Generating 3D Visual Expression Using Semantic Simplification Description Based on Logical Representation

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\textbf{Abstract.} Performance on a question answering system is reflected by the number of correct answers that is produce from a list of alternate choices. However, many answers would appear in documents and passages laden with terms from the query. It becomes more difficult and eventually impossible to make a precise answer to a query. The aim of this study is to determine the keyword of the precise answer to a specific query and illustrate the answer in visual expression. In this paper we propose a method to translate text into visual expression, closest to the correct answer. To achieve a significant illustration capability it is necessary to develop methods of dealing with knowledge base. Firstly, we must consider the real world and the visual expression of key information that can be extracted from the words. The proposed system will analyse and match them using visual semantic simplification description based on logical representation.

\textbf{Keywords:} Visual Expression, Precision Answer Extraction, Question Answering System, Logical Representation.

1 Introduction

Question answering is a central human activity in getting relevant information or a process of any information exchange that involves humans and the data that is not fully structured [1]. When we need information, we ask questions that will help us to obtain it. Question answering processes can impress users and keep them satisfied, improve the domain quality and accelerate the development process. In a question answering system, the first step involves in retrieving answers relevant to the questions. Question answering system has been relatively narrowly focused on the task of searching for and returning the answers of an individual that satisfy a query. However, it usually produces short length answers and many of the answers would appear in documents and passages burdened with terms from the query. It becomes difficult to make a precise answer to a specific query.

Natural language processing technologies lead the possible reformulations of the answers collection, in order to ensure the precise answer. This work presented is an
extension of the previous work found in [2], which is to generate a 3D virtual scene by using semantic simplification description based on logical representation.

In this paper, we will make a brief presentation of our question answering system. Then, we will discuss the problems associated with answer selection, and the strategies that can be used to overcome these problems. Finally, we will describe the solution through investigation of establishing a correspondence between words and visual depictions. This correspondence is not a one-to-one match, but for some semantic domains, it is possible to establish direct correspondence between words and pictorial elements being referenced by those words.

2 Related Work

Theoretical work in question answering is found in Artificial Intelligence (computational linguistic), psychology, linguistics, and philosophy. Thagard (2006) [3] called these interdisciplinary studies as cognitive science. Cognitive science has primarily worked with the computational-representational understanding of the mind: one can understand human thinking by postulating mental representations akin to computational data structures and mental procedures akin to algorithms [3], [4]. Work in these various areas forms the basis for implemented natural language question answering systems. Natural language question answering may be considered the most universal way to provide information access. There are several natural language question answer systems with different purpose such as START (SynTactic Analysis using Reversible Transformations) natural language system, which was developed as an information retrieval system in 1993; ALICE is a chat robot and Deep Read is a reading comprehension prototype system (1999).

Currently, many question answering systems have a growing demand for accurate and cost effective information extraction. Alternatively, to overcome the query deficiencies, automatic extraction algorithm would reduce human interactions in the information extraction. An efficient automatic extraction requires some approaches or algorithm that tries to simulate human thinking, using some expert knowledge. Recently, artificial intelligence has become an efficient tool in human thinking simulation and especially in automatic feature extraction issues [5]. Artificial intelligence can be built using advanced mathematical theories such as fuzzy logic, artificial neural networks and genetic algorithms.

However, this paper focuses on the knowledge issues in translation of semantic logical representation into 3D visual expression for precise answer extraction. Jackendoff in 1987 [6], attempts to establish a correspondence between words and 3D model of objects, but the problem is handled primarily at the single-word level (both nouns and verbs) and does not extend to establishing a correspondence between a sentence/phrase and the complex scene it may evoke.

In the present research, we proposed to generate a virtual scene by using semantic simplification based on logical representation as an input. The representation was based on a semantic approach that it is involved in building up the meaning representation and enforced both syntactic and semantic agreements. On the other hand, this research also exploited additional knowledge in order to understand the text document and produce as its output some descriptions of the information conveyed by the