An Adaptive Search Engine System
for Bangkok Restaurants

by

Ms. Nattakamol Futanakulthorn

Submitted in Partial Fulfillment of
the Requirements for the Degree of
Master of Science
in Information Technology
Assumption University

November, 2000

An Adaptive Search Engine System

for Bangkok Restaurants

by

Ms. Nattakamol Futanakulthorn

**Submitted in Partial Fulfillment of
the Requirements for the Degree of
Master of Science
in Information Technology
Assumption University**

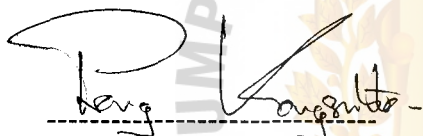November, 2000

The Faculty of Science and Technology

Thesis Approval

Thesis Title   An Adaptive Search Engine System for Bangkok Restaurants
By   Ms. Nattakamol Futanakulthorn
Thesis Advisor   Dr. Prong Kongsubto
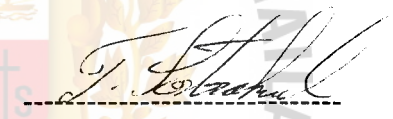Academic Year   1/2000

The Department of Information Technology, Faculty of Science and Technology of Assumption University has approved this final report of the **twelve** credits course. **IT7000 Master Thesis**, submitted in partial fulfillment of the requirements for the degree of Master of Science in Information Technology.
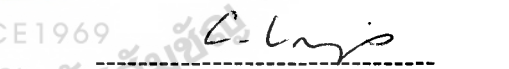
Approval Committee:

(Dr. Prong Kongsubto)
Advisor

(Dr. Thotsapon Sortrakul)
Committee

(Dr. Thatchai Chuenchom)
Committee

(Professor.Dr. Chiidchanok Lursinsap)
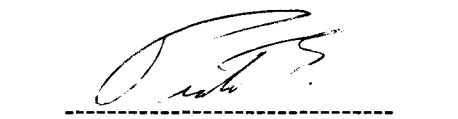Representative of Ministry of
University Affairs

Faculty Approval:

(Dr. Thotsapon Sortrakul)
Director

(Asst.Prof.Dr. Pratit Santiprabhob)
Dean

November /2000

ACKNOWLEDGMENTS

I desire to express my most sincere appreciation and thanks to my advisor Dr. Prong Kongsubto for this encouragement and advice through the course of this study and his help in the preparation and writing of this thesis.

Thanks are due to my boss, Mr. Bill Randall, Managing Director of Try It Media Co., Ltd. and Mr. George Dunford, Technical Director for supplying me with source information for my work.

Thanks also go to my lovely mother for encouraging and supporting me endlessly.

ABSTRACT

To develop an adaptive-based search engine implementing in web-based system for Bangkok dining industry, which in addition to offering information retrieval also continually adapts to improve the quality of future retrieval. The purpose of this system is to provide the most pertinent sources for users according to the behavior of users. Increasing the speed and consistency of problem solving, this system provides more reasonable sources for the user instead of huge of unrelated results. This system studies the thought processes of humans by learning from user searching experience. The knowledge refining system will analyze the user searching performance, or learn from it, and improve it for future consultations as the behavior of the sources. This paper will implement this system in a particular field for prototypes, which will be implemented on searching all restaurants at Bangkok. The system will be adding value to the restaurant details information by collating the customer's feedback on restaurants and improving the searching results according to the customer feedback.

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

CHAPTER 1
INTRODUCTION

1.1 Background of the Thesis

The growth and acceptance of the Internet as a mode of communication and seeking information has opened up new possibilities for the dining seekers to find new restaurants on the Internet. Nowadays, accessing Internet is a daily or weekly activity for everyone. Therefore, the diners do not need to search for restaurants by reading newspapers or books. They just use a computer, a modem and a phone line to connect to the Internet and access restaurant information in one place.

The system provides a list of restaurants according to the search keywords chosen by a user. The user can also choose form one or more basic combined characteristics such as location of the restaurant, type of cuisine, restaurant name and preferred price, to find restaurants. The system compares the keywords that the user has entered with the restaurant names stored in the database and returns a list of search results. The user can click on the displayed restaurant names, which are hyperlinks, and view more detailed information about the restaurant.

There is an increasing array of information in online databases available on the web. This abundance of information increases the complexity of maintaining loyalty to customer relevant information. The user is increasingly facing the problem of how to sift through the huge resources available. Existing restaurant search engines provide limited assistance to users in locating suitable restaurants. Visitors may need to "click" numerous times to find something they like. Sometimes, suitable restaurants are not listed at the top of the search results list. Current restaurant search engine systems only compare the search criteria that visitors enter and the keywords of each restaurant in the database. There is no account taken of the previous searching

experience of the user or the behavior of the user. That is, current search engines systems are passive engines, not active engines.

This paper will present an adaptive search engine system addressing the challenges we found whilst adapting a passive search engine to an active search engine. The system will provide more appropriate sources for the users according to their human behavior and the user's searching experience. The system will provide almost instant sharing and distribution of information with easy and fast access.

1.2 Objectives

The objective of this paper is to develop an adaptive search engine system which providing the most relevant content for users according to their behavior and their searching history.

The three objectives of this system are: -

1) To implement a more reliable Bangkok restaurant search engine system into the market. This will help the user find information about dining in Bangkok, and add value to the characteristics of local restaurant.

2) To increase the efficiency by developing a more accurate and reliable Bangkok restaurant searching system based on customer interest and searching history so that the provided information will be more complete and reliable.

3) To increase the effectiveness in searching for restaurants by reducing the decision making process so that the provided information will be more easy to understand for the user.

1.3 Scope of the Thesis

The scope of this paper is to develop an adaptive search engine system. The system will be implemented in a particular field using prototypes. The paper will implement this system as a search for all restaurants in Bangkok. This system is based on established content served using web-based technology.

The new system will improve the search results of the current system by considering the previous search history of the user and will add value to the characteristics of the restaurants by incorporating feedback from the user. The system monitors the user and collects the searching history as the user surfs through the restaurant details. The system builds a user interest profile from the customer feedback towards each restaurant, and then it re-sorts the list of the restaurant search results for the users. The database will be adapted through out the time the user uses the search engine system.

After the customer signs up as a member, the details of customer will be collected in a database. Each time a customer logs in, the customer can modify their profile, suggest a new restaurant or search for restaurant. The search history for each customer will be collected when the customer searches for a restaurant. The search information collected includes the search key that the customer entered, the search experience, the rating of restaurant, and the interest of the customer. Suitable search results will be shown. The customer can click to see the details of each restaurant, review a restaurant, and giving feedback. The feedback of the customer toward each restaurant will be collected into the database to further enhance future searches.

After implementation, the search results will be evaluated under the same conditions as regular searches for restaurants. The purpose is to prove that the system is adapted itself according to customer feedback and the search history of users. This

system also adds value to the characteristics of the restaurants by including customer feedback, bolstering credibility.

CHAPTER 2
LITERATURE REVIEW

2.1 What is a Search Engine?

Searching for information is a common activity when people use the Internet. The user can click on links and explore a wealth of information. However, searching randomly is not efficient when the user is searching for specialized or complex information. Using a search engine is a more appropriate solution.

A search engine locates information by matching key words or search criteria entered by the user with key words in documents. There are three types of search engine: Search Engines, Directories and Hybrid Search Engines.

Search engines create their listings automatically such as InfoSeek and HotBot. Search engines crawl the web, then people search through what they have found. If you change your web pages, search engines eventually find these changes, which effects how you are listed. Page titles, body content and other elements all play a role.

Directories such as Yahoo depend on humans for its listings. You submit a short description to the directory for your entire site, or editors write one for sites they have reviewed. A directory reviewer search looks only at the web site descriptions and pages submitted on that date. Changing your web pages at a future date has no effect on the listing. The directory search engine is not adaptive. Elements that are useful for improving a listing with a search engine have no effect improving a listing in a directory. The only exception is that a good site, with good content, might be more likely to get reviewed than a poor site.

Hybrid search engines are maintained with an associated directory. Being included in a search engine's directory is usually a combination of luck and quality.

You can submit your site for review, but there is no guarantee that it will be included. Reviewers often keep an eye on sites submitted to announcement places, and then choose to add those that look appealing.

2.2 Current Restaurant Search Engine

The current restaurant search engine system is able to provide the search results list according to the search criteria the user has chosen such as location, name, type of cuisine and preferred price. Those search criteria are acquired by identifying the restaurants' characteristics and grouping them by these said characteristics.

Therefore, the customer searches the restaurant by choosing search criteria such as restaurant name, location of restaurant, cuisine type or the preferred price range of that restaurant. The system compares the restaurant name the customer typed and the restaurant name in the database. If they are match, a list of search results will be provided. Some systems also compare the search criteria that the customer has chosen from a list of restaurant characteristics in the database. The system provides a search results list. The customer can click a hyperlink on the restaurant name and read the details of the restaurant.

The details of the functions and features of each particular restaurant search engine are described in the followings sections.

2.2.1 www.foodeasy.com

www.foodeasy.com is a restaurant search engine, which can search for most restaurants in Hong Kong. The searching characteristics consist of location, type of cuisine, characteristics and price. The search results show the details of restaurant s including name, type of cuisine, rating from customers, cost per person for dinner or

lunch, address and telephone number of restaurant, environment, remarks and the restaurant URL. The search results can be sorted by rating from customer, cost per meal or the name of the restaurant.

2.2.2 www.a-roi.com

www.a-roi.com is a website able to search some of the restaurants in Bangkok. There are many searching characteristic comparing to other search engines. These include the name of restaurant, location, type of cuisine, price per meal for one person, restaurant characteristics and delivery. The details of restaurants shown are very detailed, including the name, address and telephone number of the restaurant, landmark, selling points, restaurant characteristics, type of cuisine, recommended dish, gift certificates, delivery details, promotion, credit cards and car park services. However, the search results are only sorted by the name of restaurant.

2.2.3 www.restaurantsweb.com

www.restaurantsweb.com is a simple website for searching restaurants in Singapore. The searching characteristics only include the name of restaurant, type of cuisine, location and website. And there are brief details about the restaurant which only include the name, address and telephone number of the searched restaurant. It seems that the purpose of this website is persuading the owner of restaurant to have a web site under www.restaurantsweb.com

2.2.4 www.restaurant.ca

As special feature of www.restaurant.ca is that the customer can search for restaurants by choosing the "best in" category. Other search characteristics include the

name of restaurant, location, price per meal, type of cuisine and the restaurant characteristics. The details of the searched restaurant include the name, address and telephone number of restaurant, type of cuisine, the price per meal for one person and the rating from customers.

2.2.5 www.restaurant.com

www.restaurant.com is a web site for searching restaurants in the United States. The visitors can choose search criteria such as state, city, zip code, and restaurant name to find restaurants. In the advanced search, the system is under construction. The features in the advanced search consist of the restaurants' characteristics such as atmosphere, amenities, specialties, special needs, banquet facilities, average price, payment type and bar facilities.

2.3 Comparison of Current Restaurant Search Engines

Table 2.1 illustrates the details for comparing current restaurant information in a search engine. There are different search criteria among these search engine systems. The basic search criteria include the name of the restaurant, the location of the restaurant, and the type of cuisine. The restaurant details shown on the search results list varies among the search engine systems. At www.restaurantsweb.com, the restaurant details only include the name, address and telephone number of the restaurants. The www.a-roi.com gives few more detail. Beside the basic information, there are restaurant characteristics, price per person, landmark, selling points, recommended dishes, gift certificates, delivery, credit card, car park, services at the restaurant and so forth.

	foodeasy.com	a-roi.com	restaurantsweb.com	restaurant.ca
Location	Hong Kong	Bangkok	Singapore	Canada
Searching Characteristics	Location, Type of Cuisine, Restaurant Characteristics, Price per Person	Name, Location, Type of Cuisine, Restaurant Characteristics, Price per Person, Delivery	Name, Location, Type of Cuisine, Website	Name, Location, Type of Cuisine, Restaurant Characteristics, Price per Person, Best in Category
Restaurants Details	Name, Address, Telephone, Location, Type of Cuisine, Restaurant Characteristics, Price per Person, Rating form Customer, Working Hours, Remarks	Name, Address, Telephone, Location, Type of Cuisine, Restaurant Characteristics, Price per Person, Landmark, Selling Points, Recommended Dishes, Get Certificates, Delivery, Credit Card, Car Park Service	Name, Address, Telephone,	Name, Address, Telephone, Location, Type of Cuisine, Rating from Customer, Price per Person
Sorted by	Rating from Customer, Price per Meal, Name of Restaurant	Name of Restaurant	Name of Restaurant	Name of Restaurant
Customer Interest Consideration	No	No	No	No
Customer Searching History Consideration	No	No	No	No

Table 2.1: The Comparison of each Restaurant Search Engine.

Normally, the search results lists in the current search engine systems are sorted by restaurant name only. However, the www.foodeasy.com allows the user to adjust the sorting order of the search results list. Sorting orders include rating from customer, name of the restaurant and price per meal.

Notice that among the current search engine systems, there is no consideration of customer interest and customer past searching behavior in the process of searching restaurants. Therefore, there is no login requirement for user accessing the system.

2.4 The Problems with Current Restaurant Search Engines

In the various current restaurant search engine systems, the search results are filtered out by comparing the keywords of the search characteristics the visitors entered, and the characteristics of each restaurant in the database. Therefore, the visitors may need to click more than one click to find appropriate restaurants on the search results list. The position of the restaurant within the results list is static and does not change with the search criteria the customer was chosen. The position of the restaurant in the listing is based upon the name of the restaurant only. That is, the interests of particular customers and the search histories of each customer are not included in the process of searching restaurants.

Another major problem with current restaurant search engine systems is that the value of restaurant characteristics will not been changed according to the customer feedback. Manually updating the restaurant characteristics is required. The above observations identify an important failing for existing search engines dealing with a potentially dynamically changing data set, they do not learn or ADAPT from the customers' behavior.

2.5 What is an Adaptive System?

Adaptive means having a built-in, more formalized learning process. New information is used to adjust what is being done. It is common sense to do that anyway, but some type of process is needed to make sure that it is happening.

Notice that the definition of an adaptive system is a system that has a means of monitoring its own performance, a means of varying its own parameters, and uses closed-loop action to improve its performance or to optimize traffic.

Therefore, an adaptive system should learn behavior from the user and adapt the database. The database will be adjusted upon by frequency and ways in which users access the system. The system becomes active instead of passive.

According to the adaptive system and interaction group (ASI) from Microsoft, the application of adaptive system is on information access, filtering and management. In this realm, Microsoft have refined collaborative filtering (CF) algorithm methods for recommending content or services to a user based on the analysis of the behavior of a large number of users.

Autonomous, adaptive systems prove to be the needed item in transforming passive search and retrieval engines into active, personal assistants. And it improves the performance of short-term information retrieval in an existing search engine.

2.6 An Adaptive Search Engine System For Bangkok Restaurants

For the above situation, this paper will propose the design and prototype implementation of an adaptive search engine system. The adaptive search engine system is a new concept in the dining industry, which compiles restaurant reviews with ratings and comments based on market research surveys completed by both Thai and expat Bangkok diners. The system obtains the opinions of the restaurants' real, everyday customers by asking them to fill out a survey. They are allowed to rate restaurants on a scale of 1 to 4 in the categories of food, service, menu, and atmosphere. Reviewers are also asked to write comments based on their opinions and experiences at these restaurants. The scores are tabulated into ratings, and the

11

comments are compiled into fun, interesting and honest reviews, telling you what is really good or bad at various restaurants.

The system will be launched at www.TryItAsia.com, which is a dining search site where readers can also be restaurant reviewers, adding their comments to the database of over a thousand Bangkok eateries. Readers can reserve a table, buy dining certificates, create a dinner party, ask for dining advice, read constantly updated features on food and wine, and much, much more online. The site currently contains over 1,200 restaurants, with more being continually added.

The system will consider the customer behavior and search history in the process of searching restaurants. The restaurant rankings in the search results list will depend on the customer feedback. The system will learn the customer behavior and past searching history for application in the process of searching restaurants. That is, the system adds value to the restaurant information. The database will be adapted as the system grows.

The details of the database design, database flow design and the prototype implementation of the adaptive search engine system are described in the next chapter.

CHAPTER 3
IMPLEMENTATION OVERVIEW

3.1 Introduction

This chapter explores the design of the database in the adaptive search engine system. The detail of the structure of the database is attached at Appendix A: Data Dictionary section. Also covered in this chapter is the database flow design for the adaptive search engine system. The database flow design describes how the database tables are accessed for each different event triggered by the customers using the system. A graphical user interface of the system and how the system is adapted is covered in the last part of this chapter.

The database holds all of the restaurant details, customer details, customer feedback collected and customer searching history. The database allows the maintenance of an organized record of all restaurants, customers, the reviews that customers provide about the restaurants and the search history. Therefore, the database must also contain all the customer feedback, and information about how each restaurant that has been rated. The feedback information will also be used to calculate trends. This information must be also stored. The search history information is used for the purpose of searching restaurants.

The database is stored in Microsoft SQL Server version 7.0 and the operation system is Microsoft Window NT Version 4.0. The system is programmed by ASP (Active Server Pages) and is scripted by both VB Script and Java Script. The system can run on any existing browser, but is best on Internet Explorer version 4 or above and Netscape Navigator Version 4 or above.

