used to access the company's website. When a company's target audience is increasingly using mobile devices to access its website, it may be necessary for the company to develop a mobile app.

Discover the Needs of the Customer: Web analytics data helps the companies to see the levels of traffic and which are most popular web pages of the company in which they can use this information to then tailor sales pitch or update web pages to convert more traffic.

Padma Jyothi et al. (2017) illustrate some examples of the benefits of web analytics as follows:[10]

It's a good way to keep tabs on how people are using a website.

Key metrics such as unique visitors, unique sessions, top-performing website content, the performance of different traffic sources, and much more can be viewed in real time.

Get a clear picture of where your visitors come from, as well as the most popular sources of traffic.

Utilizing a website, count the total number of visitors.

Visitor segmentation into new/returning and referral sources.

The ability to determine which pages were most frequently visited by visitors.

Check the average time spent on each page by visitors.

Visitors can be identified by the links they click on.

5 Web Analytics Tools

There are different tools for tracking general traffic and even more specific goals. Some of that are free and others are paid. The most common tools like Google Analytics can be used by everyone that runs a website. If other tools are truly

[10] U. Padma Jyothi, Sridevi Bonthu and B. V. Prasanthi. (2017), ***A Study on Raise of Web Analytics and its Benefits***, International Journal of Computer Sciences and Engineering Vol. 5(10), p. 61

required for a business, they should only be used after careful consideration. In this part, we will summarize some of these tools:

5.1 Google Analytics

As the most widely used web analytics service in the world, Google Analytics provides a wide range of features to help businesses better understand how users interact with their websites and, as a result, better plan their online strategies.[11]

Google Analytics is the foundation of web analytics. It offers varied features for businesses to get a hold over user behavior on website. Suraj Chande illustrates some features of Google Analytics:

Advertising Reports: All digital channels' conversion rates and returns can be seen in Google Analytics Ad reports.
Campaign Measurement: A user can use this tool to evaluate each campaign's performance and then decide whether or not to strengthen a weaker campaign.
Cost Data Import: Users compare the cost details on the digital marketing channels to allow them to make better decisions on marketing programs.
Advanced Segments: Using Advanced Segments, businesses can isolate and analyze subsets of the web traffic, like paid traffic.

In real time, users can see how many people are visiting their website and what they're looking at right now.

An audience's demographics and frequency of visits and the sources from which they come to a website can all be determined using Google Analytics, which is a free service.

Google Analytics Alerts and Intelligence Events are used to are used to generate an alert when it notices sudden spike in traffic from certain geographical area, it helps in making investment decisions about marketing and sales.

5.2 Google Tag Manager

It is a simple tool to use which allows installing various web analytics and marketing tools and their management without coding. It helps to measure the website's events quickly using analytics, and it also helps to manage multiple scripts or tags on a website. Google Tag Manager improves site speed.

[11] Suraj Chande, Google Analytics – Case study, January 2015, https://www.researchgate.net/publication/271447580.

Table 1 Web analytics tools: advantages and disadvantages

Web analytics tools	Advantages	Disadvantages
Webtrends Analytics	Provides detailed information, excellent heat map feature, and access to real-time data	(Relatively) high price
FireStats	Easy to use, downloadable data raw logs, real-time data	Not recommend for beginners due to install requirements
StatCounter	Access to real-time data, provides two levels of analysis	Outdated user interface
eTracker	Tracks visitor mouse movement, survey options	(Relatively) high price
IBM Unica NetInsight	Very flexible and customizable reports, customizable dashboards	(Relatively) high price
AWStats	Reveals how much time visitors spend on site, processes raw log files, open-source	Not possible to provide an in-depth analysis, neither to measure user activity
GoSquared	Pinging feature that reveals how long visitor stayed on site	Monthly page view limit

Source: Ivan Bekavac and Daniela Garbin Praničević, Web analytics tools and web metrics tools: An overview and comparative analysis, (2015) Croatian Operational Research Review 373 CRORR 6, p. 378

5.3 Facebook Pixel

Web analytics can be improved by using this tool, which provides a new perspective on data. In addition to keeping track of everyday activities like purchases and sales leads, Pixel also records financial data. It creates better Facebook advertising campaigns (https://engaiodigital.com/what-is-web-analytics/).

Other web analytics tools analyzed by Ivan Bekavac and Daniela Garbin Praničević are illustrated in the following Table 1.

6 The Benefits of Web Analytics Tools for Business Growth[12]

The web analytics tools help the company to analyze the performance of its website using the traffic of websites. This means that increased website traffic indicates the site's development, whereas decreased website traffic indicates the site's inactivity or decline. This helps in planning the marketing campaigns consequently.

Web analytics tools can be used to identify visitors who return frequently, as well as those who are unique. According to the number of repeat visitors, your website is

[12]https://www.businesswire.com/news/home/20180810005198/en/Major-Benefits-Web-Analytics-Tools-Business-Growth visited 24/08/2020.

doing well at retaining current visitors, but not so well at appealing to new visitors. As a result of this, it may be possible to develop new ways to attract new visitors to the website.

Web analytics tools help in dividing traffic into groups like referral, organic, and social which help to progress the website's performance:

Organic traffic is found using a search engine, and knowing this gives you a better idea of where your website stands in the results.

Referral traffic link is coming from a different website, either one with a connection to yours or one for which you've done a guest post.

Social traffic is from a variety of social media platforms via your shared posts.

Web analytics tools help also the company to understand how many visitors are exiting in website instantly after arriving. Lower bounce rate specifies that its website is able to engage and occupy the visitors for a longer time.

7 The Use of Web Analytics in Algeria

According to this graph, the top ten African countries from 2009 to 2016 are shown in the following table. There has been a noticeable decrease in the number of visitors from specific countries since 2013. Another thing to note is that in some years, several countries fail to make it to the top ten. Tanzania in 2009, Egypt in 2016, Zimbabwe in 2009 and 2012, Algeria in 2009 and 2011, and Namibia in 2013 are the most recent examples. According to this, there is an ever-changing ranking (Fig. 2).[13]

According to the statistics of Google Analytics updated on **23 September 2020**, the websites using Google Analytics as a tool of web analytics in Algeria are shown in Table 2. As we see in this table, not all the companies in Algeria use Google Analytics; this means that in Algeria there is a lack usage of the web analytics tools and the most used tool is Google Analytics.

In applying web analytics to business objectives, four main categories of metrics are used: website usability, traffic sources, visitor profiles, and conversion statistics. Website usability evaluates items such as page views, time on sight, and click paths to determine how user-friendly or user-relevant a website is. Traffic source metrics identify traffic origination points, such as referral websites or even offline advertising campaigns. Visitor profiles data from visitor profiles can provide information such as geographical origination of traffic, the time of day users most frequently visit, or what keywords are used in reaching the sight. Conversion statistics measure which visitors are new, returning, or abandoning the site, as well

[13] Shadrack Katuu. (2018) ***Using Web Analytics to Assess Traffic to the Mandela Portal: The Case of African Countries***, NEW REVIEW OF INFORMATION NETWORKING, VOL. 23, NO. 1–2, p. 8.