Chapter 9
Web Analytics with Fuzziness

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ABSTRACT
In the Internet economy and information society, it has become an essential task of electronic business to analyze, to monitor, and to optimize websites and Web offers. Therefore, this chapter addresses the issues of Web analytics, which is defined as the measurement, collection, analysis, and reporting of Internet data for the purposes of understanding and optimizing website usage. After a short introduction, the second section defines Web analytics, describes benefits and problems of Web analytics, as well as different software architectures and products. Third, a controlling loop is proposed for Web content and Web user controlling in order to analyze Key Performance Indicators (KPIs) and to take website- and e-business-related actions. Fourth, different Web metrics and KPIs of information, transaction and communication are defined. Fifth, a fuzzy Web analytics approach is proposed, which makes it possible to classify Web metrics precisely into more than one class at the same time. Considering real Web data of the Web metrics page views and bounce rate, it is shown that fuzzy classification allows exact and flexible segmentation of Web pages or other objects and gradual rankings within fuzzy sets. In addition, the fuzzy logic approach enables Computing with Words (CWW), i.e. the perception-based, linguistic consideration of Web data and Web metrics instead of measurement-based, numerical ones. Web usage mining with inductive fuzzy classification and Web Analytics with Words (WAW) allows intuitive, human-oriented analyses, description, and reporting of Web metrics values in natural language.

1. WHY WEB ANALYTICS WITH FUZZINESS?
Since the development of the World Wide Web 20 years ago, corporate websites have become a crucial instrument of information, communication and transaction. With the growing importance of the web, the analysis, monitoring and optimization of a website and online marketing – Web Analytics (WA) – is now an important issue for both business practice and academic research.

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According to a study of Forrester (2009), 74% of large enterprises agreed that web analytics is a technology they cannot do without. Consequently, it is not the question if companies do web analytics, but how, why and what for? Surprisingly, little academic and practical research has been done on web analytics so far to answer these and further research questions.

Today, many companies are using web analytics software like Google Analytics, Webtrends or Omniture to collect, store and analyze web data. These powerful tools provide dashboards and reports with many metrics to web analysts and managers, responsible for planning and decision-making about website-related activities. One problem of measurement-based reports is that all web metrics values, e.g. the number of page views, visits, visitors or conversion rates, are often raw numbers and therefore difficult to interpret. Another problem is that web data and metrics are usually reported, classified and evaluated in a sharp manner. This chapter proposes a fuzzy logic concept making it possible to classify web data and metrics fuzzily and to analyze and express their values with meaningful linguistic variables (i.e. words or word combinations).

After defining web analytics and its main benefits and problems, a web controlling framework with different levels is proposed in section 3 as well as different steps and actions of web content and user controlling. Section 4 explains various web and e-commerce metrics.

Section 5 exemplifies the fuzzy logic approach, showing how it can be used for classifying, describing and mining web data. In addition, the idea of web analytics with word and of fuzzy if-when rules for web analytics are shown. In the case study of section 6, real web data is classified fuzzily. Finally, section 7 offers a conclusion and an outlook.

2. WEB ANALYTICS – AN OVERVIEW

2.1 Definition

According to the Web Analytics Association (WAA 2010), Web Analytics (WA) is defined as the measurement, collection, analysis and reporting of Internet data for the purposes of understanding and optimizing web usage. Inan (2009) considers web analytics as the study of user activities on a website in order to assure the site’s performance, gain insights into the needs and wants of users’ of the site and to identify areas that can be optimized. Weischedel et al. (2005) define WA as the monitoring and reporting of website usage so that enterprises can better understand the complex interactions between website visitor actions and website offers, as well as leverage insight to optimize the site for increased customer loyalty and sales. However, it is not only the website, web usage and sales which can be monitored, but also other objectives of a web presence (Zumstein & Meier 2010). Therefore, WA is defined as follows:

Definition 1 (Web Analytics): Web analytics is the measurement and analysis of web data to better understand website usage and user behavior as well as the definition and analysis of Key Performance Indicators (KPIs) in order to control the achievement of web-based goals and to optimize the website and electronic business, particularly electronic marketing and Customer Relationship Management (eCRM).

According to definition 1 in the broad sense of electronic business (compare Figure 1), WA goes further than just collecting and analyzing web data. First, WA can be understood as a web controlling process of defining, collecting, storing, preparing, measuring, analyzing and reporting web data, metrics, and KPIs. A web analytics system should not be an end in itself, but should help to measure and reach website or e-business related
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