ExpertClerk: A Conversational Case-Based Reasoning Tool for Developing Salesclerk Agents in E-Commerce Webshops

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Abstract. Conversational Case-based Reasoning (CCBR) has been used successfully to improve knowledge management in corporate activities as a problem solver. In our past research, we developed CCBR systems in customer support domains where CCBR systems played the role of customer support agents. Based on these experiences, we have applied the same CCBR technologies to design the user-interface of e-commerce websites. ExpertClerk was designed as a tool for developing dialogue-based front-end systems for product databases. We first analyzed conversation models of human salesclerks interacting with customers. The goal of a salesclerk is to effectively match a customer’s buying points and a product’s selling points. To achieve this, the salesclerk alternates between asking questions, proposing sample products, and observing the customer’s responses. ExpertClerk imitates a human salesclerk. It consolidates the human shopper’s requests by narrowing down a list of many products through a process of asking effective questions using entropy (navigation-by-asking) and showing contrasting samples with an explanation of their selling points (navigation-by-proposing). This request elaboration cycle is repeated until the shopper finds an appropriate product. In this article, we present the system architecture, algorithms as well as empirical evaluations.

Keywords: agent, conversational case-based reasoning, dialogue management, e-commerce

1. Introduction

This paper describes ExpertClerk, a tool for developing virtual salesclerk systems as a front-end for e-commerce websites. It was designed to help website visitors easily find, compare, and decide on appropriate products, services or solutions by using conversational case-based reasoning (CBR) techniques (Aha and Breslow 1997; Aha et al. 2001).

The underlying idea of the ExpertClerk approach is to view the action process of human salesclerks as a conversational CBR system for improving their selling activities. We think that human salesclerks have three roles. First, they are *problem solvers* for shoppers. A salesclerk interviews a shopper and finds the appropriate products to fit the shopper’s needs. This is typical when a shopper knows his/her specific needs. A second role of salesclerks is as *advisers* to shoppers. If a shopper doesn’t have specific needs or require-
ments in making a purchase, a salesclerk infers the shopper’s implicit desire and suggests the products the shopper will want. An example of this style may be conversations with cosmeticians. The third role of salesclerks is testimony for shoppers. Salesclerks often help a shopper convince himself/herself that this product best fits the shopper. Conversational CBR is an interactive system that, via a mixed-initiative dialogue, guides users through a question-answering sequence in a case retrieval context. We believe that conversational CBR provides, at least, the functions of problem solver and adviser in its paradigm.

The motivation behind this research was two-fold. First, we have developed several customer support systems using conversational CBR techniques (Shimazu et al. 1997, 2001). Based on these experiences, we applied the same techniques to e-commerce website design. However, because expected conversations in retail websites were different from those in customer support, the trial did not have good results. Second, well-designed websites such as Lands’End (http://www.landsend.com) provide the ability to press a button and talk to a customer service representative from the website via live chat or phone for shopping help, professional advice, or gift suggestions. We were surprised that even such retail websites rely on the conversation skills of human representatives. We surveyed various conversation skills manuals for human salesclerks. The survey taught us that salesclerks effectively match customers’ buying points and products’ selling points. Today’s websites do not have such salesclerk-like conversational interfaces. Therefore, ExpertClerk was designed and developed to imitate the conversation techniques of human salesclerks.

Section 2 analyzes conversations between human salesclerks and shoppers. Section 3 introduces a conversation model between human salesclerks and shoppers. Section 4 explains our conversational CBR techniques. Section 5 describes the user interface of ExpertClerk. Section 6 describes the evaluation results of ExpertClerk. Section 7 summarizes related research, and Section 8 concludes this paper.

2. Conversations between Salesclerks and Shoppers

This section analyzes aspects of real conversations between human salesclerks and shoppers. The analysis focuses on product purchase activities that match a product’s selling points and a shopper’s buying points. In a conversation between a shopper and a salesclerk, the shopper plays the role of a decision-maker and the salesclerk plays the role of an adviser who assists the shopper’s decision-making. The conversation is a clarifying process of the subconscious desire of the decision-maker.