13

3.2 Database Design

The database consists of a number of related tables. This section only shows the main tables that are used in the process of the adaptive search engine system. The detail of the relationship of the main tables in the database for the adaptive search engine system is described in Figure 3.1.
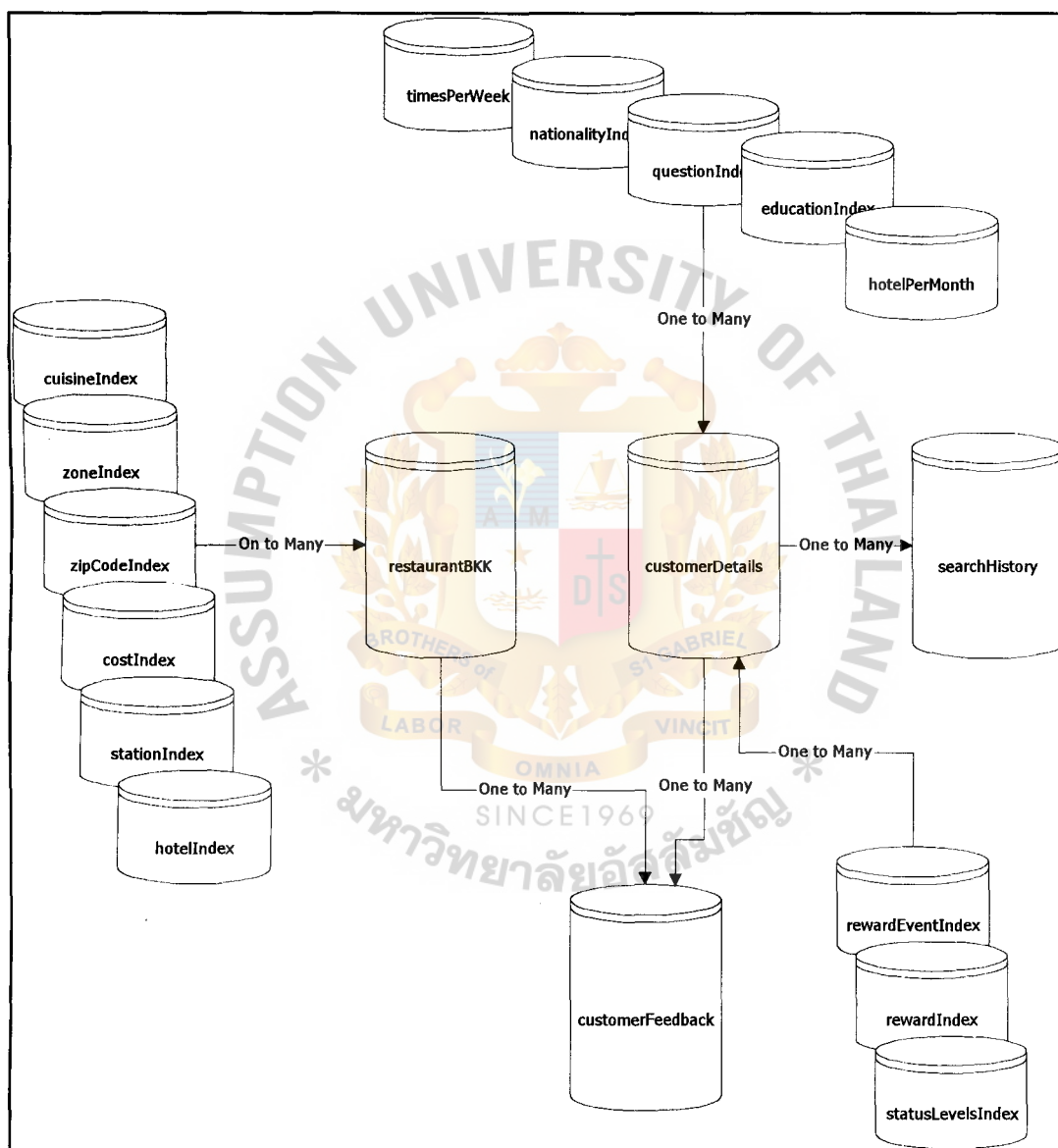
Figure 3.1: The Relationship of the Tables in the Database

The most important tables in this system are restaurant details, customer details, customer feedback and search history. One customer can vote for more than

one restaurant and one restaurant can be voted for by more than one customer. Each record in the "customer feedback" table includes only one customer and one restaurant. Therefore, the relationship between the table "customer details" and the table "customer feedback" is one to many and the relationship between the table "restaurant details" and the table "customer feedback" is one to many also.

In order to easily modify the information about the restaurant characteristics, city, country, type of cuisine, zone, price, BTS Sky train station, and hotel data will be stored in a unique table and act as foreign keys in the table "restaurant details". In the same way, the data about city, country, nationality, times per week for eating outside, question for password, education level and times per month for staying at a hotel are stored in the unique table as foreign keys in the table "customer details".

Cuisine, zone, price range, hotel and BTS Sky train station are used in the process of searching restaurants. In the process of searching for restaurants, the search history of each user will be recorded in the table "search history". One customer can search more than one time. The relationship of "customer details" toward the table "search history" is one to many.

The following are details of each major table in the database, which are included in the process of searching for restaurants:

- Restaurant Details

- Customer Details

- Customer Feedback

- Search History

3.2.1 Restaurant Details

The restaurant details table contains restaurants in Bangkok, including restaurant name, contact information, restaurant characteristics and restaurant ratings. The primary key is the restaurant index number. The restaurant ratings are calculated immediately after the customer reviewing the restaurant. The ratings for each restaurant are based on the calculation from the data in the table customer feedback. Each review from the customer is stored in the table "customer feedback". Each time reviewing the particular restaurant, the system filters out the reviews of that restaurant and calculates the average ratings of that restaurant. The number of votes field allows the average to be calculated in the online database without the complete "customer feedback" table being present. Restaurant characteristics are covered in the "restaurant details" table, such as romantic, scenic view, live music, business dining, trendy, quiet conversation, people watching and so forth. The value of storing these fields is to narrow the search results list help the customer to specify more useful searches.

3.2.2 Customer Details

All customer details are stored in this table. This table consists of the user name, password, personal details and dining behaviors from the customer. This table is used for checking user authentication. Also included are the referral name and the total points that the user earned.

3.2.3 Customer Feedback

The "customer feedback" table contains the customer feedback data. The customer rates the restaurant on the food, service, menu and atmosphere, and writes

comments. A customer can enter more than one review for a restaurant but only the most recent review is included in the process of calculating the restaurant ratings. The table "customer feedback" provides the source information for calculating out the restaurant ratings in the table "restaurant details".

3.2.4 Search History

The "search history" table contains the customer's previous search history data. Each time the customer selects a search criteria, the data about the restaurant name that the user typed, the type of cuisine, the location of the restaurant, the preferred price per meal, the hotel where the restaurant is located and the nearest Sky Train station will be gathered in the table search history. The aim of this table is to gather the customer searching behaviors to help in the next search by adapting results.

3.3 Database Flow Design

Normally, before the user logs into the system, the user can search restaurant and read the restaurant's details. A list of restaurants is returned according to the search criteria chosen by the user. The results list is sorted by the number of votes, overall ratings, and restaurant name respectively. However, without logging in, the user cannot get the list of results according to his/her past searching experience. Also, the user cannot review the restaurants and the system does not add value to the restaurant information. This is because the system cannot identity who is using the system. For this reason, the user has to sign up as a member and login to use the system. So, the description of the system focuses on the searching, reviewing function after the user has logged on.

An overview of the database flow design is given in the Figure 3.2: The Level 0 Data Flow Diagram for the Adaptive Search Engine System.
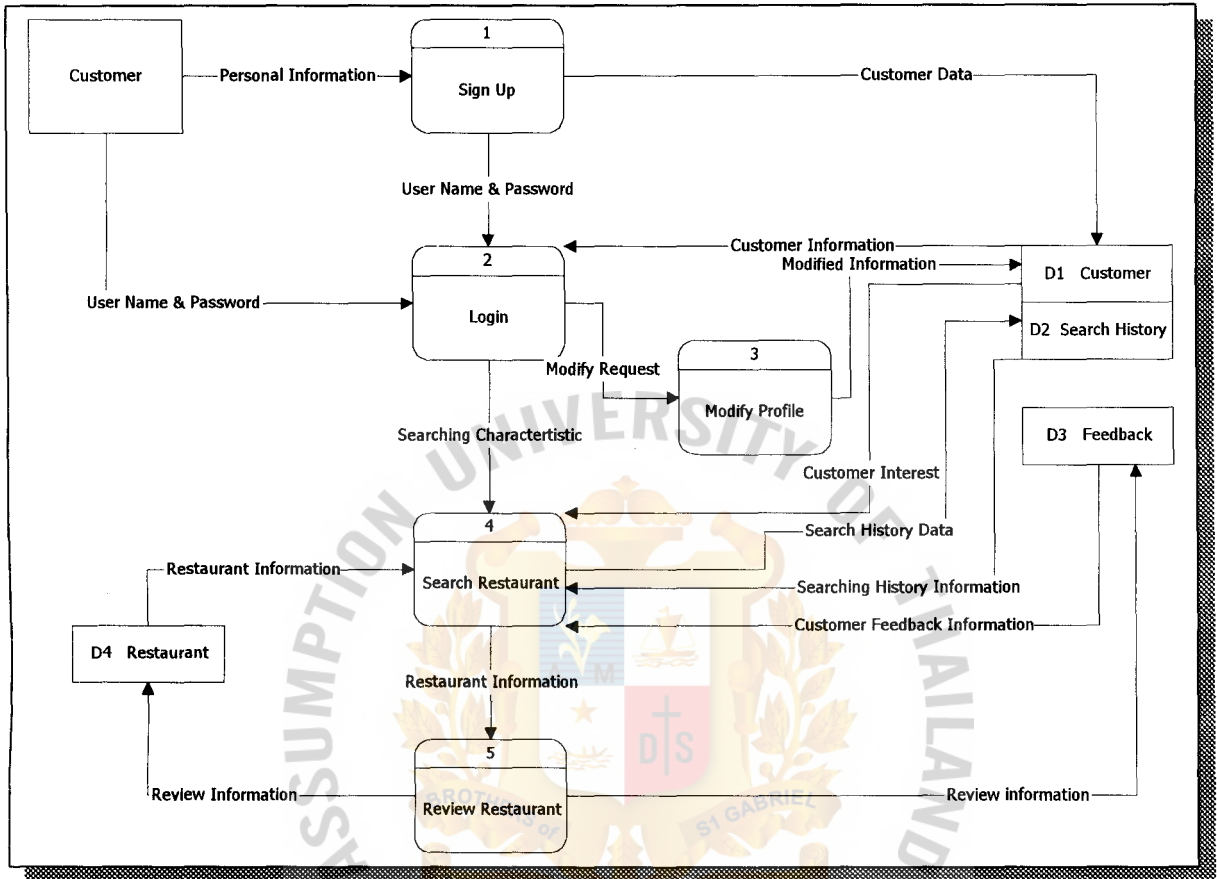
Figure 3.2: The Level 0 Data Flow Diagram for the Adaptive Search Engine System

The flow of data in the online web site database is customer event driven. The main events handled by the web site are listed below.

- Customer Sign Up

- Customer Login

- Customer Alters Personal Details

- Customer Forgot Password

- Customer Searches for Restaurants

- Customer Reviews Restaurants

- Calculate Ratings

3.3.1 Signing Up as a Reviewer

When a visitor is interested in being a reviewer, he/she can sign up via the system. The system asks for a user name and password and checks that the user name is available.
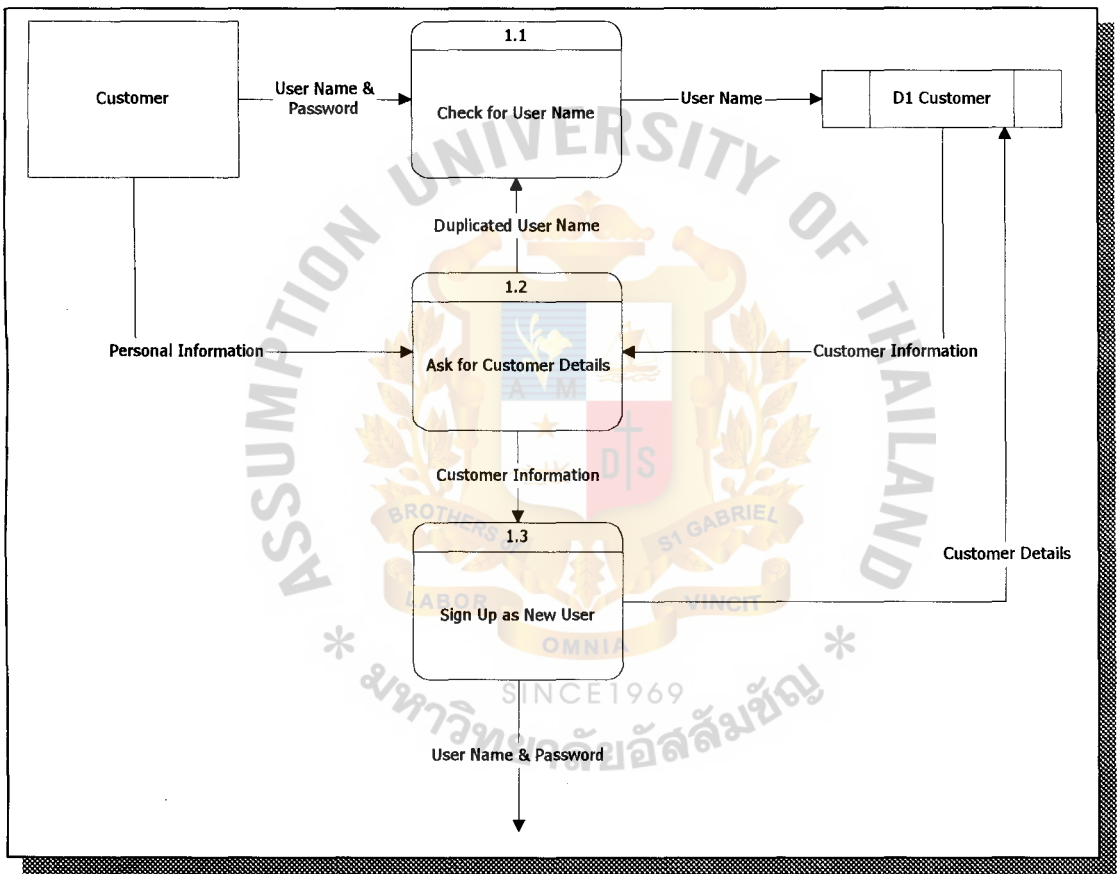
Figure 3.3: The Level 1 Data Flow Diagram for Process 1: Sign Up

After the visitor was signed up as a member, the details of the visitor are collected in the database for further consideration in searching for restaurants. The system asks for personal details and dining behaviors from visitors. The system takes new visitor details and adds them into the "customer details" table. The user name is a unique key in the system. Therefore, the user name cannot be duplicated. The system

takes the user name and password and checks that they match in the customer details table. If they do, the user can use the features in the system. The details of the process of signing up are presented in Figure 3.3.

3.3.2 Logging In and Forgotten Password

Once the user uses his/her user name and password for logging in, the system checks they against those recorded in the database. If the user name and password exist and are correct, the user can access the system.

If the user forgets his user name or password, there is a page for help. The user has to answer the questions displayed by the system correctly. The required questions are birth year, telephone number or email, password question and its answer. If the answers match the data in the database, the user name and password will be provided on the screen.

Every time the user logs in, he can modify his profile, suggest a new restaurant, search for restaurants using quick search or advanced search, review a restaurant, read his/her past reviewing history, earn points for prizes, reserve a table and so forth. The user also can earn points and win the prizes when navigating through the system.

