A LEXICONIZING FRAMEWORK OF FEATURE-BASED OPINION MINING IN TOURISM INDUSTRY

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entitled

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ABSTRACT

Among all of the travel agency business in Thailand, Agoda (www.agoda.com) has boomed in recent years with the number of online agents offering for hotels booking. When customers need to make decision, they typically explore there opinion by investigating the opinions attached with each hotel online agent. This paper proposes a framework of feature-based opinion mining by using scores which essentially relies on the usage of two main lexiconizing levels, features, and polar words. An approach for extracting features and polar words from textual opinion is based on syntactic pattern analysis. The evaluation is performed with existing opinions and compared to the statisticalresulted scores with the existing scores of each hotel. The proposed scoring method has proved the effectiveness of the scores from Agoda, and the online process could facilitate the further text retrieval application development for the benefit of automatic customer's opinion detection.

KEY WORDS: OPINION MINING/ LEXICONIZING/ TRAVEL AGENCY/ TEXT MINING/ HOTEL AGENCY

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โครงร่างการทำเหมืองลักษณะความคิดเห็นโดยวิธีการแบ่งคำในอุตสาหกรรมการท่องเที่ยว

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บทคัดย่อ

ในธุรกิจตัวแทนบริการจองห้องพักผ่านระบบออนไลน์ สำหรับการท่องเที่ยวในประเทศไทยของเว็บไซต์ อโกด้า ปีที่ผ่านมามีจำนวนห้องพักของโรงแรมที่ถูกเสนอ และจองผ่านระบบออนไลน์ของตัวแทนบริการจองห้องพักเป็นจำนวนมาก โดยเมื่อลูกค้าต้องการที่จะทำให้การตัดสินใจในการจองที่พักโรงแรมของพวกเขา มักจะสำรวจโดยการตรวจสอบความคิดเห็นที่ทางตัวแทนบริการจองห้องพักเตรียมไว้ให้ในเว็บไซต์ งานวิจัยนี้นำเสนอกรอบความคิดของการทำเหมืองแร่ความคิดเห็น ตามคุณสมบัติของการบริการของโรงแรมขณะเข้าพักโดยใช้ร่วมกับคะแนนที่ลูกค้าได้ทำประเมินแต่ละคุณสมบัติด้วยเป็นหลัก โดยคุณสมบัติของการบริการและคำขั้วของความคิดเห็น จะใช้วิธีสกัดคำร่วมกับข้อมูลของดิกชั่นนารี วิธีการสำหรับการสกัดคุณสมบัติและการคำขั้วความคิดของต้นฉบับเดิมขึ้นอยู่กับการวิเคราะห์รูปแบบประโยค คะแนนที่ได้จากการประเมินผลการเข้าใช้บริการของ อโกด้า เมื่อเทียบกับคะแนนที่ได้จากการนำเสนอวิธีการในงานวิจัยของแต่ละโรงแรม การเสนอวิธีการหาคะแนนประเมินผลโรงแรมในงานวิจัยได้รับการพิสูจน์ว่าคะแนนที่ได้มีประสิทธิภาพ เพราะคะแนนมีความใกล้เคียงกับคะแนนของอโกด้าและสามารถนำข้อความการประเมินที่ได้จากงานวิจัยฉบับนี้ ไปใช้เพื่อการพัฒนาโปรแกรมต่อไปเพื่อประโยชน์ของการตรวจสอบความเห็นของลูกค้าอัตโนมัติ

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CHAPTER I
INTRODUCTION

1.1 Background and Problem Statement

The tourism industry is important in the world since the tourism industry is responsible for the economic and social growth. The rising of the Web 2.0, a great number of travellers generate reviews, comments and opinions about their travelling experiences. The travellers when they are want to make a decision, a typically read the review from previous customers. And when a company wants to find opinions of the general customer about its products and services, it conducts surveys and focused groups. The reviews online is explosive growth of the user generated content on the Web. Customer can post reviews feedback of products at merchant sites and express views on almost anything in web forums. This communication channel is increasing based on a number of customer using the reviews, comment and opinion and score in each feature to make better decision. Especially for hotel agent booking process, a lot of users usually survey the opinions of the previous traveller before making a decision in hotel booking.

