

A Framework for Meaning Aware Product Discovery in E-Commerce

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INTRODUCTION

Current e-commerce statistics state that around 40 percent of worldwide internet users have bought products, goods or services online via desktop, mobile, tablet or other online devices. This amounts to more than 1 billion online buyers and it is projected to grow in the upward direction. The enabler of this online buying process, the E-Commerce technology platform, plays a central role in promoting the upward growth of this industry. The user experience provided by these platforms is crucial in achieving customer satisfaction which promotes customer loyalty and thus profitability. Understanding a customer's interest/intent and providing meaningful product/service discovery experience is a highly rewarding opportunity in this context. But most of the current era E-Commerce platforms do not provide anything more than the technology support for the dissemination of product details, buyer cart handling, enablement of payment processes, the tracking of item discovery, and a basic feedback mechanism. In these platforms, detailed product listings and a basic text based search experience are the only user tools in assisting the product discovery process. The tedious processes involved in the product discovery process often deter even an internet savvy user from using the e-commerce services.

In the above said context, most of the organizations dealing with electronic commerce today are striving hard for innovative ways for customer engagement and product promotion. Providing meaning aware/semantic product discovery experience is one of the most important aspects in this scenario. To build such an experience, organizations are exploring new dimensions of leveraging semantic technologies rather than the traditional text based syntactic framework for product catalogue data handling and meaning aware product discovery experiences. In the context of web search, semantic search technologies have been successfully experimented to build meaning aware web information discovery experiences. The opportunity to extend the technological breakthroughs in the field of semantic web search to the domain of E-Commerce is a highly potential opportunity.

Semantic web based e-commerce will help organization in marketing and distributing their product information in a more sensible fashion. In E-Commerce platforms, the meaning aware product discovery experience can be built by replacing the syntactically tagged product catalogues with semantically annotated catalogue knowledge bases. Such semantic knowledge bases equipped with semantic reasoning mechanisms will enable better reach for product data over web search interfaces and more meaningful product discovery experience for the Ecommerce portal user. This chapter discusses a framework for building semantic product discovery over an Ecommerce platform. This chapter is organized as follows.

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Section 2 describes the background and motivation for this work. Section 3 discusses the semantic search in E-commerce and section 4 describes how a semantic product discovery experience can be built over an E-commerce platform. Section 5 illustrates the semantic product discovery using two handmade shopping ontologies. Section 6 gives future research dimensions and conclusions are given in section 7.

BACKGROUND AND MOTIVATION

Semantic search, being the buzzword for quite a long time, has the potential for transforming the traditional web search scenario to meaning aware web information retrieval. Unlike conventional keyword based search mechanism, semantic search takes into account the context and meaning of the search words and retrieve semantically relevant information. For example, if you submit the keyword “Apple iPhone 6” into a semantic search interface, then the results may include not only the pages having the keyword “Apple iPhone 6” in their description, but also the product features, comparison with other vendors, price lists etc. Here the context is “Mobile Phone” and the results will be filtered based on this contextual information whereas a traditional search engine may yield results from other sources where the keyword “apple” is syntactically tagged to, even as a fruit. Thus major shortfall of keyword based search engines is the lack of meaning awareness in a given search context. Keyword based search engines of today’s era has come to a plateau and it is estimated that almost 20 – 30 percent of web searcher do not find relevant results in the top result set returned by this type of search engines. Here semantic search technology comes into picture as an extension of today’s web where the information is represented which can be read and processed by machines independently. Traditional web uses Hyper Text Markup Language (HTML) to represent the information whereas semantic web uses Resource Description Framework (RDF) and Web Ontology Language (OWL) for knowledge representation. In addition to the linkages for media information such as audio, video, pictures etc, semantic web also links objects such as people, place, organization and other related resources. Semantic search engine has a huge amount of semantic information in its store which is inter-related thus it can solve very complex user queries. In semantic web search, customers expect search engines to understand and interpret natural languages and conceptualize the intention behind the words submitted to it. Thus semantic search engines should work in such a way that they must focus less on keywords but more on intent based intelligence. The key idea behind semantic web is that every object in the real world is to be referred to by a Uniform Resource Identifier (URI). Organizations who want to implement semantic discovery of their data must publish it in standardized forms called ontologies represented in OWL. The ontological data is machine interpretable for indexing and surfacing in relevant semantic search contexts. E-Commerce platforms may utilize this opportunity for promoting products and service offerings over the web. A generic architecture for building semantic search experience is shown in Figure 1.

Apart from the layers available in traditional search engines, a new layer called Semantic Layer is employed in semantic search engines which are vested with the duty of ontology generation and the meta-data management. Search queries are submitted to the search engine through presentation layer and application layer will process the query submitted by the user. Ontology information that is present in the semantic layer is processed and the result will be presented through the user interface module.

In the context of semantic web, researchers have explored many potentially valuable ontology based computational opportunities. Some of those research contributions with special emphasis on e-commerce related applications are discussed in the remaining part this section. Using TimeML as the annotation language, the metric of inter-annotator agreement (IAA) is used to map semantically similar but syn-

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