Existing details are searched and retrieved from the "customer details" table. The details of the flow of logging in is illustrated in Figure 3.4.
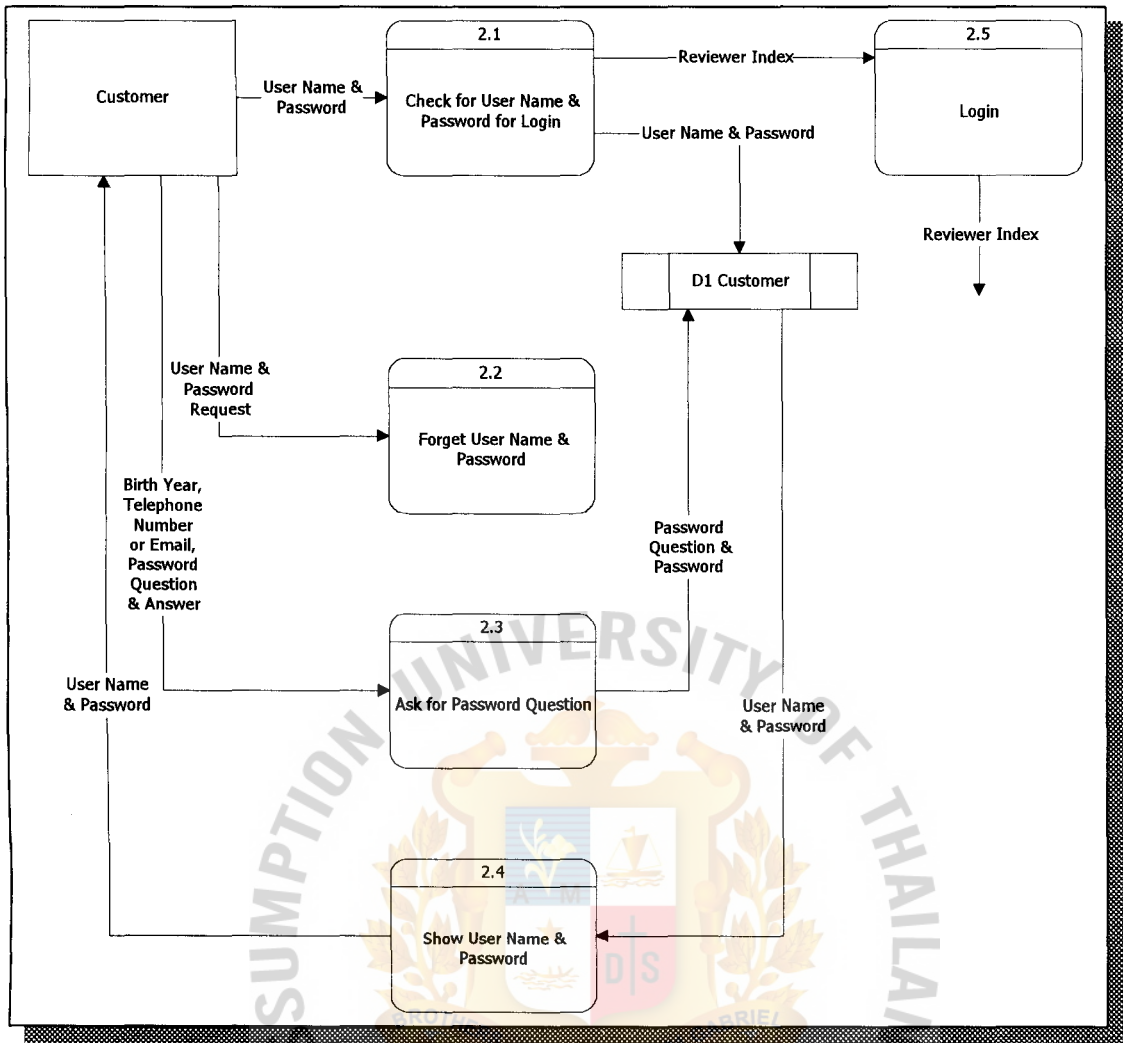
Figure 3.4: The Level 1 Data Flow Diagram for Process 2: Login

3.3.3 Altering Details

As shown in Figure 3.5, the system offers the user the ability to adjust his/her profile. The existing user profile will be shown on the screen and the user modifies his/her profile and information. The new user profile is updated into the table "customer details".
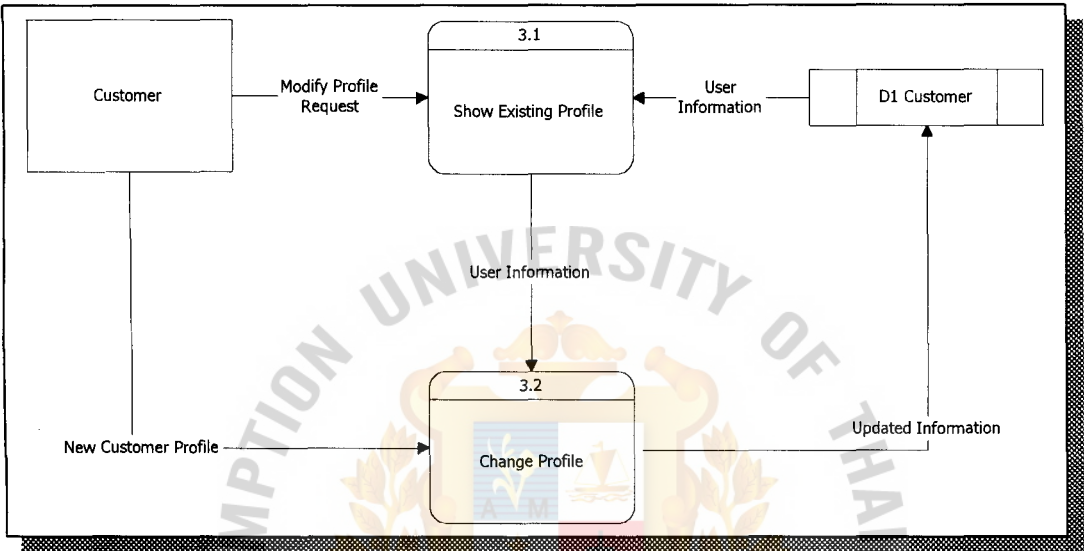
Figure 3.5: The Level 1 Data Flow Diagram for Process 3: Modify Profile

3.3.4 Restaurant Searches

The user can search for restaurants by choosing the search characteristics provided in both the quick search section and in the advanced search page. In the quick search section, the provided search criteria only include restaurant name, type of cuisine and location of the restaurant. The user can choose just one or combine search characteristics to narrow the search results. If the user would like to search for restaurants by using more features in order to narrow the results list, he/she can go to the advanced search page. In addition to the search criteria in the quick search section, the search criteria in the advanced search page include the price range per meal at the restaurant, hotel name if applicable, the BTS Sky train station, as well as some

characteristics of the restaurant such as cultural performance, dancing, delivery, free
parking, karaoke, kids menu, live music, vegetarian and so forth.
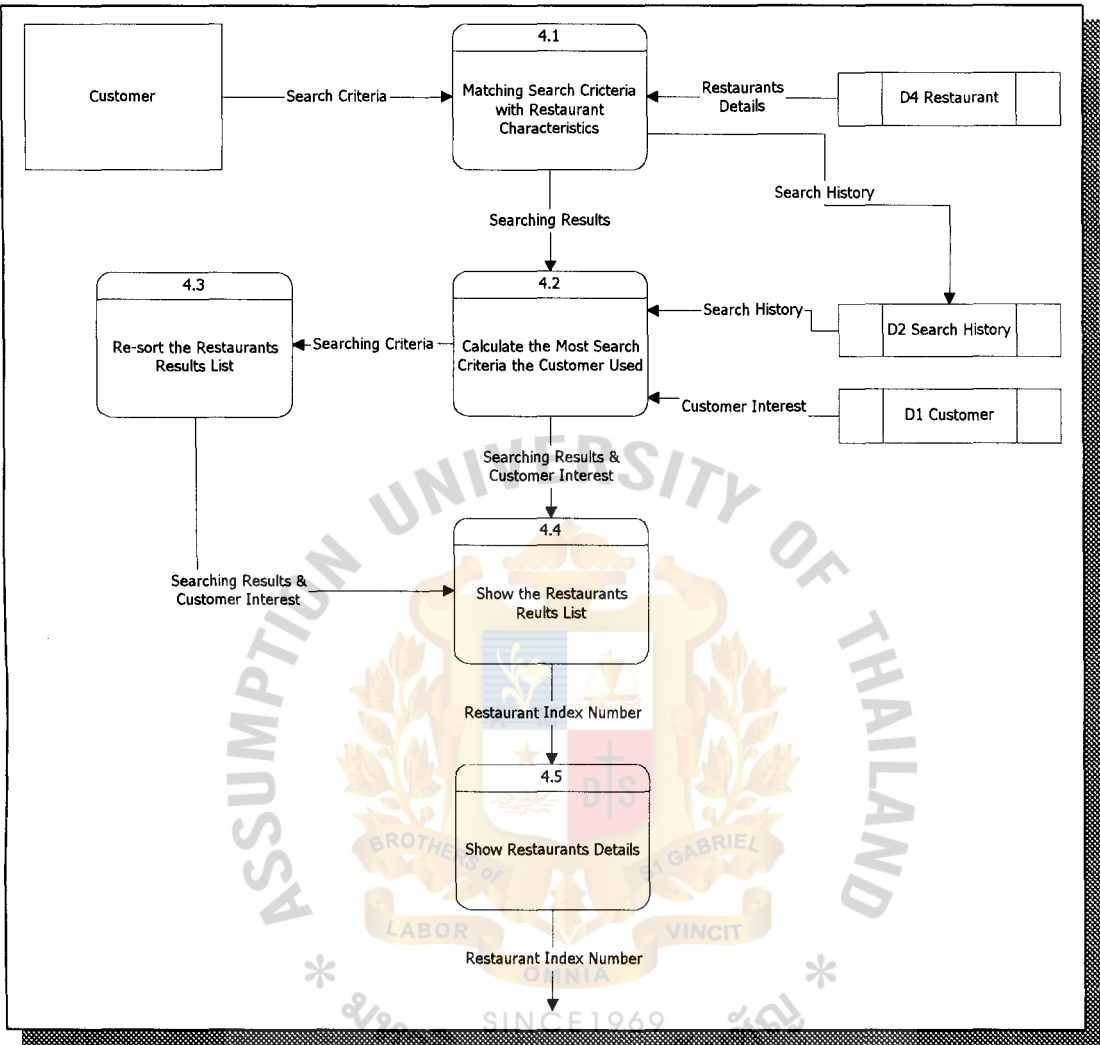
Figure 3.6: The Level 1 Data Flow Diagram for Process 4: Search for Restaurants

After the user has chosen the search criteria, a list of search results is provided.
The list of search results is sorted by the number of votes, overall ratings and the
restaurant name respectively. The customer feedback is considered in the process of
searching for the restaurant.

During the process of the user searching for the restaurant, the searching
history of the user is collected. The information about the restaurant name that the
user typed, the type of cuisine, the location of the restaurant, the preferred price per

meal, the hotel where the restaurant is located, the BTS Sky train station that the restaurant is near is stored into the table search history. The purpose of storing that information is to collect the customer characteristics and customer behavior in the process of searching for restaurants.

The system finds out which search criteria like cuisine type, location of the restaurant and price per meal per head the user has chosen the most when searching for restaurants from the table "search history". Then, the search criteria are used at the next search and re-sort the restaurant results list in order to list the user-prefered restaurants near the top of the results list. For example, when the user searches the restaurants by choosing the location of restaurant "Silom (Bangrak) Area" only, the system considers what search criteria the user chose the most such as type of cuisine, preferred price per head. If the system finds that the user choose "Thai" cuisine and the price range is between 300 and 500 Baht the most, then the system re-sorts the results list and posts the restaurants having these features of location of restaurant (Silom, Bangrak Area) that were chosen by the user as well as the type of cuisine (Thai) and preferred price (300 – 500 Baht) from the user's past searching history. The system will also list all restaurants in the location that the user has chosen. The system considers both restaurant and customer information in the process of searching for restaurants.

The user can click on the restaurant name hyperlink to read extra details such as restaurant name, address, zone, telephone number, the price per head, the editorial and restaurant characteristics. The details of the process of searching for restaurants is indicated at Figure 3.6.

There are some additional pages for the user such as the creation of a menu page, reservation page, special information page and so on.

3.3.5 Customer Reviews for Restaurants

Figure 3.7 presents the process of reviewing restaurants. After reading the details of a restaurant, the user can to give feedback.
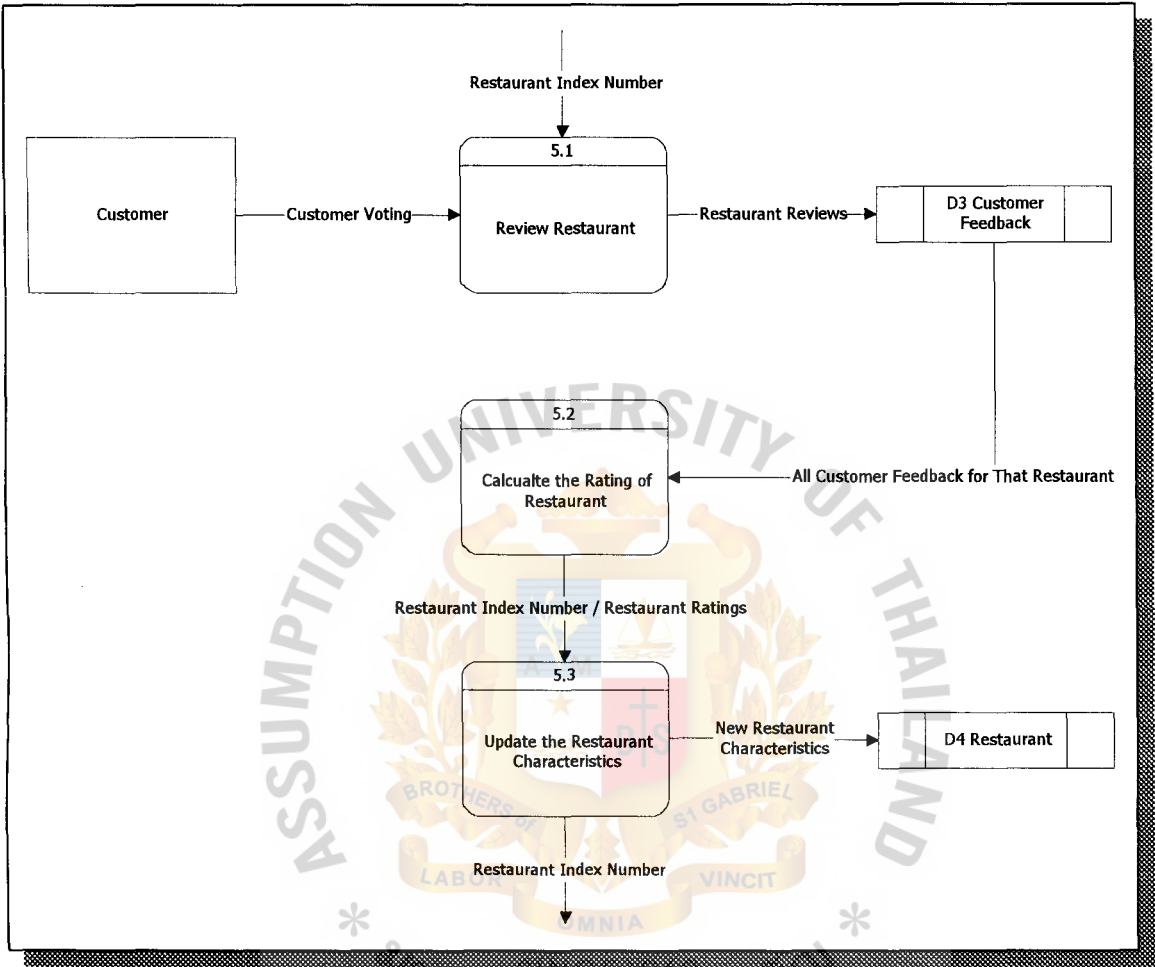
Figure 3.7: The Level 1 Data Flow Diagram for Process 5: Review Restaurant

The user enters a restaurant name and a search takes place on the "restaurant details" table. The most closely matching restaurant names are returned for the customer to select one for reviewing. The customer can vote on one of the displayed restaurants. The customer selects one of the displayed restaurants, and the rating screen is displayed. The system gathers the customer feedback on this consisting of restaurant. The customer can send a brief review with numeric ratings to the system the rating of the food, service, menu and atmosphere towards. The user can also write

his/her comments for that restaurant and indicate special characteristics for that restaurant such as romantic, scenic view, trendy, meet for a dinner, people watching, quiet conservation, social atmosphere and so on.

The customer can vote for as many restaurants as they wish. The customer can vote for the same restaurant more than once, but only the latest review is considered in the process of calculating the restaurant's average rating. The primary purpose is to reflect the customer searching behavior in the process of searching for restaurants. That information helps in process of searching for restaurants.

The restaurant ratings are created from the feedback from the reviewer. After the user reviews, the ratings for that restaurant are stored in the table "customer feedback". Then, the system explores all the reviews for the restaurant. The system sums the total scores for food, service, menu and atmosphere and divides by the number of votes to find out the average scores in food, service, menu and atmosphere. The new scores of ratings in food, service, menu and atmosphere and the number of votes are updated in the table "restaurant details". Therefore the system adds value to the restaurant characteristics.

3.4 User Interface

The system is currently launched with the URL address of www.TryItAsia.com with an interactive user-interface. The first page of the system is showed in Figure 3.8: www.TryItAsia.com

Figure 3.8: www.TryItAsia.com

The system is a locally targeted online restaurant search engine. Any registered user can instantly add his/her ratings of a restaurant to the system's own review, along with comments. As each restaurant gains more ratings the standard deviations decrease. This way everyone can benefic from both the collective dining knowledge and experience of all the reviewers. Each user can only rate a restaurant once, and while all comment are welcome, only the best are published on the site as part of the restaurant's editorial review.