Recently, the web Agoda is the most popular hotel agency because it stores and presents a scoring, rating and opining of previous travellers. Typically, when customer needs to choose a hotel, they will find the general published opinions according to the products and service of their interested. For this reason, Agoda conducts to the research and surveys. Agoda is important the growth in economic and social of Thailand, especially by the explosive growth of the generated opinions the web users. Normally, Agoda separates users into two types: travellers and hotels. Firstly, a traveller reviews the efficiency of hotels by reading the opinion of the previous travellers and reserve chosen hotel via Agoda directly. Second, a hotel achieved benefit from score and opinion, so they unnecessary to conduct surveys, to organize focused group or to employ external consultants in order to find consumer opinions or sentiments about its products and those of its competitors. Thus, an

automatic system which can extract and retrieve the opinion related to their interest might be essential.

Opinion mining, an application in the field of text mining, provides some methodologies for rule and knowledge discovering from textual data. One related tasks of the opinion mining is to classify the opinions in different scales. In a number of cases, the purpose is to identify opinions in a text and classify them into positive, negative classes [1]. In other occasions, the goal is not to assign different rates, e.g. ‘‘very bad’’, ‘‘bad’’, ‘‘satisfactory’’, ‘‘good’’, ‘‘very good’’, or ‘‘excellent’’. The sentiments uses the ‘‘positive’’ or ‘‘negative’’ labeling [2].

I propose a framework for constructing of feature-based opinion mining in Thai language. It essentially relies on the use of two main lexicons, features and polar words. For clarification, the term “features” means the categories of opinion which were pre-classified into six groups. The term “polar words” means the lexicons which can identifies the feature such as good, bad, expensive, etc. Our approach for extracting them from opinion text is based on syntactic pattern analysis [3] and calculating the scores. Our proposed scoring method is based on lexiconizing analysis and selects the top five ranking of polar words. The evaluation is performed and compared with scores of case study on hotel opinions.

The remainder of the paper is organized as follows: The next section reviews the existing literature in the feature-based opinion mining in tourism industry, Thai words tokenization and the polar ranking method. Section three introduces the architectural framework of Feature-based Opinion mining and methodology to calculate statistical analysis the feature-based and polar words score. Section four presents the experimental results and discussion of technical issues. Finally, we conclude the paper and suggest some directions for future research.

1.2 Objectives

To propose a scoring method of lexiconizing feature-based opinion mining from online review and compare with the existing score of Agoda in each feature.

1.3 Scope of Work

- Collected reviews data and score are from Agoda.com.
- A method in lexiconizing levels is in both features and polar terms.
- The data of opinion is in Thai language.

1.4 Expected Result

- The term of polar words can be used for determines an opinion each feature-based.
- The proposed scoring method is proven for the comparative effectiveness of the score from Agoda.
- The term of polar word in each feature-based could facilitate the further text retrieval application for the benefit of automatic customer's opinion detection and classification.

CHAPTER II
LITERATURE REVIEW

In this section, we discuss related works in opinion mining. Opinion mining (also known as sentiment analysis) aims to assist users to automatically detect relevant opinions within a large volume of opinions collection and create a coherent overview of them. Reviewed comments are usually classified into two categories of opinions: positive and negative. Many approaches have been proposed to mine the overall opinion information at the document level or sentence level. However, a positive review on an object does not always indicate that the opinion holder has positive opinions on all aspects or features of the examined object. To further obtain such detailed aspects, feature-level opinion mining has been proposed and extensively studied on product reviews to find opinions expressed on individual product features. For the proposed frameworks have been using score from opinion mining each feature-based.

Literature review in this chapter consists of four parts. (1) Opinion mining (2) Feature-based opinion mining in tourism industry (3) Thai word tokenization (4) Current scoring system in Agoda

2.1 Opinion Mining

The textual information on the web is facts and opinions. Facts are statements that have happened and can be proven to be true. Opinion is statements that express how someone thinks or feels. For textual opinion in the opinions mining are so important that whenever customer needs to make a decision that wants to hear others' opinion and may want some opinions from previous customers. Each opinion not only true for customer individuals but also true for company.

