Chapter 3
Utilizing Sentiments in Online Contextual Advertising

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ABSTRACT

Ever increasing number of internet users has attracted many of the companies on the internet for promoting their product and services. This has led to the development of new age of advertising called online or web advertising. The objective of this chapter is two-fold. First, it introduces concepts involved in online advertising. Second, it proposes a novel conceptual framework for contextual online advertising which attempts to utilize local context and sentiment for identifying relevant ads. Contextual advertising is an important class of online advertising in which ads are displayed automatically on web pages based on their content. The proposed framework works in two stages. The first stage retrieves ads for placement. The second stage uses sentiment analysis to filter out ads that do not agree with the sentiments (positive or negative polarity) being expressed in the document. The polarity is identified using SentiWordNet and context-based heuristics.

1. INTRODUCTION

Traditionally newspapers, bill boards, radio and television have been preferred media for advertisement. The advent of Internet has led to the new way of advertising, on-line advertising (also known as web /Internet advertising). Its wide coverage and low cost as compared to traditional form of advertising mediums makes it quite attractive. Many organizations are spending significant amount of their advertisement budget on it. As mentioned in Broder et al. (2007) the total advertisement cost was estimated over 17 billion dollars in United States alone in 2006 with yearly...
growth rate of 20%. It is major source of funding for many of the Internet companies. Earlier online advertising was in the form of banner, pop-up and e-mail, now it appears in various forms like sponsored search, pay-per-click, pay-per-action, behavioral targeting, contextual advertising, video advertising, in-line text, etc. The impact of online advertisement can be understood from the fact that it had forced Google to change their advertisement policies. Earlier Google restricted ads up to a dozen words only on results from its web search engine. Now it has started putting videos on pages of search results. New ad formats with images, interactive maps and other features are being developed. However, textual advertising still remains the primary business model behind web search. Most of the Ad networks like Yahoo!, Google, MSN, etc. use textual advertising in which contextually relevant ads are displayed alongside search results. They find relevant ads by matching ads in a large inventory with query or web page content and deliver them at certain position on web pages. Yahoo! and YouTube rely on text only for online media advertising also. One step further is in-line advertising used in Vibrant media (Vibrant, 2010). Instead of delivering ads around content, in-line advertising embeds them inside the media content. ImageSense (2010) and VideoSense (2010) use this approach. ImageSense and VideoSense are contextual advertising system for online images and video services which embeds contextually relevant ads at appropriate positions within the image and video. These systems consider both textual relevance and visual similarity into account in ad selection process. This is unlike conventional ad networks such as Google AdWords (2010) and AdSense (2010) which treat image and video advertising as general text advertising and display ads relevant to query or web page based on textual relevance only. The increasing amount of images and videos on the internet has made image and video advertising an important research topic. However, in this chapter, we restrict to textual advertising only.

On-line advertising can be considered as search problem over a corpus of ads. The results retrieved should be relevant for display in a particular context. In this way it is similar to information retrieval (IR) system. However, there are some differences between them. One important distinction is that unlike IR system which always returns some results, in on-line advertising it is acceptable and even desirable not to return any result if it is not relevant (Ribeiro-Neto et al. 2005).

Ad Networks and publishers are continually looking for new and innovative advertising solutions that will increase their ad revenue and provide advertisement with a variety of options to choose from to reach their target audience. Several approaches to select ads based on content or keywords have been proposed (Broder et al., 2007; Lacerda et al. 2006; Ribeiro-Neto et al. 2005; Yih et al., 2006). In this chapter we will review some of these approaches. These approaches may end up in selecting inappropriate ads. This causes poor user experience and unnecessarily wastes space in displaying ads that don’t earn any revenue. For example, on a blog site if a blogger is complaining about a product then it is quite likely that a keyword-based approach returns an ad on the same product as relevant one. Displaying this ad will irritate the blogger. Likewise, it will be useless to give an ad of a product which the blogger is using and is satisfied with it. This problem occurs because existing approaches neglect the sentiments or opinions being expressed in the document in deciding relevant ads. In this chapter, we propose a novel two-stage framework for online contextual advertising which uses both local context as well as sentiments for retrieving ads. The sentiment being conveyed by a word is often
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