3.4.1 Sign Up

The user can register for free as a reviewer on the sign up page. Once registered, the user gets a user name and password for reviewing restaurants, adding restaurants, searching restaurants, earning points, and winning prizes.
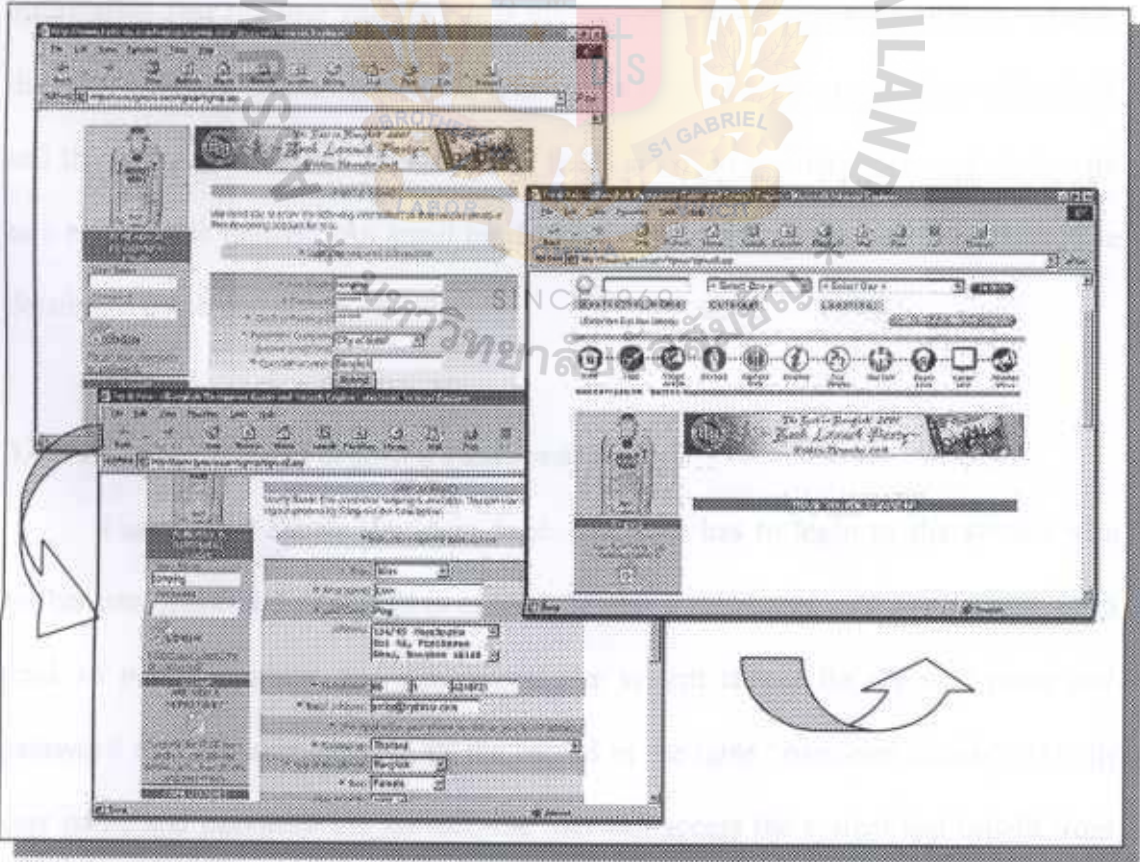
Figure 3.9: Sign Up page

28

There are two parts in the sign up process. In the first part, the user types his/her user name, password, confirm password, chooses a password question from the list, which is provided from the table "password question", and types the answer. The user should fill out all the required fields otherwise the user cannot continue the sign up process. If the user does not fill out all required fields, the system will remind the user to fill out the missing fields. After filling out all the required fields, the user submits the form. The system checks the user name that the user types to make sure it is not.

In the second part of sign up, the user is required to fill out his/her personal information and interests such as title, first name, last name, telephone number, email address, nationality, city of residence, sex, how many times the user eats out per week and how much the user normally spends per person on a meal. The optional information that the user can fill out is his/her contact address, year of birth, what is the user's highest level of education, what is the user's favorite restaurant in Bangkok and the name of a referral. If all required fields are filled up, the process of signing up as a reviewer is finished. An email notification will be sent to the user's mailbox. The details are presented in Figure 3.9.

3.4.2 Logging In and Forgotten Password

Figure 3.10 shows the login page. The user has to login to the system with his/her user name and password in order to review a restaurant, add a restaurant, keep track of points earnings, and win prizes. The system checks for the user name and password that the user typed in to the record in the table "customer details". If both user name and password are correct, the user can access the system and benefit from navigating the system.
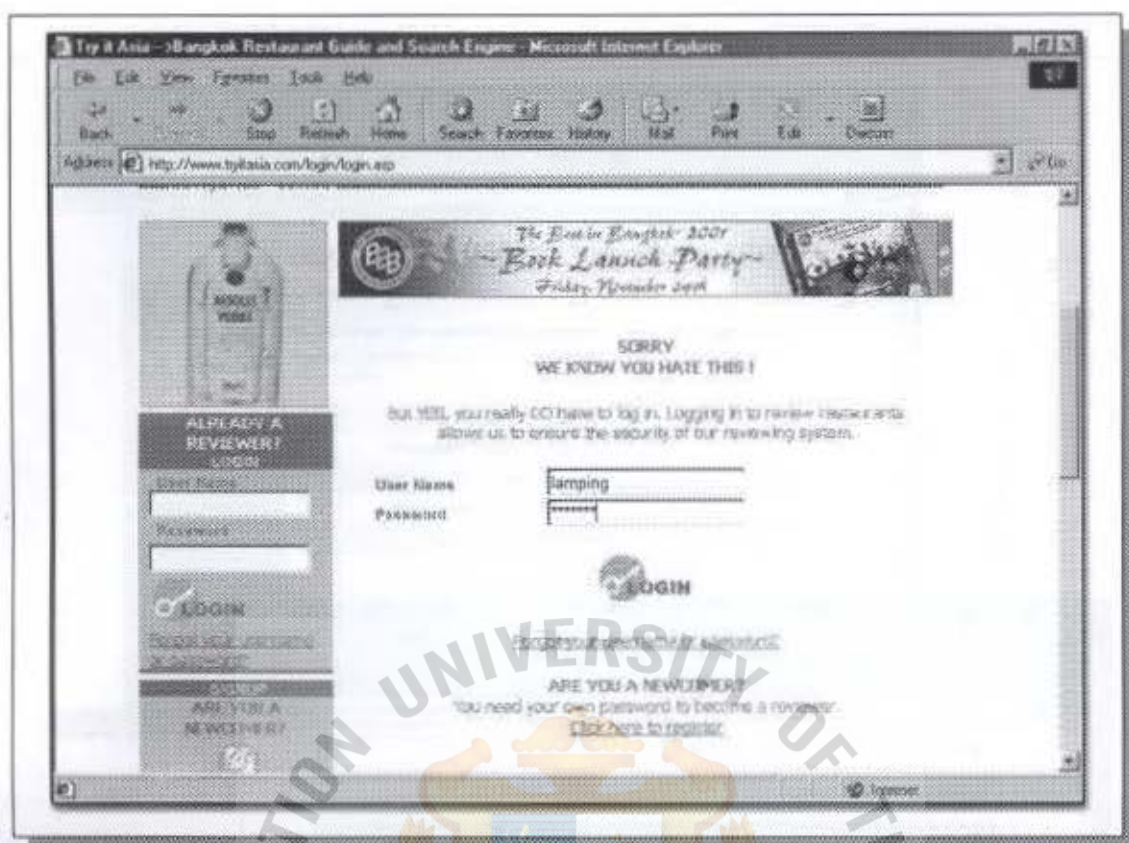
Figure 3.10: Login page

If the user forgets his/her user name or password for logging into the system, there is a page for help, which presents the information shown in Figures 3.11. The system tells the user his/her user name and password when the user enters the required information such as year of birth, password question, password answer and either telephone number or email address. The system checks that the information that the user types matches the record in the database. If yes, the system shows the user name and password on the screen.
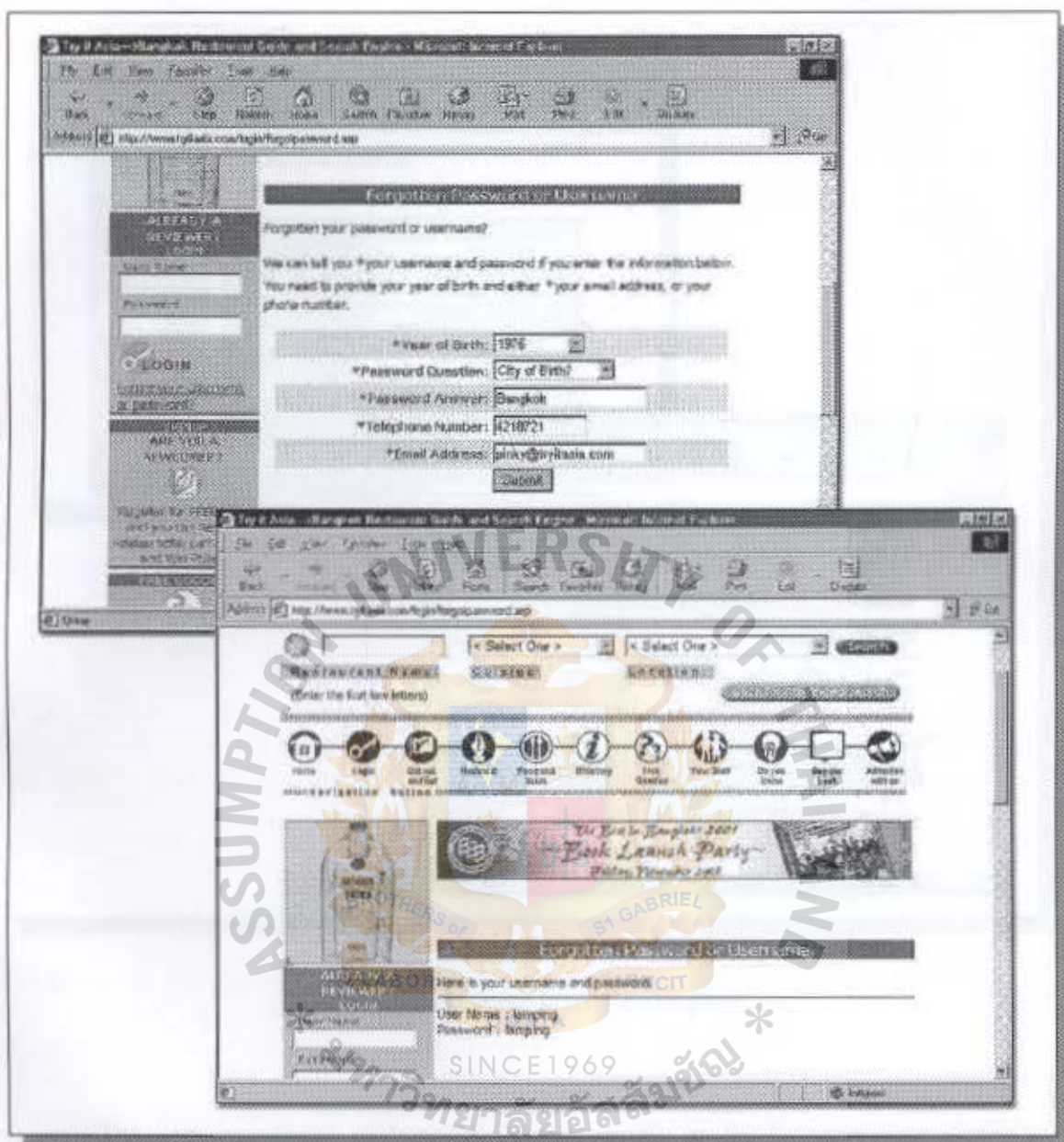
Figure 3.11: Forgotten Password page

3.4.3 Altering Details
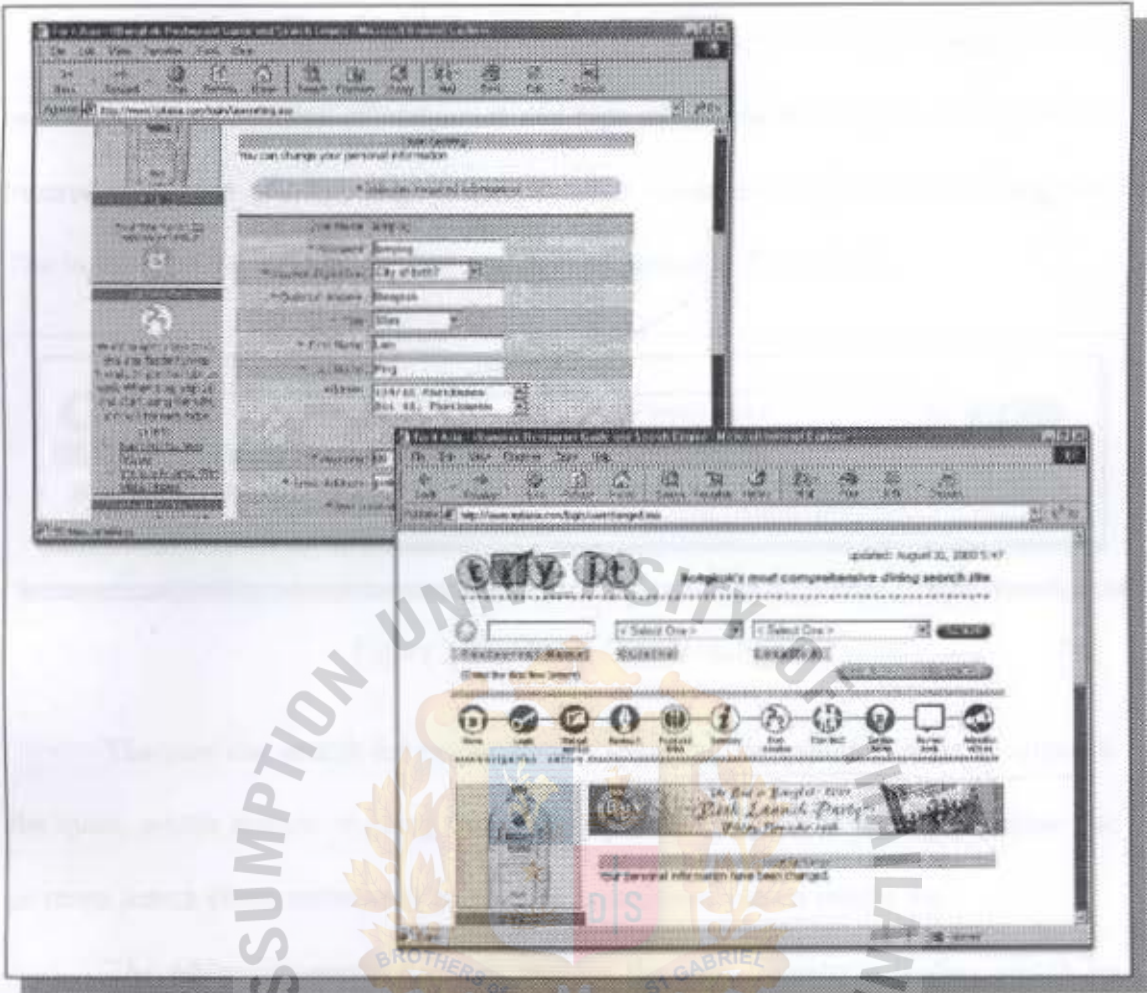
Figure 3.12: Change User Profile page

The user can check and modify his/her profile at the "change user profile" page, which is shown in Figure 3.12. The user edits his/her required personal information and interests such as title, first name, last name, telephone number, email address, nationality, city of residence, sex, how many times the user eats out per week and how much the user normally spend per person on a meal. The user can also modify his address, year of birth, the user's highest level of education, the user's favorite restaurant in Bangkok and the referral name. When submitting, the new user information is updated to the table customer details.

3.4.4 Searching For Restaurants

The system enables the user to search for over 1,200 Bangkok restaurants by restaurant name, location of restaurant and type of cuisine in the quick search section located at the top of every page. The number of restaurants in the system is ongoing. The outlook of the section of quick search is presented in Figure 3.13.
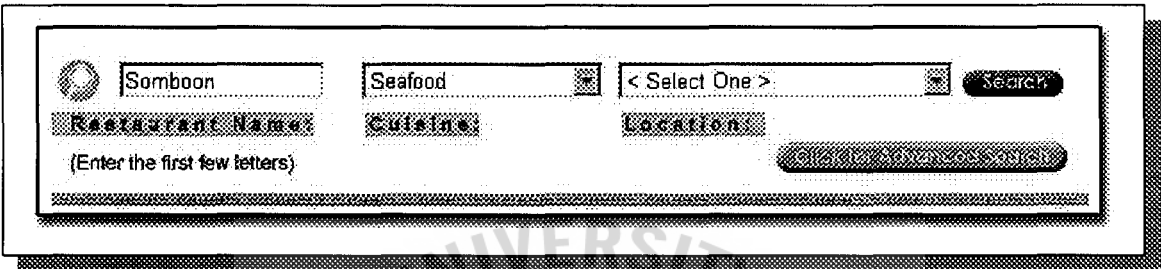
Figure 3.13: Quick Search section

The user can search for restaurants by choosing the search criteria provided in the quick search section or using the advanced search page. The user can choose one or more search characteristics to narrow the restaurants search results list.

