Chapter 1: Introduction

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1.1 Introduction

Word sense disambiguation is the task of selecting the appropriate senses of a word in a given context. An excellent survey of the history of ideas used in word sense disambiguation is provided by Ide and Veronis (1998). Word sense disambiguation is an intermediate task which is necessary in order to accomplish some other natural language processing task, e.g.,

1) translation selection in machine translation,
2) eliminating irrelevant hits in information retrieval,
3) analyzing the distribution of predefined categories in thematic analysis,
4) part-of-speech tagging, prepositional phrase attachment and parsing space restriction in grammatical analysis,
5) phonetization of words in speech synthesis and homophone discrimination in speech recognition, and
6) spelling correction, case changes and lexical access in text processing.

Word sense disambiguation (WSD) involves the association of a given word in a text or discourse with a definition or meaning which is distinguishable from other meanings potentially attributable to that word. The task therefore necessarily involves two steps according to Ide and Veronis (1998)[1]. The *first* step is to determine all the different senses for every word relevant to the text or discourse under consideration, i.e., to choose a sense inventory, e.g., from the lists of senses in everyday dictionaries, from the synonyms in a thesaurus, or from the translations in a translation dictionary.

The *second* step involves a means to assign the appropriate sense to each occurrence of a word in context. All disambiguation work involves matching the context of an instance of the word to be disambiguated either with information from external knowledge sources or with contexts of previously disambiguated instances of the word. For both of these sources we need preprocessing or knowledge-extraction procedures[2] representing the information as context features.

For some disambiguation tasks, there are already well-known procedures such as morpho-syntactic disambiguation and therefore WSD has largely focused on distinguishing senses among homographs belonging to the same syntactic category.

However, it is useful to recognize that a *third* step is also involved: the computer needs to learn how to associate a word sense with a word in context using either machine learning or manual creation of rules or metrics. It is the third step which is the focus of this work and especially the machine learning aspect. Unless the associations between word senses and context features are given explicitly in the form of rules by a human being, the computer will need to use machine learning techniques to infer the associations from some training material. In order to avoid confusion, we will speak of manually created disambiguation techniques as a separate category and only divide the machine learning techniques into the subcategories of supervised, semi-supervised and unsupervised.

1.2 Problem area:

The automatic disambiguation of word senses has been an interest and concern since the earliest days of computer treatment of language in the 1950's. Sense disambiguation is an "intermediate task" (Wilks and Stevenson, 1996) which is not an end in itself, but rather is necessary at one level or another to accomplish most natural language processing tasks. It is obviously essential for language understanding applications such as message understanding, man-machine communication, etc.; it is at least helpful, and in some instances required, for applications whose aim is not language understanding.

1.3 Problem statement:

The idea of using simulated evolution to create neural networks that learn faster and generalize better is becoming increasingly widespread.

However, such evolutionary processes are usually extremely computationally intensive. We propose a supervised approach to word sense disambiguation based on neural networks combined with evolutionary algorithms. Large tagged datasets for every sense of a polysemous word are considered, and used to evolve an optimized neural network that correctly disambiguates the sense of the given word considering the context in which it occurs.

1.4 Objective of research:

1. Study the word sense disambiguation problem.
2. How the genetic algorithm and neural network can be used for word sense disambiguation.
3. To develop a hybrid method for the word sense disambiguation using neural network and genetic algorithm.

1.5 Significance of research:

Word sense disambiguation (WSD) is the task of determining the meaning of an ambiguous word in its context. It is an important problem in natural language processing (NLP) because effective WSD can improve systems for tasks such as information retrieval, machine translation, and summarization.

Neural network approaches to WSD have been suggested. These models consist of networks in which the nodes ("neurons") represent words or concepts, connected by "activatory" links: the words activate the concepts to which they are semantically related, and vice versa. In addition, "lateral" inhibitory links usually interconnect competing senses of a given word. Initially, the nodes corresponding to the words in the sentence to be analyzed are activated. These words activate their neighbours in the next cycle in turn, these neighbours activate their immediate neighbours, and so on. After a number of cycles, the network stabilizes in a state in which one sense for each input word is more activated than the others, using a parallel, analog, relaxation process.

1.6 Organization of thesis

Chap 1 : Introduction about the problem and how we are going to solve that problem.

Chap 2: Describe the neural network from its basics and also how it functions and their limitation and advantages over conventional techniques.

Chap 3: Disscuss the genetic algorithm, how the different operation are done in the genetic algorithm , different models are discussed for processing of algorithm.

Chap 4: Discuss the word sense disambiguation , what the problem is ? and how other techniques are used to solve the problem..I have discussed each techniques and also from root level i.e from the sense of word to the higher level , how these techniques are used to solve the problem. Then how genetic algorithm evolve the new results that are discussed.

Chap 5: In this chapter we have discussed the context of the word and its modalities and the depth of preprocessing.

Chap 6 : In this chapter we have discussed disambiguation problem separately what different techniques used to solve the problem are discussed.

Chap 7: In ths chapter the system and the methodology discussed of hybrid system. How it work and how it process the sentence , what is it's structure and what topology is used.

Chap 8: In this chapter we discuss the result which we have got after processing and then compare it with other techniques.

Chap 9: Conclusion , summary and future scope are discussed.