The opinions are hidden in many reviews. It is very difficult for a customer read to find relevance opinion. An automated opinion mining and summarization

system is thus needed. Opinion mining, also known as sentiment analysis [4], grows out of this need. This article introduces this research area, In particular, it discussed the following topics: (1) the abstract model of opinion mining, (2) sentiment classification, (3) feature-based opinion mining and summarization, and (4) opinion mining from comparative sentences

2.1.1 The Abstract Model of Opinion Mining.

The opinions on web have been indicated on product and service. The basic term object is used to show the entity that has been commented on. The set of object is components (or parts) and attributes. Every component may also have its sub-components and its set of attributes. Thus, the object can be hierarchically decomposed based on the part-of relationship. For hierarchy the root is the object itself. Each node below root node is a component or subcomponent of the object. Each link is show relationship. Each node is associated with a set of attributes. An opinion can be expressed on any node and any attribute of the node. However, the word “features” is used to represent attributes.

2.1.2 Sentiment Classification

Sentiment classification has been widely method in the natural language processing (NLP). The research used the expresses of positive and negative opinion on an object. Example, given a set of hotel opinion, the system classifies them into feature-based in opinion mining and classifies them into positive opinion and negative opinion. This process is clearly a classification learning problem. They are similar but also difference from the text classification, which classifies opinion into predefined feature classes. In feature based classification, feature related words are important. However, in sentiment classification, feature related words are unimportant. Instead, polar word that indicate positive or negative opinions are important, e.g., ‘‘very bad’’ (แย่มาก), ‘‘bad’’ (แย่), ‘‘satisfactory’’ (พึงพอใจ), ‘‘good’’ (ดี), ‘‘very good’’ (ดีมาก), or ‘‘excellent’’ (ยอดเยี่ยม), etc. There are most of them apply to machine learning techniques for classification, but does not match with proposed framework of feature-based opinion mining.

2.1.3 Feature-Based Opinion Mining

The evaluation has been method of classification in text review. The positive polar in reviews on an object does not mean that review has positive all of aspects or feature. Similar as polar negative reviews on an object does not mean that review has negative all of aspect or feature. In an evaluative hotel a review, the opinion has typical got both positive and negative each aspect or feature of the object, although the general sentiment on the object may be positive and negative. The paper is present the 6 feature-based in Agoda.com. The feature-based help to classifies a polar word and evaluate the opinions.

2.1.4 Mining Comparative and Superlative Sentences

The process of comparative is a degree of polar words and other similar degree of polar words. In English, comparisons are usually conveyed using the comparative and the superlative of adjective or adverbs. Mining of comparative sentence basically consists of identifying what features, polar word and degree of polar words. The Thai language is difficult for identify the degree of opinion, because in business does not compare it. Same as the paper does not compare the opinions.

2.2 Feature-based Opinion Mining in Tourism Industry

2.2.1 Thailand's Tourism Information Service Based on Semantic Search and Opinion Mining

The information online is difficult to get to make decision effectively. For a specific domain in tourism industry, a customer's information need could be more complicated than just review on web hotel agency. For example, planning a vacation trip would retrieval information from previous customer such as places and service to travel airlines, restaurants, hotel and activities. The addition information, customer may want to obtain the reviews or opinions of pervious customers. It is difficult to integrated information pervious customers. The framework of Thailand's Tourism Information Service Based on Semantic Search and Opinion Mining consists of two key techniques: semantic search and opinion mining. First, techniques of semantic search are performed

by using ontology to support the semantic query. Second, techniques of opinion mining apply text mining on user opinions to summarize the viewpoints of users. The paper given a user can query in semantic query via the inference engine. The information is retrieved and summarized to provide user for decision making.

The paper proposed framework opinion mining of Thai tourism. The framework is collected the opinion of customer previously. The opinions contain customer ratings each Agoda feature and each hotels. The significance of a feature was rated by users scoring that comment in each feature. Although, the data collected of opinion is useful for opinion analysis. The free-text comments of opinions, on the other hand, are more informative (e.g., reasons for the opinions) than the ratings and scoring, providing concrete and descriptive information about customer opinions. Nevertheless, manually analysing in free-text comments is time-consuming and tedious. This motivated us to use an opinion mining technique to extract customer opinions from the free-text comments automatically.

