Studies on a Question Answering System Handling Ambiguous Questions

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This paper describes a concept of an open-domain ranking-type question answering system. When an user inputs an ambiguous question, this system detects its ambiguity and outputs list of answers with ambiguous information. Ambiguous questions in this research indicate ones that can't choose only one answer, because a meaning of word in question is ambiguous. For example, a question "worldcup no yuusyoukoku ha dokodesuka(Which country won the worldcup?)" is ambiguous, because there are some meaning in "worldcup" as soccor or ski. Therefore, system can't choose only one answer. When an user asks such a question, the system outputs list of answers with ambiguous Information such as "Brazil(soccor no worldcup)" and "Norway(ski no worldcup)". In this research, we mainly describe the way to extract ambiguous word in user question. Outline of our proposed techique is as follows. In the previous example, when system extracts two answers as "soccor" and "ski", we pay attention to the expression which specializes keyword meaning(specializing expression). For example, the noun "soccor" or "ski" which modifies "worldcup" can be considered to be an expression that specializes meaning of worldcup. Thus, for each keyword in a question, we extract specializing expression of it, and it is considered that the keyword is ambiguous when

different specializing expressions of the same keyword exist for difficult answers.

The flow of the process of the system is shown below. First, keywords, answer type and a type of keyword are extracted from an user question and text including keywords is extracted. A past system didn't handle inflections of verbs and adjectives. For example, when "oyogu(swim)" was the keyword, even if text was included the inflection of the verb "oyoida(past form of "swim")", it can't extract the text because of surface form of verbs are different. Then, to handle them, basic forms of verbs and adjectives of inverted index was made and the system came to be able to handle inflection. When answer candidates are extracted from those text, nouns that meet two requirements, morpheme information matches to the answer type, it is in the neighborhood of the keyword, are extracted as answer candidates. Furthermore, the system gives scores to answer candidates.

Next, for detection of question ambiguous, nouns related to keyword in the same sentence are extracted from text including answer candidates. They are considered as the candidates of all the specializing expressions. For extracting the spexializing expressions, relativity between keyword and the noun was calculated. Relativity is defined by Dice co-efficience. Then, in particular, the noun with high relativity was considered to be the specializing expressions. By this process, a lot of triples of (answer, keyword, specializing expressions) are extracted. And, the answer group that the question has paired with the answer is made, and in this answer group, ambiguity is detected by finding an answer have different specializing expressions. We think that when we make the answer group, if it doesn't have the similar specializing expressions of a keyword to answer, it can't appropriately represent ambiguity of meaning of a keyword. Therefore,the answers where the keyword is common and the specializing expression has a common attribute are collected in one group. Attribute is a feature of specializing expression. In this research, we deal with 4 type, "number + suffix", "parentheses", "semantic class of thesaurus" and "N characters at ending". For example, when there is the specializing expression of candidate such as "60 kiro-kyu(class 60 kilograms)", "48 kiro-kyu(class 48 kilograms)", and "100 kiro-kyu(class 100 kilograms)", the answer group of "(Nomura, judo, 60 kiro-kyu)", "(Tamura, judo, 48 kiro-kyu)" and "(Inoue,

judo, 100 kiro-kyu)" are composed, because they have common attribute "number + suffix". Next, several answer group are extracted, then they are ranked by score described later and we choose the best answer group to output as a list of answers. Score is defined by number of answers included in the answer group, reliability scores of answers in answer group, whether same specializing expressions are extracted for different answers. Using 31 ambiguous question, we tried to create a proper answer group by our proposed method. As a result, the proper answer group was created for 74% of ambigouas questions. But, the correct answer groups were ranked best by scoring scheme for only 30% of questions.