



# Context Setting Using Ontology for Domino's Pizza

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**ABSTRACT:** Information retrieval (IR) is a method of gaining information resources related to a need of information from a group of information resources. Searches can be either content-based or metadata indexing. Information retrieval is broadly used in fields such as universities and public libraries, to provide access to books, journals and other documents. Search engines are the most visible example for Information Retrieval applications. The traditional information retrieval is based on keywords but lack context. Knowing the context will enhance the precision of the retrieval. In this experiment, we have created ontology for the Domino's pizza and have created a context for the queries related to it. Our evaluation and the experiments conducted have shown an increase in the accuracy of the retrieval results.

**KEYWORDS:** Information Retrieval, Ontology, Context.

## I. INTRODUCTION

Information retrieval (IR) is a method of gaining information resources related to a need of information from a group of information resources. Searches can be either content-based or metadata indexing. Information retrieval is broadly used in fields such as universities and public libraries, to provide access to books, journals and other documents. Search engines are the most visible example for Information Retrieval applications. The process of retrieval starts when a user inputs a query into the system. A query is used in order to retrieve certain information from large amount of data. A query is not used to uniquely identify a single object in the collection; it can match several objects, perhaps with different degrees of relevancy.

Information retrieval system has a query processing stage, indexing stage, matching stage and the ranking stage. Modifications in any part of this system will have an overall impact in the system performance. Even though the technology of search engines have evolved a lot in the last decade, the Information Retrieval (IR) system is currently built on keywords. There are a lot of problems associated with this model and hence most of the time it does not meet user requirements. The way to solve this problem is to move from keyword matching to semantic matching, which means searching by the meanings rather than the literal strings.

It is very important to retrieve information accurately and efficiently. There have been many attempts to improve the precision of the searching. One such attempt is to understand the context by some mechanisms like personalization etc. One such attempt is to understand the context by using ontology. Though ontology is a term used in philosophy it has gained momentum in computer science after the advent of World Wide Web in particular after the vision of semantic web. Ontology characterizes concepts that are a part of the world. At present, ontology serves as a backbone of the Semantic Web. It provides vocabularies and formal conceptualization of the provided domain to facilitate information exchange and sharing. In this study, ontology is used to provide context by creating ontology. We have created a domain ontology for Domino's pizza, and have used to queries related to Domino's pizza.

In the next section we will be explaining about Context, then the role of Context in Query Expansion, the implementation of the prototype system, results and discussion and then will be the conclusion.

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## II. CONTEXT

The use of context in the field of computer science is not at all new, it is studied in many areas such as machine learning and Artificial Intelligence. With the emergence of information retrieval and in particular after the impact of web that has created lot of challenges in different levels, context has been in the forefront for researchers. Information retrieval context can be used to understand and learn the different aspects such as link analysis, language models, background of the user and the background of the knowledge resources, so that it can be used to improve the performance of the Information Retrieval system.

## III. CONTEXT AND QUERY EXPANSION

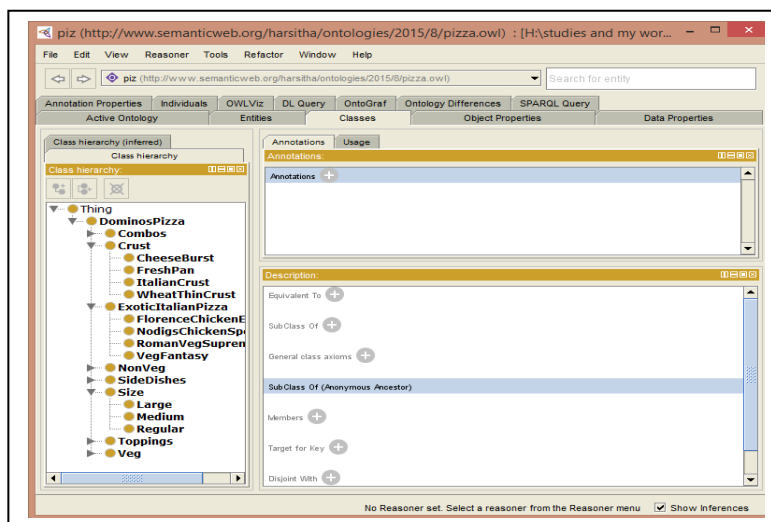
Context is one of the areas where researchers are looking to provide improvements. The main focus has been on Query Expansion. Query is a user's information requirement. Most of the time the user's query input is not detailed enough to get fully satisfactory results. To overcome this drawback in Information Retrieval systems, most of today's systems use Query Expansion. Query Expansion allows to search based on keywords and also on some variations of the original terms.

Query Expansion is aimed at formulating a user query into one that is more responsive for Information retrieval. Various query expansion strategies are being proposed one among them which is recently used to expand is Ontology. This approach can give considerable improvement in the accuracy of retrieval results.

## IV. IMPLEMENTATION OF THE PROTOTYPE SYSTEM AND ANALYSIS OF TEST DATA

1. **ONTOLOGY CONSTRUCTION:** Ontology is a formal way to represent knowledge. It is a set of concepts within a domain. It is a knowledge base for our project that is built based on the concepts related to Domino's Pizza domain. By referring to the Domino's Pizza brochures and websites a handful of data is collected and based on the information gathered ontology is constructed taking into consideration the various aspects under Domino's Pizza domain.

TOOL USED: Protégé 5.0 Beta



2. **USER INPUT:** The user enters a query related to Domino's Pizza domain in natural language. The result is expected to be relevant web links based on the search made and other irrelevant web links must be eliminated or filtered out.