The advanced search function enables the user to narrow his/her search by using 27 additional restaurant characteristics: 1). Price range, 2). BTS Sky train station, 3). Hotel venue, 4). Cultural performance, 5). Dancing, 6). Delivery, 7). Evening buffet, 8). Free parking, 9). Happy hour, 10). Karaoke, 11). Kids menu, 12). Live music, 13). Live sports, 14). Lunch buffet, 15). Meet for a drink, 16). People watching, 17). Power scene, 18). Pub, 19). Quiet conversation, 20). Reservations accepted, 21). Romantic, 22). Scenic view, 23). Set dinner, 24). Set lunch, 25). Social atmosphere, 26). Trendy and 27). Vegetarian friendly. The details are on Figure 3.14: The advanced search.
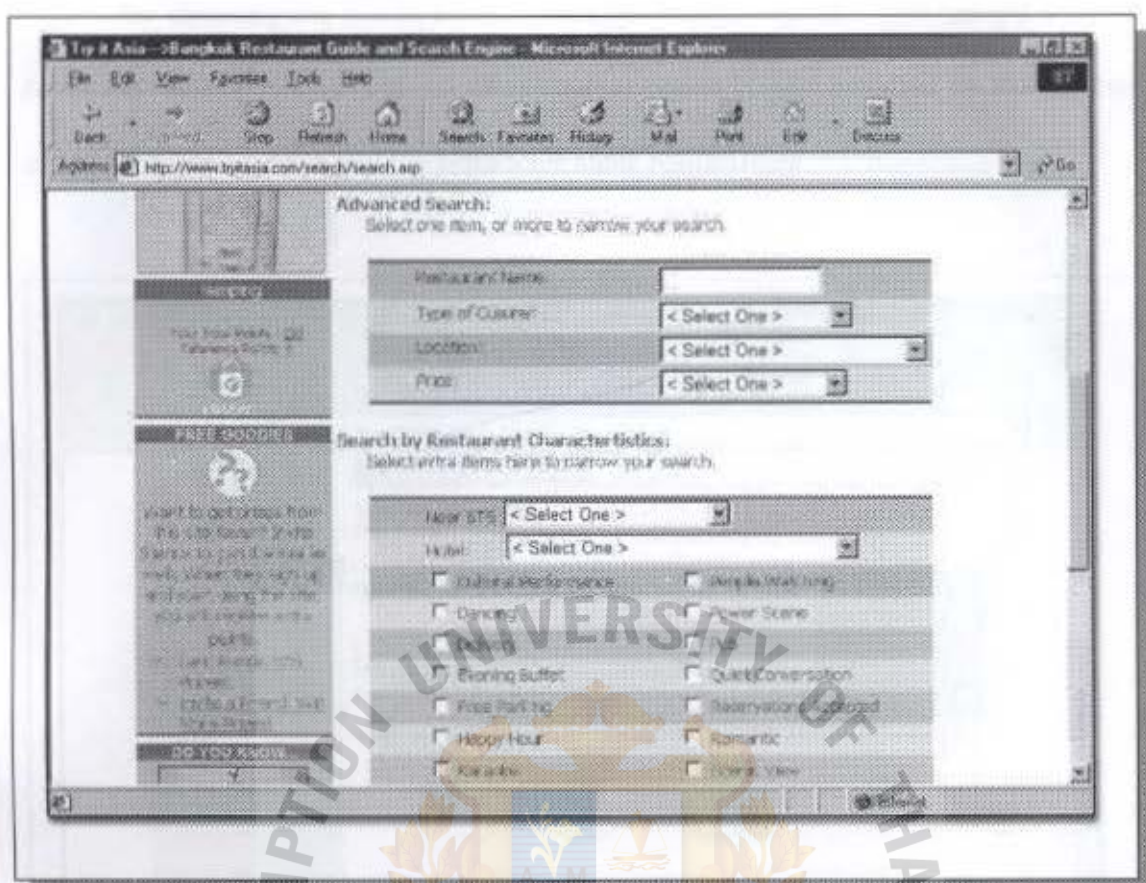
Figure 3.14: The Advanced Search

By choosing the search criteria from the search page, the user can get a list of restaurant search results. The list of restaurant search results is sorted by the number of votes, overall ratings and the restaurant name respectively.
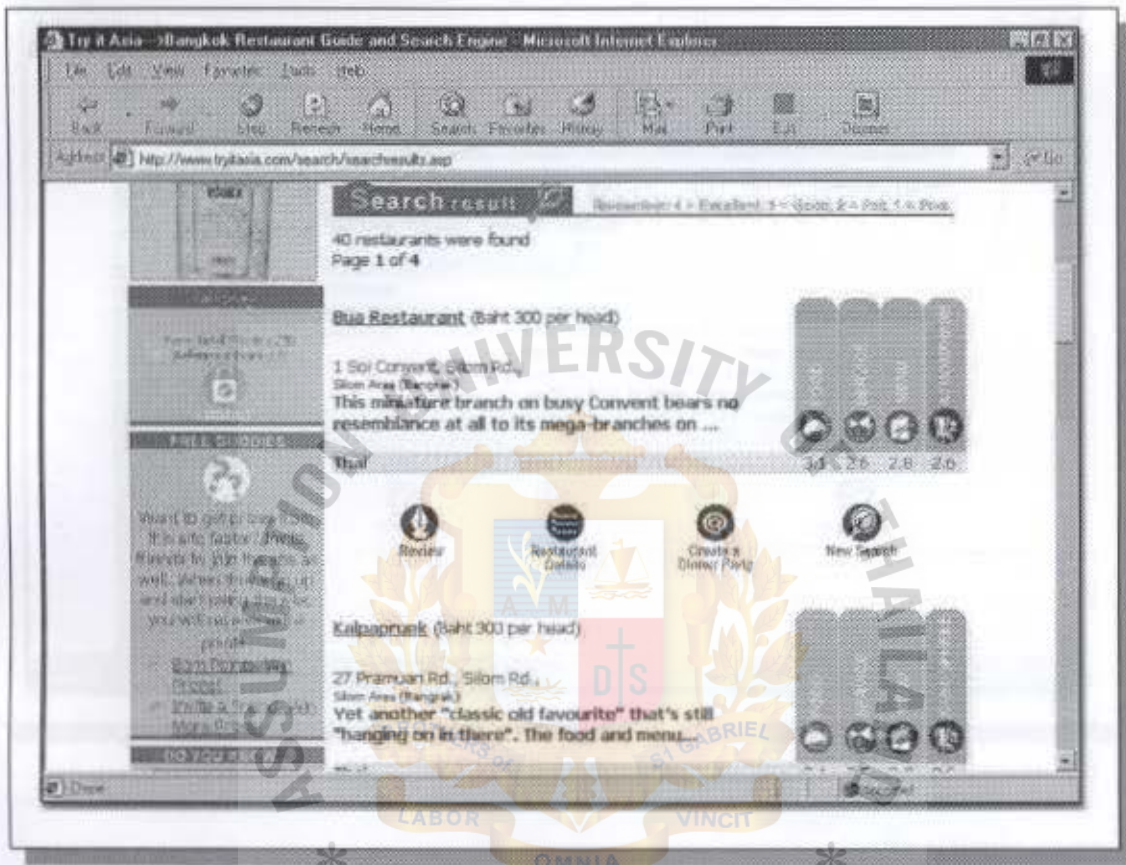
FIGURE 3.15. The Search Results page

There are ten restaurants per page in the search results list. The user can click on a link to see the next ten results. The information on each restaurant includes restaurant name, price per meal per head, type of cuisine, address, zone, editorial as well as the rating in food, service, menu and atmosphere. The details are presented in Figure 3.15.

The details of the restaurant can be reached by the hyperlinks found there. Beside the brief information provided in the previous search results page, there are

telephone number, opening hour and restaurant features on the restaurant details page.

The detail of the restaurants are presented in Figure 3.16.
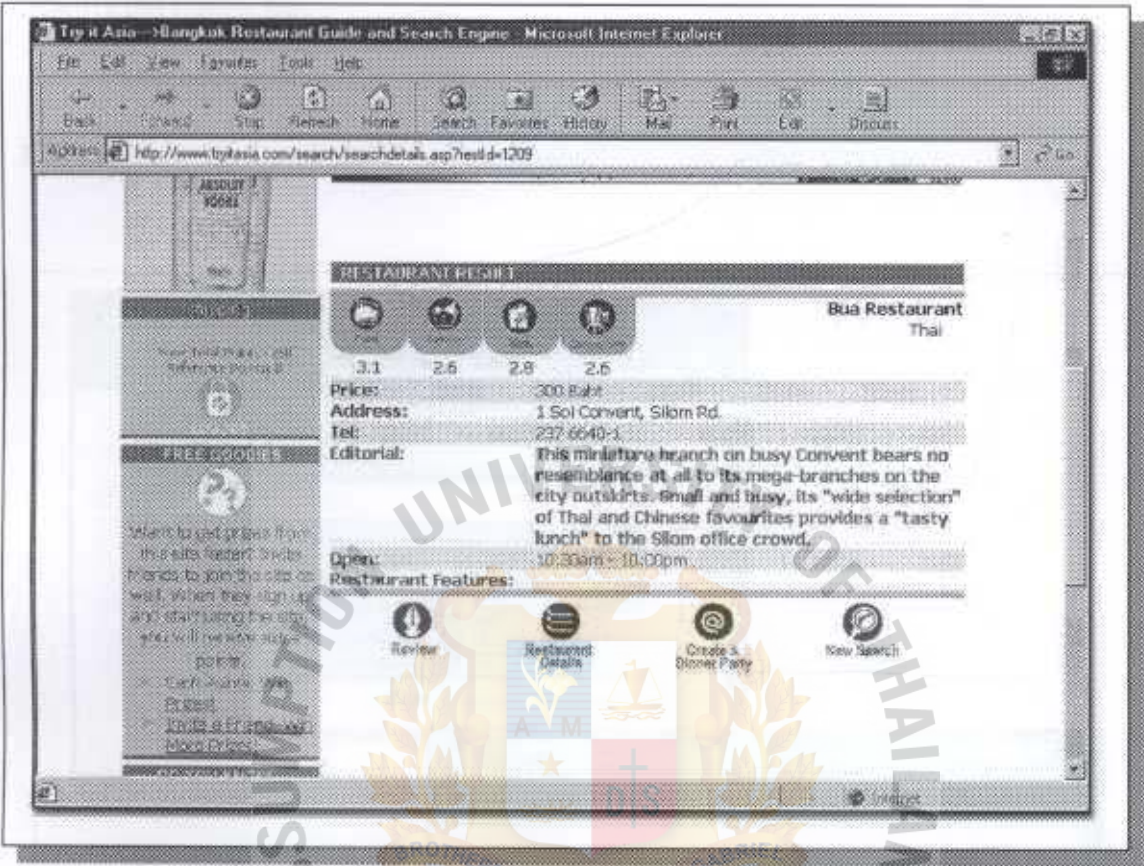
Figure 3.16: Restaurant Details page

During the process of the user searching for restaurants, the user's searching experience is collated in the table "search history". The stored information includes the restaurant name that the user typed in well as the type of cuisine, the price range, the hotel venue, and the BTS Sky train station. The aim of collecting is information is to reflect the customer search behavior in the process of searching for restaurants. That information helps in progressively improve the accuracy of the search process.

The system learns the way the customer searches for restaurants. The system computes which search criteria the user uses most for searching for restaurants from the table "customer feedback". Then, those search criteria are applied in the process

of searching for restaurants by re-sorting the search results list. The system filters all the restaurants that satisfy the current search criteria and the user's search history and re-sorts the results list.

3.4.5 Review Restaurants
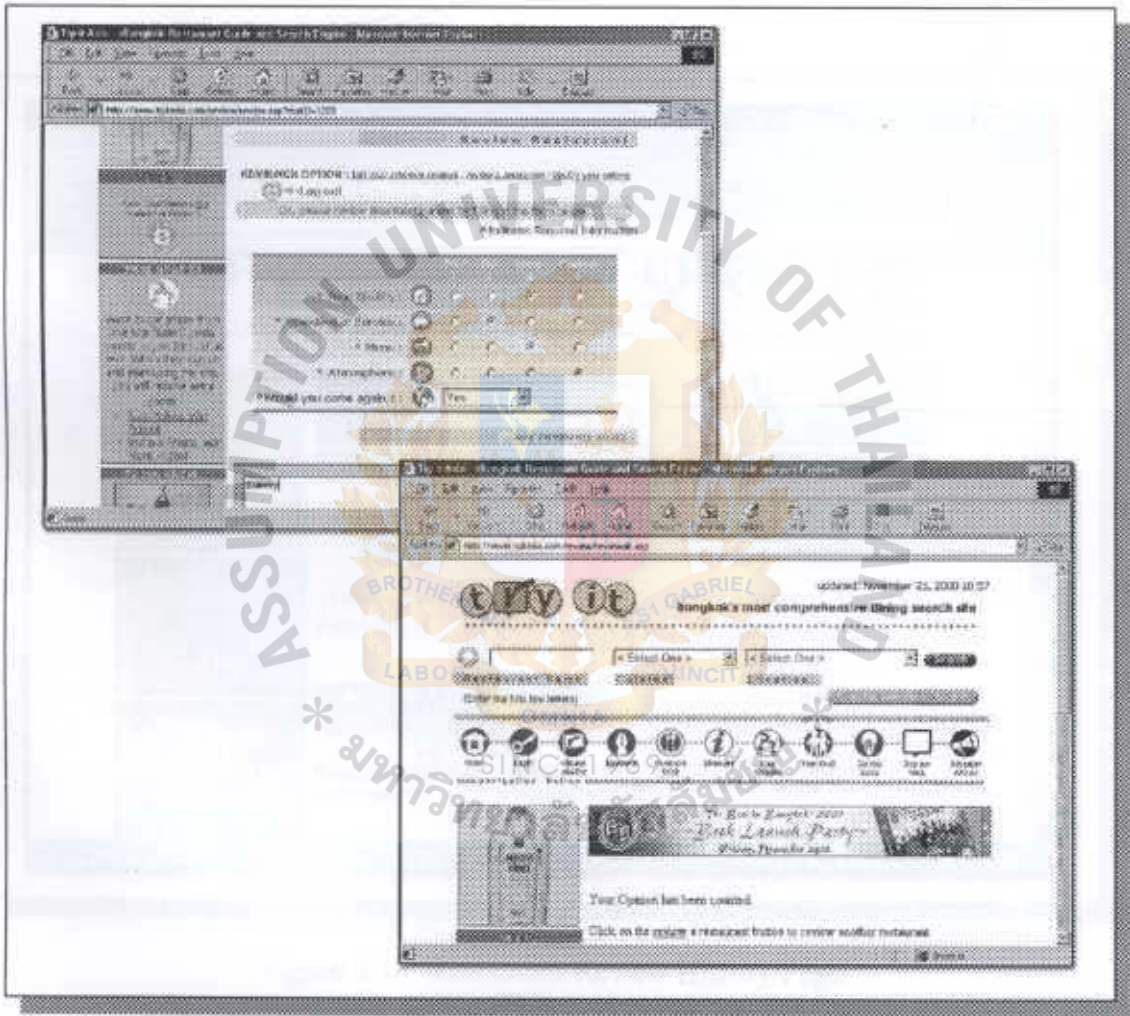
Figure 3.17: Review Restaurant Pages

To review a restaurant, the user has to login to the system, a necessary step to ensure the security and reliability of the reviewing system. The user can review as many restaurants as his/her wishes. Only the latest review for each restaurant is considered in the process of adapting restaurant characteristics.

To review, the user selects on of the displayed restaurants, and the rating screen is displayed. On the restaurant review page, which shows on Figure 3.17, the user can provide a brief review of the particular restaurant with numeric ratings including the rating of food, service, menu and atmosphere.

The user can view previous reviews in the review history page, which is presented in Figure 3.18.
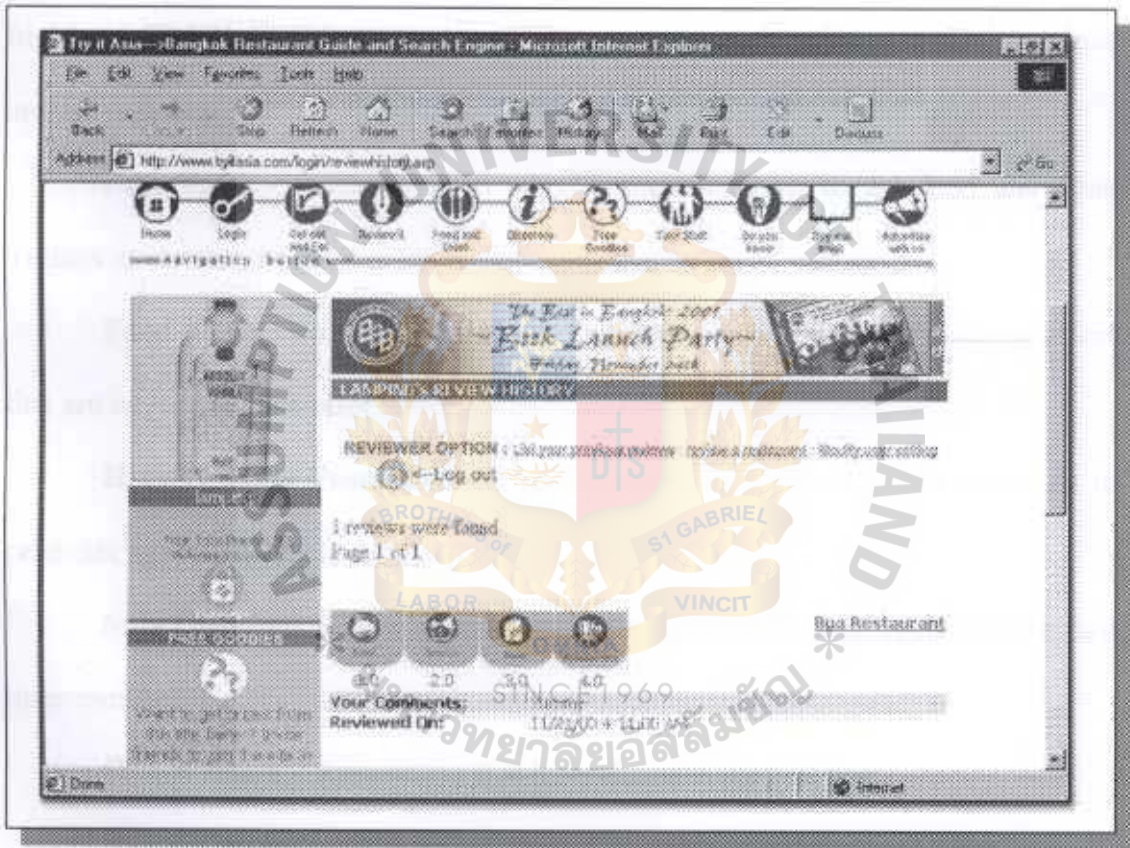
Figure 3.18: Restaurant Review History Page

The reviewing results are stored in the table "customer feedback". The rating of the restaurant is re-calculated after the review is entered.