2.2.2 Identifying Customer Preferences about Tourism Products using an Aspect-Based Opinion Mining Approach

Customers using the internet for reserved a hotel. They are checking the reviews before make a decision. The reviews are making a good choice for buy service or product on internet. In particular, results provided group of feature-based opinion mining techniques could represent information in finding customer preferences about a service and product.

The proposed an extension of Liu's aspect-based opinion mining methodology [2]. That research is concerned with fact of customer refer kind of service and product when writing reviews on the internet. Most of the existing works; they are focus in service and product reviews mining. However, for kinds of service and product different phenomena occur. For instance, when a customer writes a hotel review, he/she input comments not only on service elements, but also comment on location. The feature is appearing two kinds of features from a review in Tripadvisor. The algorithm for aspect expressions extraction, based on frequent words and NPs appearing in reviews, achieved a poor performance in the tourism domain. The Agoda

feature is appear six kind of feature-based. That feature is important for determining semantic orientation proved to be very effective for extracted aspect expression.

2.2.3 OpinionSeer: Interactive Visualization of Hotel Customer Feedback

An approach of opinion mining is used to extract feature-based opinion mining from free-text opinion. I am interested comment from the online Agoda hotel agency. That website is diverse cultural backgrounds and come from different countries. The OpinionSeer [5] use interactive visualization of hotel customer feedback. They are focus on the visual analysis of online hotel customer feedback. Such diversity may likely cause varied levels of expectations toward the products/service offered, which could be a cause of complaining behavior in the case of product/service failure. For example, Chinese are generally price sensitive, while customer form the US care more about space, cleanliness, and service. That is important opinion patterns for hotel managers. However, reasoning about opinion to detect the patterns could be time-consuming and difficult for several reasons. Therefore, the visualization system should be carefully designed to present all opinions to user with sufficient visual cues, and allow users to determine which subset to further visualize. These feature, among others, make opinion data visualization challenging. I proposed a feature-based opinion mining technique to faithfully model the uncertainty in the review text.

2.3 Thai Words Tokenization

Thai words do not use spaces for a segmentation of word, which is usually implemented by seeing if a word can be subdivided into multiple words that appear in a vocabulary. The drawbacks of the dictionary-based approach, machine learning algorithms have been adopted for the word segmentation task. The machine learning approach can be formulated as a binary classification task in which each character in the text string is predicted as belonging to one of two classes: word-beginning and intra-word characters. The advantage of the machine learning approach is the independence of dictionary.

LexToPlus [6] is designed to handle the intentional errors caused by the repeated characters at the end of words. LexToPlus is a dictionary-based parser which

detects existing terms in a dictionary. Unknown tokens with repeated characters are merged and removed. It performed statistical analysis and evaluated the performance of the proposed approach by using a Twitter corpus. The experimental results show that the proposed algorithm yields an accuracy of 96.3% on a test data set.

LexToPlus selects an appropriate approach for tokenizing and normalizing social media texts, it first performs a comparison between two approaches, dictionary-based (DCB) and machine learning based (MLB) [7]. For machine learning based approach, that adopts the conditional random fields (CRFs) algorithm [8] to train the tokenization model. The dictionary-based approach is a lexicon-based parser which solves the ambiguity with a longest matching heuristic.

The DCB approach can correctly tokenize all the terms which are included in the dictionary. The repeated word-ending characters are merged into a chunk. The DCB-Norm algorithm is shown in figure 2.1. The algorithm performs text parsing with longest matching strategy (LM PARSE). The strategy is used to solve the ambiguity problem in which there are more than one possible path to select in the parsing tree. The longest matching uses the heuristic such that longer terms contain better semantic than shorter terms.

Algorithm: DCB-Norm (*input_text*)
1 **Input**: A set of *N* terms, *T*, from dictionary
2 **Output**: *tokenized_text*
3 load *T* into *TRIE* data structure
4 **while** (not end of string)
5 *token, token_type* LM_PARSE (*input_text*, *TRIE*)
6 **if** (*token*_type equal to unknown)
7 **if** (token not equal repeated characters)
8 merge unknown token into *chunk*
9 append (*chunk* +|) to *tokenized_text*
10 **else**
11 append (*token* +|) to *tokenized_text*
12 **return** *tokenized_text*
Note:|denotes a word boundary maker

Figure 2.1 DCB-Norm algorithms.