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3. **PARSING OF QUERIES:** The query that is passed as an input by the user is initially parsed using a parser. This is done in order to analyse the query syntactically which checks the part of speech of each word in the query. In this way of parsing the query is analysed grammatically.

TOOL USED: Stanford Parser

4. **WORDNET:** The output that is obtained from the parser is passed through the WordNet API in order to get the related synsets of various words present in the query. Hence semantically related words are obtained from the output of WordNet

TOOL USED: WordNet API

5. **EXTRACTION FROM ONTOLOGY:** This is an important process where the information related to the given user input query is extracted from the built ontology. The initial query after passing through Stanford Parser and WordNet API, gives a set of classified and semantically analysed words. These words are matched with the concepts that are contained within the ontology to get a set of more related key words. At the end of this process we get a collection of words which are domain specific keywords.

TOOL USED: Jena API

6. **FORMATION OF REFINED QUERY:** The next process is query formation that is using collection of the words that were collected before this step. The query that is formed will produce more refined results and will fetch more semantically related links when we pass the query as an input in the search engines. The refined query will be sent to the search API which fetches web links related to user query.

TOOL USED: Google Search API

## V. RESULTS AND DISCUSSION

Our experiment proves that the refined query gives more relevant web links and is producing better results when compared to passing the query directly to the search engines. We have experimented this in the month of August and September 2015. The first 20 results were manually checked for relevance.

The queries that were processed are given below.

Sl.no	Sample Queries	Google	Bing
1	Categories in domino's pizza	2	4
2	Divisions in domino's veg pizza	3	4
3	Types in Domino's non veg pizza	3	3
4	Domino's pizza toppings	5	4
5	Crust options in domino's pizza	4	5
6	Combos in domino's pizza	9	8
7	Side orders in domino's pizza	7	5
8	Types of ItalianExoticpizza	5	4
9	Beverages given in Domino's pizza	7	10
10	Sizes in domino's pizza	5	6

Sl.no	Refined Queries	Google	Bing
1	Category or Categories in domino's pizza	5	5
2	Section or Divisions in domino's veg pizza	9	8
3	Type or types in Domino's non veg pizza	7	8

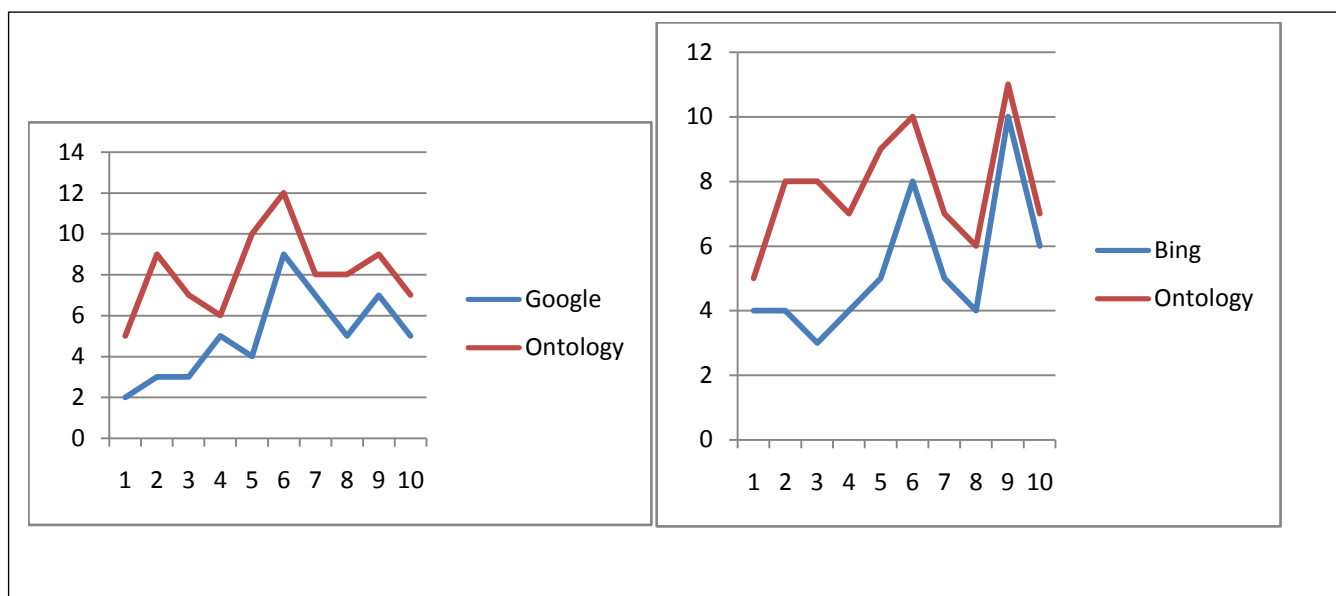
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4	Topping or Domino's pizza toppings	6	7
5	Crust or Crust options in domino's pizza	10	9
6	Combo or Combos in domino's pizza	12	10
7	Side or Side orders in domino's pizza	8	7
8	Type or types of ItalianExoticpizza	8	6
9	Drink or Beverages given in Domino's pizza	9	11
10	Sizes in domino's pizza	7	7

## VI. COMPARITIVE RESULTS



In this paper we have used ontology to facilitate context based search. It helps to understand the advantage of using ontology over the traditional keyword based search. The quality of ontology plays a vital role in the context based search. The context based search will yield better relevant results than the traditional information retrieval methods. Since our ontology is based on Domino's Pizza domain it provides a better result when query is related to this domain.

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