3.4.6 Others

There are others interesting sections to attract the visitors to join the system.

1. Get Out and Eat

The section features dining activities and promotions that will get readers to go out and eat in Bangkok's restaurants.

Create a Dinner Party – Readers can create their own dinner party by searching for the restaurant they want to eat in, then sending a group email to their friends inviting them to get together at that restaurant for a meal, using the email invitation system.

Free Food – Insider tips on where, when and how to get food and drink freebies at restaurants all over town.

Food Promotions – Food festivals featuring special cuisine or discount prices that are on limited time offer.

Holiday Food Promotions – Special menu or discount prices on meals to celebrate specific holidays and festivals.

New Openings – New restaurants, pubs or bars that have opened in the past three months.

Closed Down – Restaurants that have closed in the past year.

Name Change – Restaurants that have changed their name, but basically remain in the same location with the same cuisine.

2. Food & Drink

This Week – These are feature tories on topics related to various aspects of dining in Bangkok or food related holidays.

Dining Do's and Don't's – Helpful tips on the correct etiquette for eating out in restaurants, using tableware, and eating food.

Food Dictionaries – A to Z explanations of various types of cuisine.

Wine Chart – A color-coded that chart helps the reader track the quality of various types of wine for each year over time.

3. Directory

After Dinner – Listings of movie theatres, bars, discos, traditional Thai massage establishments, night markets, cafes & teashops, and Internet cafes.

Hotel Phone Numbers – Useful listing of Bangkok hotel phone numbers

4. Talk About

This is the community channel of our site. Readers can give feedback on our site, chat online and post messages, etc.

Comment on our Site – Readers can post their comments, suggestions, and give general feedback on our site.

Message Board – Readers can post any messages or ask questions relevant to dining in Bangkok.

5. Free Goodies

This section tells readers how to earn points and win prizes. Readers can earn various points amounts by surfing the site or reviewing restaurants. Various point's totals will qualify the reader for various levels of prizes. Readers can double their points by inviting a friend to sign up on our site. Whenever the invited friend earns points, the reader automatically earns the same number of points too.

6. Do You Know

This section offers interesting, unusual, or amusing food trivia, delivered in Question and Answer format.

7. Advertise With Us

This section is for restaurants and food and beverage industry clients who wish to advertise or buy templates on our site.

Banner advertising is not available to restaurant advertisers due to the policy of the company that do not accept restaurant advertising in the book or website, in keeping with our platform as 'the unbiased dining guide'.

Instead of banner advertising, restaurants can buy a series of four templates on our site, showing their restaurant interior views, sample menu, restaurant history or overview, and corporate services e.g. catering, private parties, etc.

Show Your Restaurant Online – Information on the types of templates and banners available for advertisers.

Join Our Reservation System – Information on how restaurants can join our online reservation system.

Sell Gift Certificates – Information on how restaurants can sell gift certificates through our site.

Obtain Our Market Research – Information on how restaurants can buy our market research results, showing how participants in our survey rated and commented on their restaurants. This material will be for sale to restaurants as a market research package, and will be available in early 2001.

Subscribe To Our Book – How to subscribe to our book online.
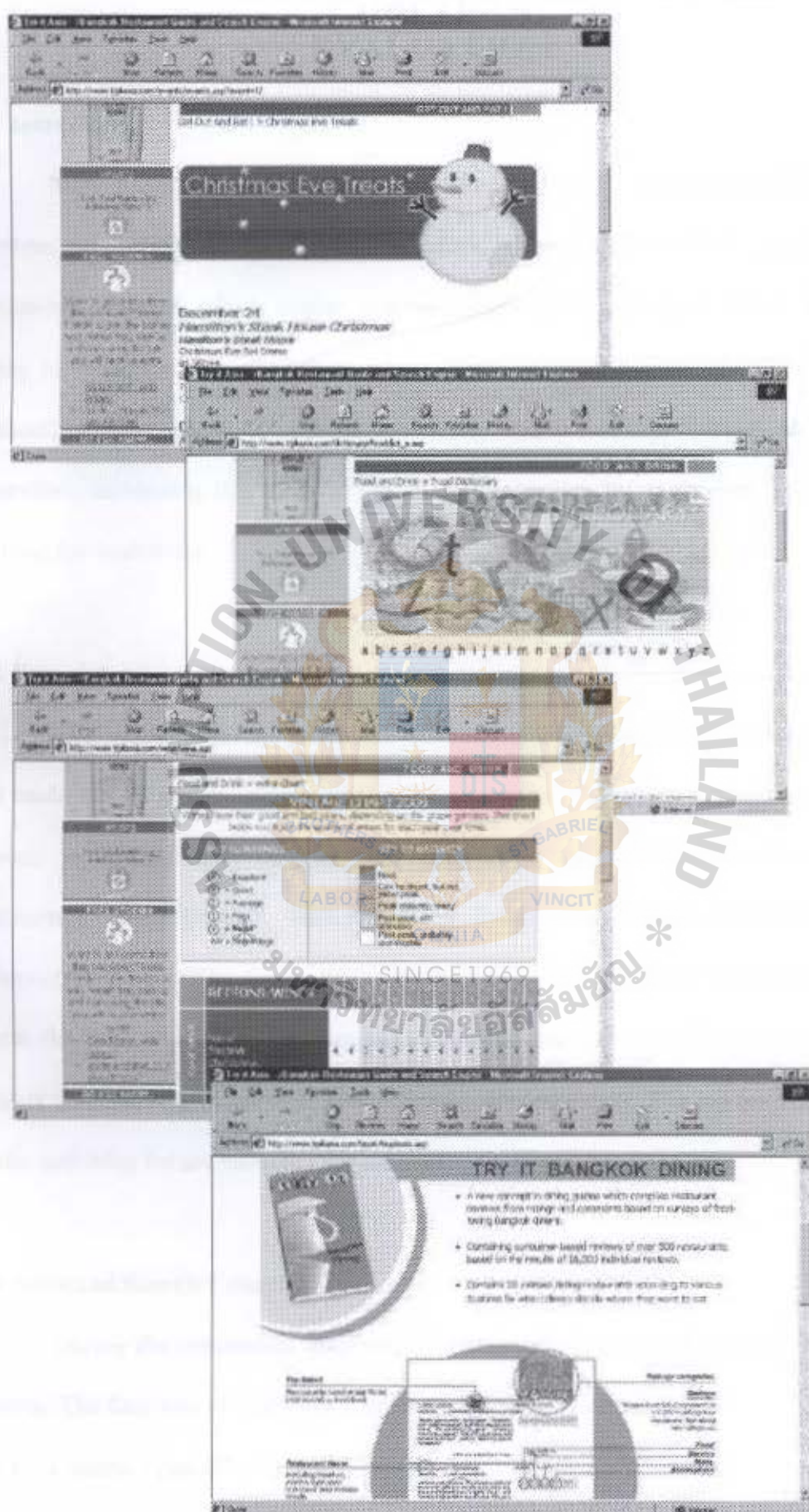
Figure 3.19: Other Pages

42

CHAPTER 4
EVALUATION

4.1 Introduction

Many agent search engines are built from scratch, it is extremely difficult to perform a comparison evaluation. Therefore, there has been little performance evaluation of agent search engine systems compared to non-agent search systems. Many of the reported performance enhancements of agent systems are not statistical evaluations. According to the above facts, self-evaluations would be useful. Therefore, estimating the adaptive search engine system by experiment is a proper method for evaluation.

4.2 Experiment

The adaptive search system is evaluated under test conditions where searches are made using the same search criteria for ten weeks. The aim is to evaluate that the system is adapted according to the customer feedback and add value to the restaurants' characteristics. Basically, it is focused on whether the database is adapting by considering the positions of the restaurants in the searching results list under the same condition. The assumption is that the user uses the same searching criteria for searching restaurants every Monday for ten weeks. The top ten restaurants in the searching list are collected for analysis.

4.3 Assumed Search Criteria

During the experiment, four sets of search criteria are used as assumed search criteria. The four sets of searching criteria are below:

- Cuisine Type: Chinese

- Cuisine Type: Thai

- Location of the Restaurant: Sukhumvit Soi 21 – Soi 55 Area

- Location of the Restaurant: Silom Area (Bangrak)

These four sets of searching criteria are chosen because they are the two largest search criteria stored in the search history table as shown in Figure 4.1.

The Graph of the Percentage the Customer Uses Each Type of Cuisine As the Search Criteria in Searching for Restaurants.
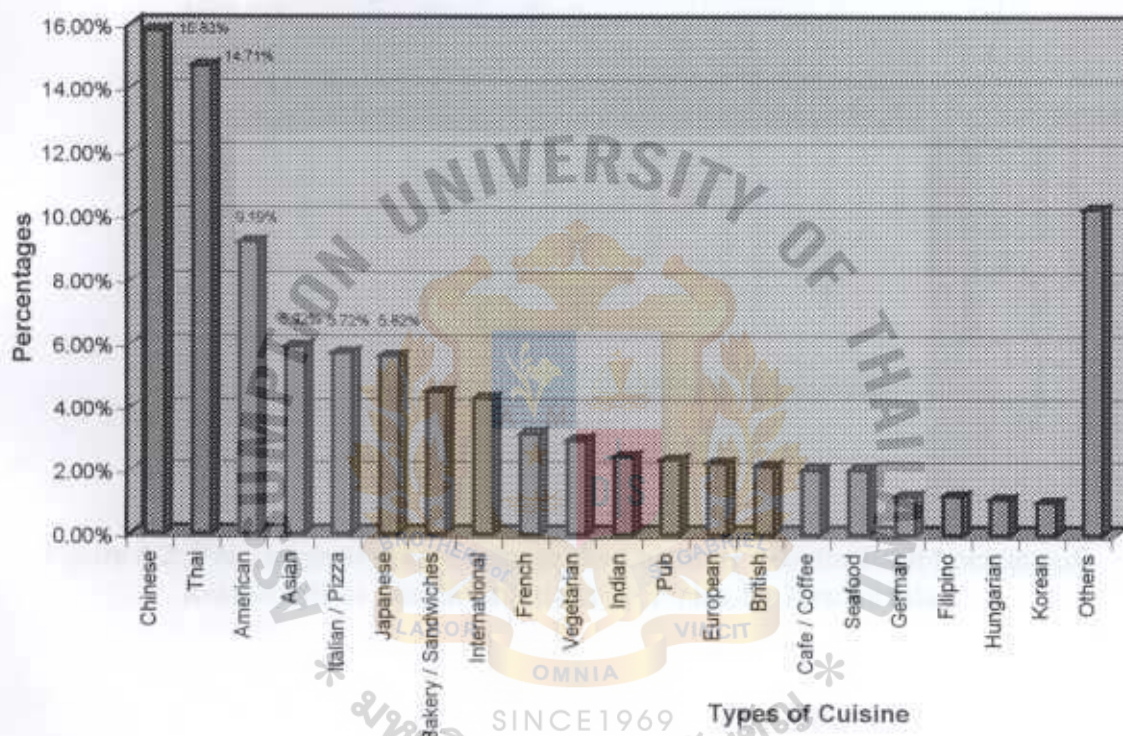
Figure 4.1: The Graph of the Percentage the Customer uses Each Type of Cuisine as the Search Criteria in Searching for Restaurants.

For the other search criteria in the location of restaurant, 15.23% of customers select "Sukhumvit Soi 21 – Soi 55 Area" and 14.81% of all customers search for restaurants using "Silom Area (Bangrak)". The full details are given in Figure 4.2: the graph of the percentages the customer uses for each location of the restaurant as the search criteria in search for restaurants.

The Graph of the Percentage The Customer uses for Each Location of Restaurants
as Search Criteria in Searching for Restaurants.
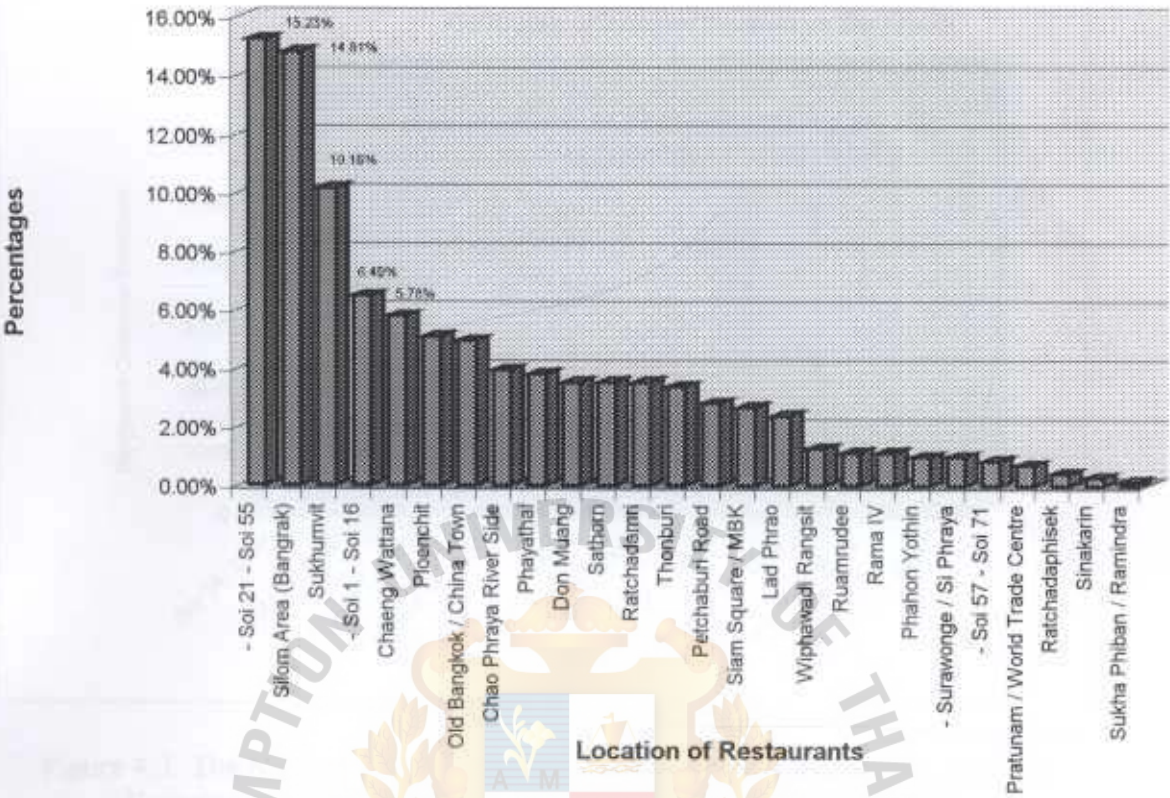
Figure 4.2: The Graph of the Percentage the Customer uses for Each Location of
Restaurants as Search Criteria in Searching for Restaurants.

4.4 Results

The assumption is that the user uses the same search criteria to search for
restaurants every Monday for ten weeks. The results of the top ten Chinese
restaurants are gathered every Monday. Let us discuss the results using a search
criteria of cuisine "Chinese".