2.4 Current Scoring System in Agoda

Agoda.com is a popular website for online hotel reservations and booking. This website is available in 37 languages and lets customers book at 250,000 hotels around more than 37,000 cities worldwide. The opinions on Agoda are an important record of a customer's actual experience at a hotel. Opinions that appear on the website are written by actual customers only after they have completed their stay, and as such are an accurate reflection of an average visit.

When customers make an opinion according to the hotel, they are asked to rate their stay based on various criteria, including value for money, location, staff performance, cleanliness, comfort, and food follow in figure 2.2. These scores are then averaged to get that customer's overall rating of the hotel. To find the top-rated hotels for 2017, Agoda.com took the sum of all customer ratings on a particular hotel and divided that by the number of reviews to get the hotel's final ranking follow in figure 2.3.

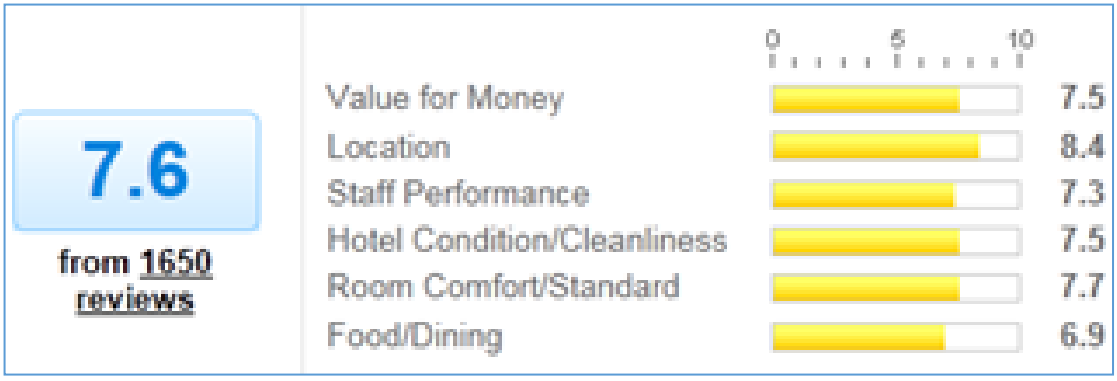

Figure 2.2 Example of Hotel Agoda score by Agoda feature.

The example of method calculates average of Hotel Agoda score.

Value of Money	= 7.5
Location	= 8.4
Staff Performance	= 7.3
Hotel Condition/Cleanliness	= 7.7
Room Comfort/Standard	= 7.7
Food/Dining	= 6.9

Customer comments score (7.5+8.4+7.3+7.7+7.7+6.9)/6 = **7.6**

Figure 2.3 The example of method calculates average of Hotel Agoda score by Agoda score.

CHAPTER III
RESEARCH METHODOLOGY

In this section, I present a methodology of feature-based opinion mining. Our methodology is carried out using data collected from Agoda (www.agoda.com). This Website agent hotel collects the information from cities across the world. To analyse and compare customer opinions from different aspects, hotel managers and tourism industry usually need to classify customer opinions into different categories (or features) such as service, place, and cleanliness [9, 10]. It collects feedback opinion from customers. Each customers consists of an overall rating (from 1, lowest, to 10, highest), a textual opinion written by the customer, and score ratings for different features of hotels (e.g., value, service, rooms) on the website Agoda.

3.1 Data Collections

Website Agoda.com is the favorite tourism industry cities of Thailand: Bangkok, Chiang Mai and Phuket. For customer opinion, I collected overall ratings, textual opinions, and score ratings for six features: value for money, location, staff performance, hotel condition/cleanliness, room comfort/standard and food/dining. These features are rated by a significant number of users. In table 3.1 shows summarizes our data set [11]. For each city, this table contains information about the number of hotels, the total amount of opinion and the score of opinion with feature ratings. In general, each hotel has sufficient opinion with feature ratings for us to evaluate our work [12].

