Reuse of customer contact experience to implement e-CRM
: E-mail response management

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1. Research Background

- *Customer support or service* in organizations is one of the most important business improvement theme in improving their business competences.
  - *Many customers view customer support as one of the most important criteria when evaluating a product or a service (Foo et al., 2000).*
  - *Customer service has a strong link to customer satisfaction, which then yields customer loyalty and long-term profitability (Szymanski & Henard, 2001; McKenna, 1991).*

- In a traditional customer support environment, mainly *call centers* or *service centers* are responsible for receiving inquiries via *telephone calls/ letters/direct-visiting*.
  - *Time consuming.*
  - *Costly with a lot of service people.*
  - *Complaint for delay;*
  - *Limited ability of service people.*
  - *Increasing training fees when a new product appeared*

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1. Research background (Cont.)

- The study by the Yankee Group found that close to 80% of large companies currently were providing (or planned to provide) *Web-based customer support access* (Kay, 1999)
- The *Web-based Customer Support* allows customer to recover from their mistakes and to overcome some difficulties associated with traditional media; e.g. it may ameliorate problems of *accessibility, bottlenecks, interaction,* and *identification* (Negash, 2002).
  - *reduced transaction costs and time to complete transactions*
  - *reduced clerical errors*
  - *faster responses to new market opportunities*
  - *improved monitoring of customer choices*
  - *improved market intelligence*
  - *more timely dissemination of information to stakeholders.*
  - *more highly customized advertising and promotion (Beatty: 2001).*

➔ *Customer contact management (Channel integration)* using *Web-based Customer Support* system is the most important issues to success *e-CRM*

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- Contact management is important on the Web in e-CRM
- Web-based customer support = e-mail response + self help service

- Applying *case-based reasoning (CBR)* technique to responding various customers' e-mails
  - *Reuse e-mail response experience to reply a new e-mail*


- *Procedure and architecture of the CBR system for e-mail response*

- Customer contact (or support) with using *e-mail(70~80%) becomes more general method to implement e-CRM*
  - *Operational and Managerial problems : Difficulty to classify many different types and inquiries of incoming e-mail from customers. (Time/Cost/People/Quality/Experience)*
  - *Response and Knowledge Discovery problem: Difficulty to keep the communication message to customers (Knowledge Sharing)*
  - *Treatment Timing Problem: Difficulty to offer treatment to customer at the right time (Right Time)*

➔ Strong needs for *managing e-mail response efficiently and analyzing e-mails with e-CRM (operational and event-based)*
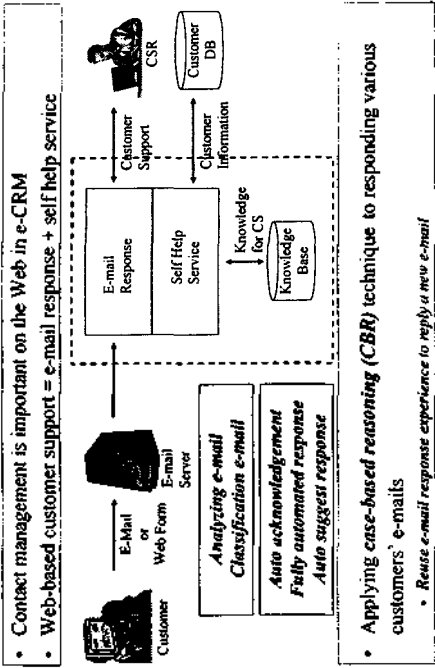
- *The basic idea of CBR is that humans reuse the problem solving experience to solve a new problem (Kolodner, 1991).*

- The main task of using CBR is generally the *representation of a case, a retrieval procedure, and an adaptation procedure.*

  - *Representation* – frame-typed data structure (inbound e-mail, keywords, reply e-mail)
  - *Retrieval* – case vector, measure the similarity between a new inbound e-mail and the cases in case base
  - *Adaptation* – knowledge based case adaptation

- *An example of case*

INBOUND E-MAIL
PRODUCT CATEGORY 1 : Computers & Related
PRODUCT CATEGORY 2 : Printer
CUSTOMER TYPE : Individual
LOCATION : PUSAN KOREA
SENDER : C.H. Park
DATE : 20030725
SUBJECT : Printer Driver
CONTENTS : 2개월 전에 K company에서 생산한 프린트를 구매하여 사용하고 있습니다. 그런데, 쓰기 자료의 PC를 교체하여 프린트를 연결했으나 프린트가 인식되고 있지 않습니다. 도움을 얻고자 이렇게 메일을 보내고요. 쓰기 사용하고 있는 프린트의 모델명은 ML2100입니다.