4.4.1 The Number of Customer Feedback
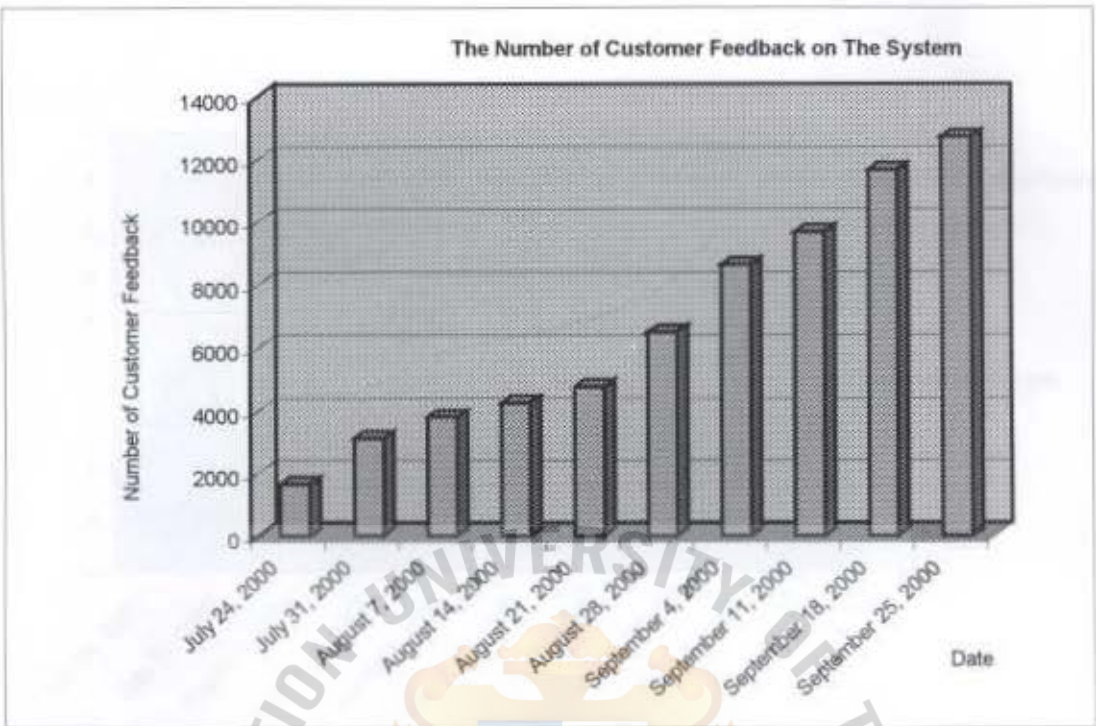
Figure 4.3: The Number of Restaurants Ratings from the Customer During the
Experiment at Period: July 24, 2000 through September 25, 2000

Figure 4.3 illustrates the number of reviews from the customer during the
experiment at period of July 24, 2000 through September 25, 2000. The number of
reviews increases from 1,800 at week1 to over 12,000 at week 10. As the number of
reviews increases, the system learns the restaurants' characteristics from the customer
feedback. That is, the system adapts the order of the restaurant listings to reflect the
customer feedback.

4.4.2 Search Criteria: Type of Cuisine "Chinese"
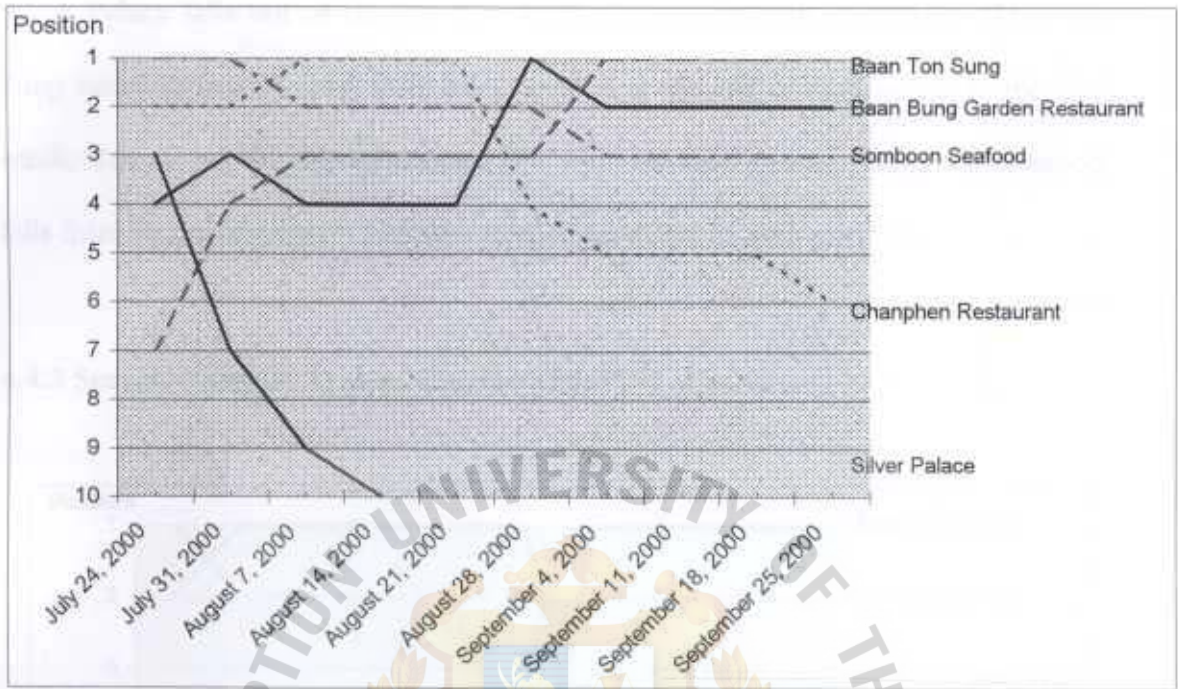
Figure 4.4: The Position of Restaurants in the Top Ten from the Results List Using
the Search Criteria: Type of Cuisine "Chinese" During July 24, 2000 through
September 25, 2000 (Ten Weeks).

Figure 4.4 presents the position of restaurants in the top ten from the results
list using the search criteria: type of cuisine "Chinese" during July 24, 2000 and
September 25, 2000 (ten weeks). It found that the position of the restaurants in the
searching results list changes during the ten weeks. The graph is generated from the
experiment generated positions of the restaurants in the search results list for ten
weeks.

As you have seen, Somboon Seafood is at the top of the results list during the
first two weeks. The second is Chanphen Restaurant, and the third is Silver Palace in
the first week and Baan Bung Garden Restaurant in the second week respectively.
Chanphen Restaurant rises to first position, but Somboon Seafood falls to second
position. Baan Ton Sung rises from forth position to third position. Silver Palace

47

drops to seventh position. After three weeks, Chanphen Restaurant drops to forth position and Baan Bung Garden Restaurant rises from forth position to first position. Silver Palace falls out of the top ten. As the number of votes increases, Baan Ton Sung raises to first position from third position at the end of four weeks. In the third week, Baan Bung Garden Restaurant falls from the first position. Somboon Seafood, falls from second position. Chanphen Restaurant drops to sixth position.

4.4.3 Search Criteria: Type of Cuisine "Thai"
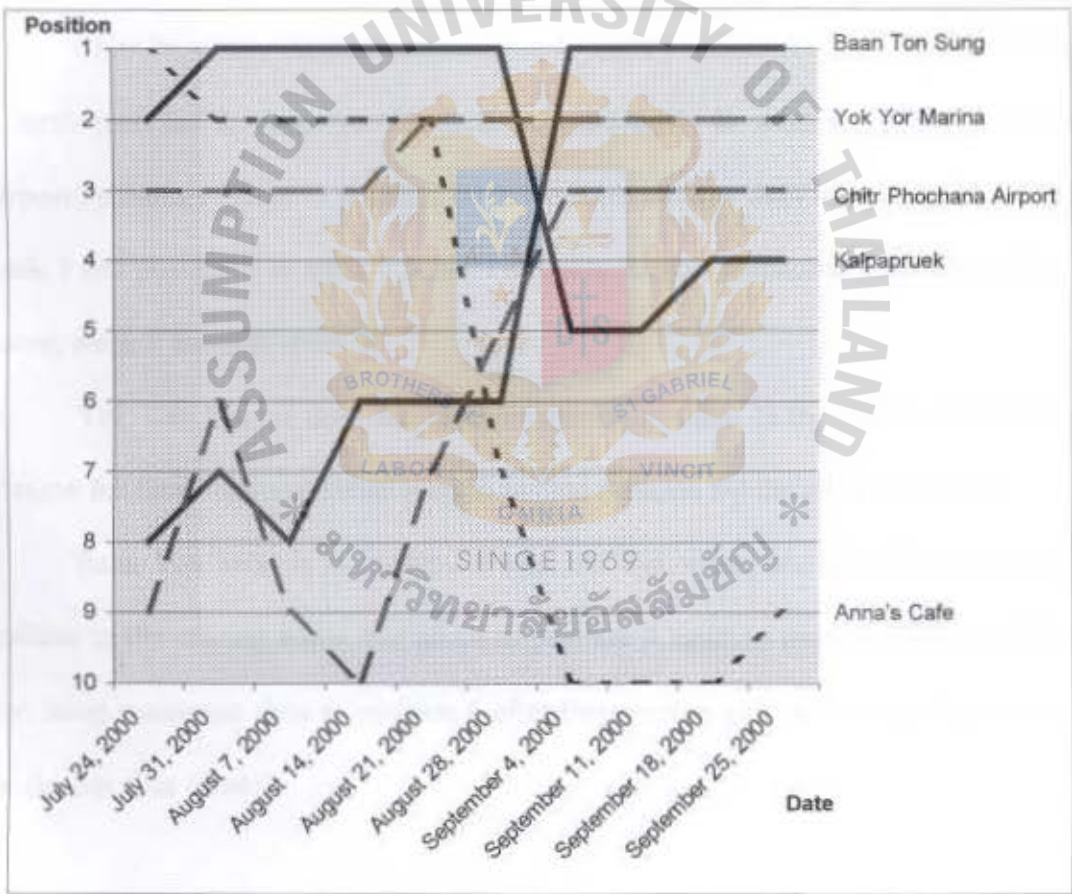
Figure 4.5: The Top Ten Restaurants Using the Search Criteria: Type of Cuisine "Thai" During July 24, 2000 through September 25, 2000 (Ten Weeks).

Figure 4.5 shows the position of the Top Ten restaurants using the search criteria: type of cuisine "Thai" during July 24, 2000 through September 25, 2000 (ten

weeks). It shows the position of the restaurants in the top ten is dynamically changing. Anna's Café is in first position after the first week and then drops to second position during week 2 through week 5. Then Anna's café drops to sixth position after week 6 and then drops to tenth position during week 7 to week 9, but rises to the ninth position in week 10.

Kalpapruek restaurant is in second position after the first week, and then rises to first position for five weeks. However, it drops to fifth position in week 7 and week 8. As the number of votes increases, Kalpapruek restaurant rises to fourth position for 2 weeks, week 9 and week 10.

Chitr Phochana Airport restaurant is in ninth position in week 1 and then rises to sixth position. It drops to the ninth position again in week 3. Chitr Phochana Airport restaurant drops to position 10 in week 4 and then rises to seventh position in week 5 and position 5 in week 6. Chitr Phochana Airport restaurant stays at position 3 during week 7 through week 10.

Yok Yor Marina does not change position as often as the others. It is in third position for four weeks and then rises to second position for the other six weeks.

Baan Ton Sung is in position 8 after the first week, and then rises to seventh position in the coming week, but drops to position 8 again in week 3. However, Baan Ton Sung restaurant rises to position 6 after three weeks and then on up to position 1 for the last four weeks.

4.4.4 Search Criteria: Location of Restaurants "Silom (Bangrak) Area"
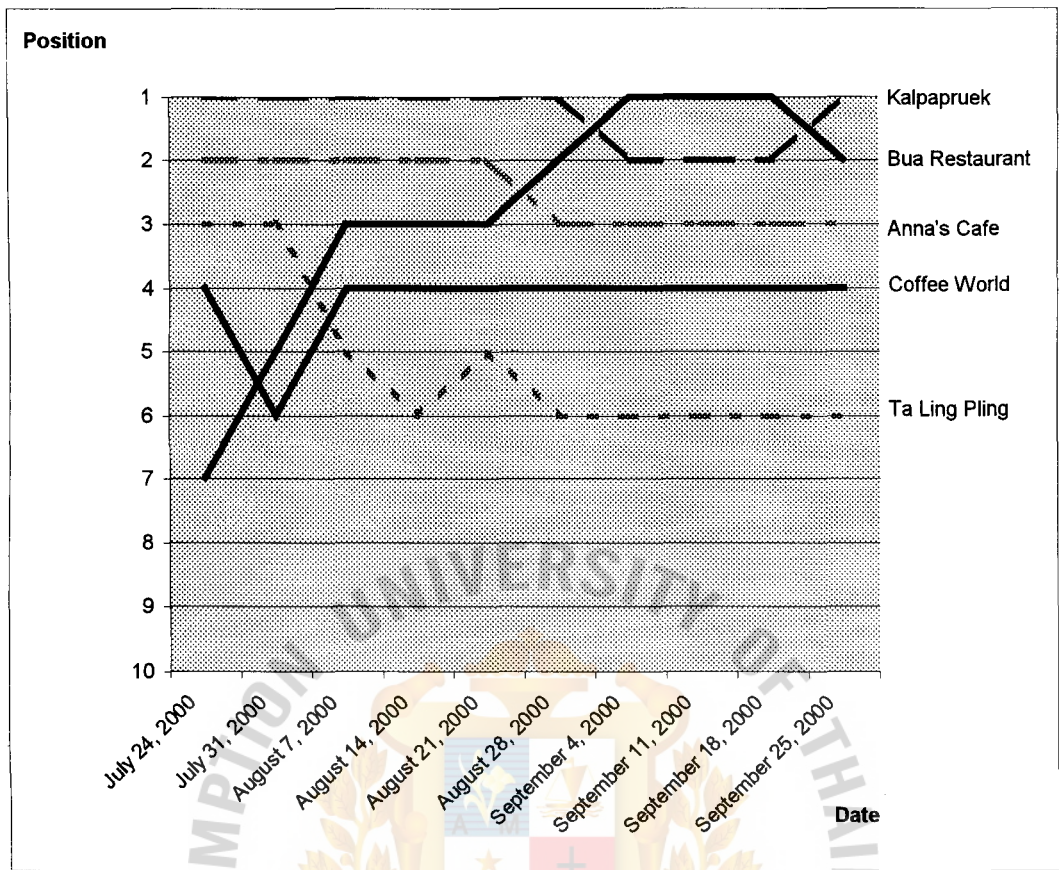
Figure 4.6: The Top Ten Restaurants using the Search Criteria: Location of Restaurant "Silom (Bangrak) Area" During July 24, 2000 through September 25, 2000 (Ten Weeks).

Figure 4.6 represents the position of Top Ten restaurants using the search criteria: location of restaurant "Silom (Bangrak) Area" during July 24, 2000 through September 25, 2000 (ten weeks).

Pan Pan restaurant is in position 1 for six weeks and drops to second position in week 7, week 8 and week 9. After that, it rises to first position in week 10. Chokchai Steak House is in third position for five weeks and then rises to the position 2 in week 6 and position 1 in week 7 for three weeks, but then drops to second position in week 10. Taurus Pub is in fifth position in week 1 and week 2, and then rises to position 4 in week 3 for four weeks. It then rises to position 3 in week 7 for another four weeks.

50

4.4.5 Search Criteria: Location of Restaurants "Sukhumvit Soi 21 – Soi 55 Area"

Figure 4.7 illustrates the Top Ten restaurants using the search criteria: location of restaurant "Sukhumvit Soi 21 – Soi 55 Area" during July 24, 2000 through September 25, 2000 (ten weeks). It shows that the position of the Top Ten restaurants changes as the ratings come in.

Kalpapruek restaurant is at position 1 for six weeks, but drops to second position in week 7, week 8 and week 9. Then Kalpapruek restaurant rises to position 1 again in week 10.

Bua Restaurant is at seventh position in week 1 and then rises to fifth position in week 2 and position 3 in week 3 for three weeks. Then, Bua Restaurant rises to position 2 in week 6 and position 1 in week 7 for three weeks. It drops to position 2 in week 10.

Anna's Café is in position 2 for five week and drops to position 3 for another five weeks. Coffee World is in position 4 at week 1 and then drops to position 6 in week 2, but rises to position 4 again for another eight weeks.

