Spoken Dialogue System Based on Information Extraction from Web Text

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We present a novel spoken dialogue system which uses the up-to-date information on the web. It is based on information extraction which is defined by the predicate-argument (P-A) structure and realized by shallow parsing. Based on the information structure, the dialogue system can perform question answering and also proactive information presentation using the dialogue context and a topic model.

To be a useful and interactive system, the system should not only reply to the user's request, but also make proactive information presentation. Our proposed scheme realizes this function with the information extraction technique to generate only useful information. The useful information structure is dependent on domains. Conventionally, the templates for information extraction were hand-crafted, but this heuristic process is so costly that it cannot be applied to a variety of domains on the web. Therefore, we introduce a filtering method of predicate-argument (P-A) structures generated by the parser, which can automatically define the domain-dependent useful information structure.

This scheme is applied to a domain of baseball news, and we design a dialogue system which can reply to the user's question as well as make proactive information presentation according to a dialogue history and a topic model. The system can be viewed as a smart interactive news reader.

The architecture of the dialogue system is depicted in Figure 1. First, information extraction is conducted by parsing web texts in advance. A user's query is also parsed to extract the same information structure, and the system matches the extracted information against the web information. If the system finds some information which completely matches to the user's query, the system makes a response using the corresponding web text. When the system cannot find exact information, it searches for some information which matches partially. For example, when the user asked “Did Ichiro hit?" and the system cannot find exact information “[Ichiro (agent) hit]”, it may find “[Lopez (agent) hit]” which is partially matched and most relevant. This information is used to generate a similar response that the user would expect.

In the conventional RDB-based dialogue scheme, the system hardly makes relevant responses if it finds no matched entries, thus usually replies “There is no matched entries”. In the conventional question answering scheme, the same situation often happens. Occasionally, a close-matched answer may be found by statistical matching, but the found answer may not be relevant to the user's query. In the proposed scheme, we guarantee that the answer is at least partially matched to the user's query in terms of the information structure.

G.G. Lee et al. (Eds.): IWSDS 2010, LNAI 6392, pp. 196–197, 2010.

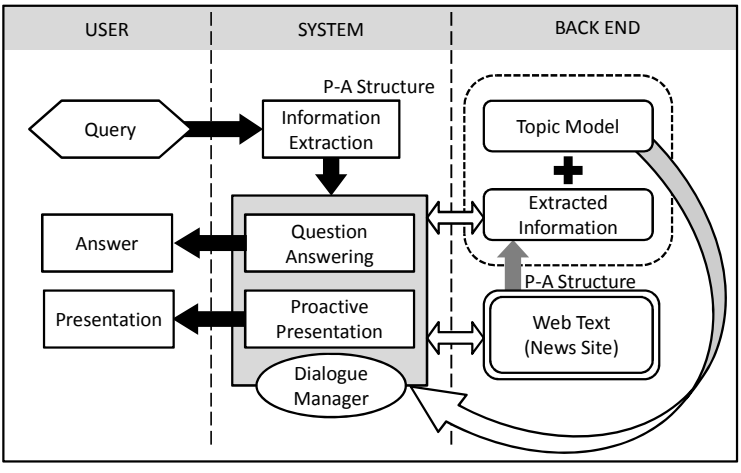

Fig. 1. System architecture

We show an example dialogue between a user and the system in Figure 2. The system responds in the question-answering mode when the user's question has a predicate and an argument. If the system cannot find exact information, the system makes proactive presentation by choosing information that has the same predicate but different arguments.

User:	Please tell me about today's Tigers.
Sys:	The Tigers won the game 3-2 against the Giants.
User:	Who was the winning pitcher?
Sys:	Nohmi was the winning pitcher.
User:	Did Kubota come in to pitch?
Sys:	Kubota didn't, but Fujikawa came in to pitch 9th inning.
	(long pause)
Sys:	Do you know Fujikawa's EPA?
User:	I don't know.
Sys:	0.00
User:	Wow.

Fig. 2. Dialogue example