Chapter 15
Ontology-Based Optimization in Search Engine

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ABSTRACT

The major aim of the chapter is to propose and study the use of ontology-based optimization for positioning websites in search engines. In this sense, using heterogeneous inductive learning techniques and ontology for knowledge representation, a knowledge-based system which is capable of supporting the activity of SEO (Search Engine Optimization) has been designed and implemented. From its knowledge base, the system suggests the most appropriate optimization tasks for positioning a pair (keyword, website) on the first page of search engines and infers the positioning results to be obtained. The system evolution and learning capacity allows optimizing the productivity and effectiveness of the SEO process.

INTRODUCTION

Online marketing is known as the study of techniques of using the Internet to advertise and sell products and services. This marketing activity has shown the highest growth in recent years driven by the exponential growth of Internet users. Looking further into the future, in US market, the interactive marketing (search marketing, email marketing, social media, display advertising, and mobile marketing) will account for 21% ($55bn) of all marketing spend by 2014 (Forrester Research, 2009).

The large volume of information available on the Internet has accentuated the need to order it, so users can easily and effectively access to such information. For this reason, search engines have become the most popular websites on the Internet. Google (www.google.com) is the most popular website worldwide according to Alexa

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Rank (Alexa, 2010). Along with this trend, the activity of search engine positioning called SEO (Search Engine Optimization) was born. It consists on the implementation of several actions to a website, aimed at making the search engines to place pages from that website in top positions in their SERP's (Search Engine Result Pages) for certain keywords.

The main objective of online marketing is to generate qualified traffic to a website, being each new obtained visit a potential client. Most of the website's visits come from major search engines like Google, Yahoo, Bing, among others. Besides, visits from search engines are of high quality because users are looking for information related to the website topic. This circumstance explains why a successful online marketing campaign increasingly depends on SEO and why search marketing still leads interactive spend representing 60% of online marketing (Forrester Research, 2009).

The method used by search engines to sort the search results is based on algorithms that are not public knowledge. However, guidelines are known for optimizing a website that involve changing certain factors tending to improve its positioning. Being unknown algorithms, SEO activity is empirical and is based on the experience of experts. Despite the experience, in many cases it is not possible to know exactly which the most effective actions to improve positioning are. Therefore, a "trial-and-error" empirical model is applied, which usually has a very high cost of implementation. The success of the activity is further compromised due to increased competition and constant changes in sorting algorithms of search engines.

The market has several SEO tools that provide values of the factors affecting the positioning of a website. The right analysis, interpretation, and modification of these values may allow the website to be located in the top of the search engines. To do this work, it is essential to have a deep knowledge of the definition of each evaluated factor, know its domain, scope, relevance, metrics and how to modify it to obtain better positioning. Under these circumstances, the following questions arise: Is it possible to position a website without being an expert in SEO? Is it possible for a SEO tool to indicate what factors should be modified to position a website?

In response to these questions born the idea to develop a SEO application centered on a knowledge-based system and able to:

- Intelligently support the process of positioning in search engines, making the domain knowledge to be dependent on a system, instead of on persons.
- Provide a list of actions to implement in order to position a keyword for a particular website.
- Identify the difficulty of positioning a particular keyword.
- Infer the position to get by the keyword in the search engine after applying the proposed optimizations.
- Estimate the organic traffic that would generate the keyword when the website is positioned.
- Dynamically adapt to changes in the search engine algorithms.
- Rank by relevance the factors affecting positioning.

The mentioned application is Matrix (www.matrixsearch.com) and was developed by Intelligent SEO SL, a company that is part of Inspirit (www.inspirit.net), a pioneer group in the ICT sector. The system consists of a facts base, a knowledge base, an inference engine, an ontology, a core module and a user interface. In this chapter, we focus on studying how the inference engine is capable of supporting the SEO activity using the rules of the knowledge base and the proposed ontology.

The following sections focus on presenting learning modules, ontology creation, and results obtained. Finally, conclusions and future research works are detailed.