Ta Ling Pling restaurant is in position 3 in week 1 and week 2, but drops to position 5 in week 3 and position 6 in week 4. Then Ta Ling Pling restaurant rises to position 5 in week 5 but drops to position 6 for another five weeks.
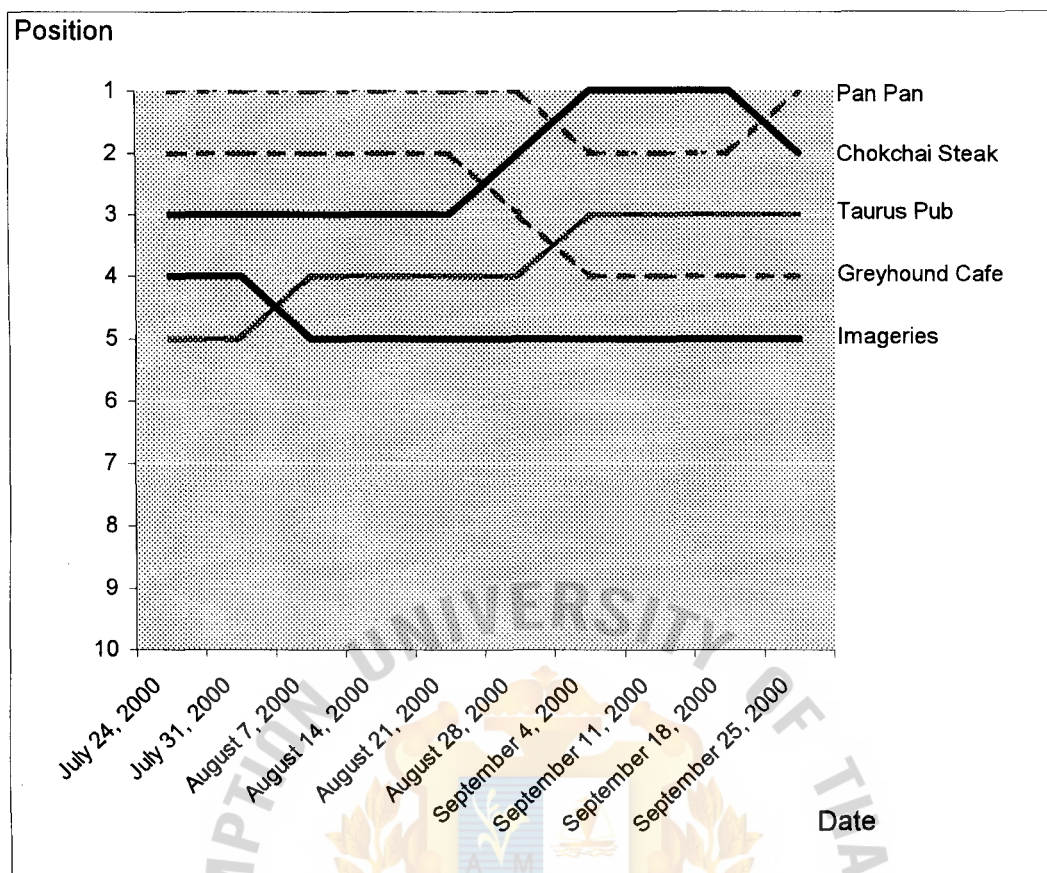
Figure 4.7: The Position of Top Ten Restaurants using the Search Criteria: Location of Restaurant "Sukhumvit Soi 21 – Soi 55 Area" During July 24, 2000 through September 25, 2000 (Ten Weeks).

4.5 Evaluation

As the amount of review data increases, the results listing change. In the experiment, it is assumed that the customer searches for restaurants using the same search criteria every Monday for ten weeks. Finally, it is shown that the top ten restaurants in the results list vary during the ten weeks experimental period. Even though the amount of customer feedback increases, the positions of the restaurant still vary from time to time. This indicates that the overall restaurant ratings are changing as the database incorporates the customers' feedback. As the customers rate restaurants, the overall ratings of the restaurants will be adjusted, and the position of

the restaurants, the overall ratings of the restaurants will be adjusted also. The number ratings for each restaurant depends on the customer rating behavior. The position of the restaurants depends on the ratings. Therefore, the system adds value to the restaurant information.

4.6 Conclusion

In summary, the system has been verified by experiment. It adds value to the restaurant information and improves the search results. It proves that the methodology of adapting to the customer search behavior helps in re-sorting the restaurants into an order more appropriate for the customer. The database is adapted through out the time the user spends using the search engine system. The system can learn the customer behavior from the process of searching and reviewing. The process of searching for restaurants considers both the restaurant details and the customer feedback. The overall ratings of the restaurants are also updated when customers review restaurants.

CHAPTER 5
CONCLUSIONS AND RECOMMENDATIONS

5.1 Conclusions

In conclusion, with the exponential growth of the Internet, the World Wide Web is rapidly becoming a global-scale data dissemination system. However, the basic problem is that the surplus of information increases the difficulty of consistently finding appropriate information. So, the basic solution is to adapt this passive search engine system to an active search engine system. That is, the characteristics of restaurants are matched with a customer's searching profile. The methodology of adapting plays an increasingly important role in search engine systems.

A system was designed and a prototype implemented of an adaptive search engine system. The system enabled the creation of a list of search results which changed dynamically based on past customer search queries. The order of the search results list depends on the restaurant overall ratings. The system learns the customers' behavior and their previous search history.

After evaluation by experiment for ten weeks, the system verified that that it provided more appropriate listings for users. This is because the system provides a list of search results list according to the search behavior and the user past searching experience. By considering the customer feedback, the restaurant overall ratings are adapted. Therefore, the system can add value to the characteristics of the restaurant. That is, the system helps the user in finding information about dining in Bangkok. The system also increases the efficiency for the user since it provides the information based on the customer's interests and their searching profile. Moreover, the system can reduce the user decision-making process because the provided information is more easy to understand for the user.

5.2 Recommendations

The limitation of the system is the speed of searching for restaurants. The reason is that the process of normal searching compares the search criteria with only one source table. However, there is additional re-sorting of the records in the process of searching for restaurants with the customer's search profile in mind. The solution is to use more than one server and load share as the users access the system.

Another limitation is the size of the database as the system grows. Due to cost limitations, we limited the size of the database to 30 MB. As the table "search history" increases in size, the transaction log file increase also. A better solution is to use a co-location service with a local company.

To make the system more user friendly the user could be prompted with a "next search" option based on their search profile. The adaptive search engine system will be an essential component for the next generation of search engines. The concept of this active, adaptive search engine can be applied to many industries. For example seeking books in the library, movie listings, and job seeking. For example, the concept of the adaptive search engine can be applied to a job seeking site. The job seekers need to answer a list of questions. The system then analyzes the answers and provides suitable job availabilities to the user.

BIBLIOGRAPHY

- Sandra Donaldson Dewitz. System Analysis and Design and the transition to Objects. Singapore: McGraw-Hill Book Co., 1996.

- Restaurant Dot Ca, http://www.restaurant.ca, eKwest Interactive Solutions, Canada, 1998.

- Decision Theory and Adaptive Systems, http://www.research.microsoft.com/dtas/, Microsoft Research Decision Theory & Adaptive Systems Group/ dtg@microsoft.com, Microsoft Corporation, August, 1998.

- Efrain Turban, Ephraim McLean, and James Wetherbe. Information Technology for Management Making Connections for Strategic Advantage, 2nd Edition. The United States of America: John Wiley & Sons. Inc., 1999.

- Invisible Web Catalog White Paper, http://www.intelliseek.com/invisibleweb/whitep.htm, Cincinnati: IntelliSeek Inc., 1999.

- A-Roi Dot Com, http://www.a-roi.com, Bangkok, Thailand, 1999.

- T. Lau and E. Horvitz, Patterns of Search: Analyzing and Modeling Web Query Refinement. Proceedings of the Seventh International Conference on User Modeling, Banff, Canada, June 1999.

- Special Issue on Data Mining: Communications of the ACM., http://www.research.microsoft.com/research/datamine/acm-contents, Microsoft Corporation, November, 1996, vol 39, no. 11.

- Danny Sullivan, Search Engine Report, Number 37, http://www.searchenginewatch.com, Search Engine Watch, December, 1999.

- Adaptive Systems and Interaction, http://www.research.microsoft.com/adapt/, Microsoft Research Adaptive Systems & Interaction Group / asi@microsoft.com, Microsoft Corporation, March, 2000.

- Restaurant Dot Com, http://www.restaurant.com, The States, 2000.

- RestaurantsWeb Dot Com, http://www.restaurantsweb.com, Singapore: 2000.

- Data Mining and Knowledge Discovery, http://www.research.microsoft.com/research/datamine.htm , a technical journal, Kluwer Academic Publishers.

- Food Easy Dot Com, http://www.foodeasy.com , Hong Kong: Easy Group Holidings Limited.

APPENDIX A: DATA DICTIONARY

Table: restaurantBKK

Columns

Name	Type	Size
restaurantIndexNumber	Long Integer	4
restaurantName	Text	50
address1	Text	255
address2	Text	50
address3	Text	50
addressZipCode	Long Integer	4
addressCity	Long Integer	4
addressCountryCode	Long Integer	4
addressZone	Long Integer	4
telephoneCountryCode	Text	50
telephoneAreaCode	Text	50
telephoneLocalCode	Text	50
faxCountryCode	Text	50
faxAreaCode	Text	50
faxLocalCode	Text	50
emailAddress	Text	100
cuisine1	Long Integer	4
cuisine2	Long Integer	4
cuisine3	Long Integer	4
managersFirstName	Text	50
managersLastName	Text	50
webSiteAddress	Text	255
openingHours	Text	255
editorial	Memo	-
hotelNameIndex	Long Integer	4
price	Double	8
lastupdated	Date/Time	8
branch	Long Integer	4
reserve	Yes/No	1
mapFile1	Text	50
mapFile2	Text	50
template1	Text	50
template2	Text	50
template3	Text	50
template4	Text	50
cleaned	Yes/No	1
cleanedDate	Date/Time	8
inthebook	Yes/No	1
romantic	Yes/No	1
scenicView	Yes/No	1
liveMusic	Yes/No	1
businessDining	Yes/No	1

trendy	Yes/No	1
stationname	Long Integer	4
quietConversation	Yes/No	1
peopleWatching	Yes/No	1
afternoonTea	Yes/No	1
breakfast	Yes/No	1
brunch	Yes/No	1
culturalperformance	Yes/No	1
dancing	Yes/No	1
kidfriendly	Yes/No	1
microbrewery	Yes/No	1
meetforadrink	Yes/No	1
newrestaurants	Yes/No	1
outdoordining	Yes/No	1
powerscene	Yes/No	1
rivercruisedining	Yes/No	1
theme	Yes/No	1
vegetarian	Yes/No	1
pub	Yes/No	1
averageFoodRating	Double	8
averageAtmosphereRating	Double	8
averageServiceRating	Double	8
averageMenuRating	Double	8
numberOfVotes	Long Integer	4
overallRating	Double	8
familydining	Yes/No	1
anotherbranchat	Text	100

Table: customerDetails

Columns

Name	Type	Size
reviewerIndex	Long Integer	4
title	Text	50
firstName	Text	50
lastName	Text	50
birthDay	Long Integer	4
birthMonth	Long Integer	4
birthYear	Long Integer	4
userName	Text	50
email	Text	50
password	Text	50
sex	Yes/No	1
nationality	Long Integer	4
cityOfResidence	Long Integer	4
address1	Text	255
address2	Text	50
address3	Text	50
addressCity	Long Integer	4
addressZipCode	Long Integer	4
addressCountryCode	Long Integer	4
telephoneCountryCode	Long Integer	4
telephoneAreaCode	Long Integer	4
telephoneLocalCode	Text	50
faxCountryCode	Long Integer	4
faxAreaCode	Long Integer	4
faxLocalCode	Long Integer	4
favouriteCuisine	Text	50
favouriteRestaurant	Text	50
preferredPrice	Text	50
preferredLocation	Text	50
question	Long Integer	4
answer	Text	50
education	Long Integer	4
timesPerWeek	Long Integer	4
hotelPerMonth	Long Integer	4
bigSurvey	Yes/No	1
signupDate	Date/Time	8
lastLoginDate	Date/Time	8
myPoints	Double	8
referredPoints	Double	8
pointDate	Date/Time	8
rewardStatus	Long Integer	4
referralNameIndex	Long Integer	4

Table: customerFeedback

Columns

Name	Type	Size
feedbackIndex	Long Integer	4
reviewerIndex	Long Integer	4
restaurantIndexNumber	Long Integer	4
foodRating	Double	8
atmosphereRating	Double	8
serviceRating	Double	8
otherComments	Memo	-
date	Date/Time	8
menuRating	Double	8
overallRating	Double	8
comeAgain	Yes/No	1
mealCost	Long Integer	4
romantic	Yes/No	1
scenicView	Yes/No	1
liveMusic	Yes/No	1
businessDining	Yes/No	1
trendy	Yes/No	1
skyTrainAccess	Yes/No	1
quietConversation	Yes/No	1
peopleWatching	Yes/No	1
other	Memo	-
afternoonTea	Yes/No	1
breakfast	Yes/No	1
brunch	Yes/No	1
buffet	Yes/No	1
culturalPerformance	Yes/No	1
dancing	Yes/No	1
desserts	Yes/No	1
hideAway	Yes/No	1
historicAtmosphere	Yes/No	1
kidFriendly	Yes/No	1
lateNightDining	Yes/No	1
microbrewery	Yes/No	1
meetForADrink	Yes/No	1
newRestaurants	Yes/No	1
outdoorDining	Yes/No	1
powerScene	Yes/No	1
riverCruiseDining	Yes/No	1
theme	Yes/No	1
vegetarian	Yes/No	1
pub	Yes/No	1
cityIndex	Long Integer	4
familydining	Yes/No	1
multiplebranches	Yes/No	1

artgallery	Yes/No	1
bakery	Yes/No	1
buffetlunch	Yes/No	1
cafe	Yes/No	1
cakes	Yes/No	1
cigarfriendly	Yes/No	1
cigarroom	Yes/No	1
delivery	Yes/No	1
freeparking	Yes/No	1
grillstyle	Yes/No	1
happyhour	Yes/No	1
hightea	Yes/No	1
internetcafe	Yes/No	1
noalcohol	Yes/No	1
nocreditcards	Yes/No	1
postalservice	Yes/No	1
privateparties	Yes/No	1
privaterooms	Yes/No	1
setlunch	Yes/No	1
snacks	Yes/No	1
sundaybrunch	Yes/No	1
thaidancing	Yes/No	1
thaipub	Yes/No	1
businesslunch	Yes/No	1
icecream	Yes/No	1
reservationrequired	Yes/No	1
reservationsuggested	Yes/No	1

Table: searchHistory

Columns

Name	Type	Size
searchHistoryIndex	Long Integer	4
date	Date/Time	8
reviewerIndex	Long Integer	4
restaurantName	Text	255
zoneIndex	Long Integer	4
cuisineIndex	Long Integer	4
costIndex	Long Integer	4
remoteAddr	Text	50
httpRefer	Text	50
URL	Text	50
remoteHost	Text	50

Table: cuisineIndex

Columns

Name	Type	Size
cuisineIndex	Long Integer	4
cuisineName	Text	50
onSearch	Yes/No	1

Table: cityIndex

Columns

Name	Type	Size
cityIndex	Long Integer	4
city	Text	50
countryIndex	Long Integer	4
onSearch	Yes/No	1

Table: countryIndex

Columns

Name	Type	Size
countryIndex	Long Integer	4
countryName	Text	50

Table: costIndex

Columns

Name	Type	Size
costIndex	Long Integer	4
cost	Text	50

Table: education

Columns

Name	Type	Size
educationIndex	Long Integer	4
education	Text	50

Table: hotelIndex

Columns

Name	Type	Size
hotelindex	Long Integer	4
hotelName	Text	255
CountOfhotelName	Long Integer	4
address1	Text	50
address2	Text	50
address3	Text	50
addressZipCode	Long Integer	4
addressCity	Long Integer	4
addressCountryCode	Long Integer	4
addressZone	Long Integer	4
telephoneCountryCode	Text	50
telephoneAreaCode	Text	50
telephoneLocalCode	Text	50
faxCountryCode	Text	50
faxAreaCode	Text	50
faxLocalCode	Text	50
onsearch	Yes/No	1

Table: hotelPerMonth

Columns

Name	Type	Size
hotelPerMonthIndex	Long Integer	4
hotelPerMonth	Text	50

Table: nationalityIndex

Columns

Name	Type	Size
nationalityIndexNumber	Long Integer	4
nationality	Text	50

Table: passwordQuestion

Columns

Name	Type	Size
questionIndex	Long Integer	4
question	Text	50

Table: reservationHistory

Columns

Name	Type	Size
reservationIndex	Long Integer	4
customerIndex	Long Integer	4
restaurantIndexNumber	Long Integer	4
dateBooked	Date/Time	8
timeBooked	Text	50
numberOfPeople	Long Integer	4
noShow	Yes/No	1
bookedOn	Date/Time	8
phoneNumber	Text	50
emailAddress	Text	255
cityIndex	Long Integer	4
smoking	Yes/No	1
outdoors	Yes/No	1
windowSeat	Yes/No	1

Table: rewardEvents

Columns

Name	Type	Size
rewardEventIndex	Long Integer	4
event	Text	50
eventPoints	Long Integer	4
referred	Yes/No	1
ratio	Double	8

66

Table: rewardScheme

Columns

Name	Type	Size
rewardindex	Long Integer	4
reviewerIndex	Long Integer	4
rewardEventIndex	Long Integer	4
date	Date/Time	8
points	Long Integer	4
remoteAddr	Text	50
httpRefer	Text	50
URL	Text	50
remoteHost	Text	50

Table: stationNames

Columns

Name	Type	Size
stationindex	Long Integer	4
stationname	Text	50
onsearch	Yes/No	1

Table: statusLevels

Columns

Name	Type	Size
statusLevelsIndex	Long Integer	4
statusName	Text	50
pointsLevel	Long Integer	4

Table: timesPerWeek

Columns

Name	Type	Size
timesPerWeekIndex	Long Integer	4
timesPerWeek	Text	50

Table: zipCodeIndex

Columns

Name	Type	Size
zipCodeIndex	Long Integer	4
zipCode	Text	50
countryIndex	Long Integer	4

Table: zoneIndex

Columns

Name	Type	Size
zoneIndex	Long Integer	4
cityIndex	Long Integer	4
zipCodeIndex	Long Integer	4
zoneName	Text	50
mapFile1	Text	50
mapFile2	Text	50