KEYWORDS
[K1: 1)(K4 1)(K5 : 1)

REPLY E-MAIL
SENDER : S.M Kim
DATE : 20030726
SUBJECT : Printer Driver
CONTENTS : 프린트가 인식되지 않는다 할 때에 내용의 구매하여 사용에 참을한 확인을 할 수 없습니다. PC를 교체하신 후 프린트 모델의 관한 드라이버를 설치하였습니다. 귀하 ML2100 모델에 맞는 표준 드라이버를 첨부하니 이 드라이버를 설치하여 보신 후에 확인을 할 수 없습니다. 가까운 구매처에 방문하여 주시면 수리 및 점검을 도와드립니다. 그러신 귀하의 문제가 해결되길 바라며 감사합니다.
Customer manager : S.M Kim
ATTACHED : ML2100.DRV, CS_center.doc

- *Case base structure*

- *Similarity*

To calculate the similarity degree or similarity value

$$S_i = |Sim(E_0, E_i)|$$

where $Sim(E_0, E_i) = \dfrac{E_0 \cdot E_i}{|E_0| \cdot |E_i|} = \cos\theta \quad 0 \le \theta \le \dfrac{\pi}{2}$

The similarity between new e-mail E_0 and the stored case E_i

$$SI = Sim(E_0, E_i) \;\; .3.4 \;\; 5.32 = .64$$

where $E_0 \;\; (0, .2, 1, 0, 1, 0, 1, 0, 0)$ and
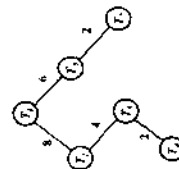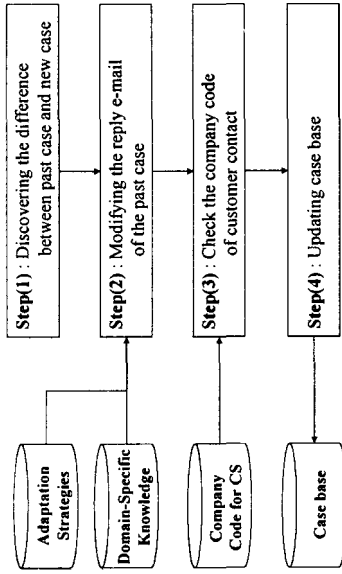$E_i \;\; (1, .8, .6, 1, 1, 0, .2, 0, 0)$

- *Case indexing using keywords and its affinity*

a case as keyword vectors $E_A = (a_{k1}, a_{k2}, ..., a_{kn})$

an example of initial case vector
$E_j = (1, 0, 0, 1, 1, 0, 0, 0, 0)$

computed an affinity value
$Affinity(T_i, T_j) = Max\{Min\{Affinity(T_i, T_k), Affinity(T_k, T_j)\}\}$
, k = 1, ..., n

the case vector reflecting keyword affinity network
$E_j \;\; (1, .8, .6, 1, 1, 0, .2, 0, 0)$

4. A prototype system

System flow diagram

Web-Center Front Office

EPMS Back Office

Webmaster

Customer Contact Manager

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5. Conclusion

- With the application of the proposed system in this study,
  - ◆ a tremendous cut in customer support cost,
  - ◆ decrease of repeated customer's inquiries,
  - ◆ establishment of knowledge-base for customer's needs and response,
  - ◆ efficient management and supervision of customer's inquiries,
  - ◆ reduction of customer's complaints by quick and accurate response,
  - ◆ improvement of service through adaptation of customer's views

- The future study would be not only
  - ◆ to integrate event-based CRM to support right time offering.
  - ◆ to personalize reply e-mail using contents-based recommender system,
  - ◆ but also improvement of the system to be adaptable all through-out the web-based customer support system and customer support through e-mail

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3.4 Knowledge-based case adaptation

Three kinds of knowledge for e-mail response

Step(1) : Discovering the difference between past case and new case

Step(2) : Modifying the reply e-mail of the past case

Step(3) : Check the company code of customer contact

Step(4) : Updating case base

Adaptation Strategies

Domain-Specific Knowledge

Company Code for CS

Case base

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4. A prototype system (Cont.)

Screens for Customer contact manager