

# Case Study Application of Business Intelligence in Digital Advertising

Dželila Mehanović, International Burch University, Bosnia and Herzegovina\*

Nermina Durmić, International Burch University, Bosnia and Herzegovina

## ABSTRACT

This paper demonstrates the application of business intelligence in decision making in digital advertising through a case study. Data used for analysis was collected during a test phase of an advertising platform. The study analyzes multiple types of traffic related to countries, browsers, household incomes, and days of a week. Beside tabular reports, the paper presents how to visualize those results using Python libraries to make them more visually appealing. Furthermore, logistic regression was used to build models to detect relationships between the number of impressions and clicks. Finally, the authors propose multiple combinations of data that could be used to create different reports that lead to smarter decision making and cost effectiveness.

## KEYWORDS

Business Intelligence, Campaigns, Data Analysis, Linear Regression, Marketing, Python, Reporting, Traffic

## INTRODUCTION

The term digital advertising denotes all forms of advertising over the Internet to reach an audience and generate traffic. AT&T released the first banner ad in 1994 which is considered as the beginning of the development of digital advertising (WIRED Staff, 2010). Fuxman et al. (2018) state that digital advertising achieved higher spending than traditional advertising for the first time in 2013. After that, the budget spent on digital advertising has been increasing and it is expected to reach \$375 billion until the end of 2021 (Dautovic, 2019).

According to the statistics in Dautovic (2019), the number of devices that have active ad blockers increased to 615 million in 2019, which is 473 million more than one year before in 2018. Moreover, it is reported that 76% of advertisers do not use behavioral data to target the audience. Improper targeting could be the reason why people use ad blockers. This means that people are overcrowded with ads they are not interested in.

Different groups of authors wrote about the essential role of business intelligence in digital advertising (Kursan & Mihić (2010), Kurniawan et al. (2014), Verma (2018)). Business intelligence (BI) refers to technologies and processes related to data collection, preparation, data analysis, and visualization. The goal of BI is to help organizations in the process of making final decisions that are considered intelligent and factual. Using BI, organizations can make predictions, analyze performance

and customer behavior, and find ways to increase profit. BI supports data analysis, querying, reporting, and visualization. (Tableau, 2020).

Bhosale et al. (2020) described the role of business intelligence in digital marketing. They concluded that real-time execution in the domain of marketing increases the need for the application of the business intelligence and the knowledge of how to apply it. The authors of this study managed to find plenty of works related to the business intelligence understanding, but without a detailed description of the applied methods and reports that could be used. In response to the identified lack of literature, the aim of this study is to describe the most common methods of business intelligence application in digital marketing in detail and elaborate the resulting reports obtained through those methods.

More specifically, the purpose of this paper is to analyze which types of campaigns and targeting options bring the most audience to digital advertising. To accomplish this goal, the aim of this paper is to see how targeting options could be adjusted when displaying ads to users so that people see personalized ads. Furthermore, this paper aims to help companies to use the advantages of digital marketing without unnecessary loss of money and time. In this paper, the authors present how business intelligence helps businesses to make smart decisions in digital advertising and not to lose extra resources through a case study of tribeOS advertising platform.

## **BACKGROUND AND LITERATURE REVIEW**

This section presents the meaning and definition of digital advertising and business intelligence fields separately, and ways they can work together, through an overview of relevant literature.

### **Digital Advertising**

Traditional marketing involves newspapers, TV, and magazines used to reach the local population. This kind of advertising sends one message to the entire audience, without any targeting including the application of filtering and personalization. On the other hand, digital advertising refers to the advertising over web, through email and mobile phones. It is globally oriented and based on filtering and personalization (Greenspan, 2018).

In traditional marketing, there are one-time payments and success is measured by inspecting whether the sales had increased during a given period. In digital advertising, payments occur all the time. Success is measured by the number of impressions, clicks, and sales. Impressions are obtained every time an ad is displayed on a user screen and used for building brand recognition. Cost per thousand impressions or Cost Per Mile (CPM) is used as one of the payment options in digital advertising (Ecommerce Answers, 2020). Beside CPM, there is a Cost Per Click (CPC) option, where a certain amount of money is paid for each click (Ecommerce Answers, 2020). The third option is based on the number of sales, which is Cost Per Sale where advertisers pay for each sale or conversion generated by the ad.

In contrast to traditional advertising, digital advertising provides support for different campaign targeting options to reach the right customers. To achieve this, there are multiple segmentation criteria for targeting the audience such as demographics features like age, gender, education; geographic location such as country, region, city, zip code; and behavioral values such as spending habits (Yesbeck, 2018). Generally, there are two types of targeting: contextual and behavioral. Contextual targeting is done based on keywords, topics, language, and location, while behavioral targeting is related to the browser history, sites visited, time spent on those sites, and recently searched items (Zhang & Katona, 2012).

### **Business Intelligence**

Business intelligence refers to the infrastructure responsible for collecting, storing, and interpreting data generated from business operations. It includes a variety of processes such as analytics, data

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