Table 3.1 Summary of The Data Set

Location	# Hotels	# Opinion	# Opinion with feature score
Bangkok	10	784	6537.2
Chiang Mai	10	1031	8511.8
Phuket	10	365	2987.6

3.2 The Lexiconizing Framework of Feature-based Opinion Mining

The opinion mining is most direct and frequent words describing a feature base. Example: location, cleanliness or value of a hotel. I use a feature-based opinion mining method to extract opinions from the customer opinions and calculating the new scores. The method works as follows as figure 3.1 [13]. First, opinion corpus has to pre-process by dividing its information into segment. Each segment is a part of sentence that gives the opinion of hotel. Associated information that can use to be feature will be extracted to tag based on lexicon types. The whole steps of pre-processing are supported by LexToPlus.

3.2.1 LexToPlus

For word segmentation is considered a very important NLP task. The goal of word segmentation task is to assign correct word. In Thai language segmentation can be broadly classified as dictionary based. The dictionary-based a set of word terms from a dictionary. Thus, the quality and size of word terms depend on dictionary-based.

The LexToPlus is a dictionary-based analyst which detects existing word terms in a dictionary. The process is detects unknown tokens with repeated characters are merged and removed. That's performed relies a set of word terms from a dictionary-based for parsing and segmenting input word tokens. During the parsing process and matching terms from dictionary-based. The performance of LexToPlus depends on the quality and word terms set in the dictionary-based. Recent works in Thai word terms segmentation have adopted machine learning algorithms.

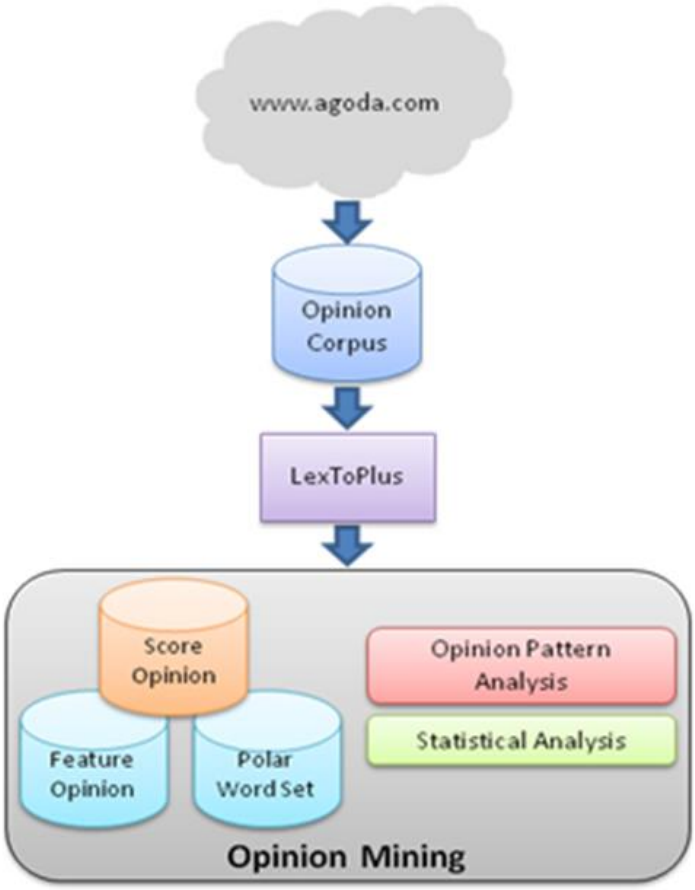

Figure 3.1 The lexiconizing framework of feature-based opinion mining.

3.2.2 Framework of Feature-based Opinion Mining

I proposed a framework of feature-based opinion mining for Thai language. The result of pre-processing step is a pattern of segment that contains both features and polar words as figure 3.2. A feature is information that associated with the given domain. For instance, the features of hotel domain could be, for instance, “price”, “location” and “service”. Another domain-dependent lexicon is polar words. In this phase, I define a sentiment keyword dictionary with “positive” and “negative” which are adjective words of customer opinion. In the opinion mining process, I focus on six features that Agoda used to describe the hotels (i.e. value for money, location, staff performance, hotel condition/cleanliness, room comfort/standard, food/dining). In real dialog, customers use the specific word to describe its feature.

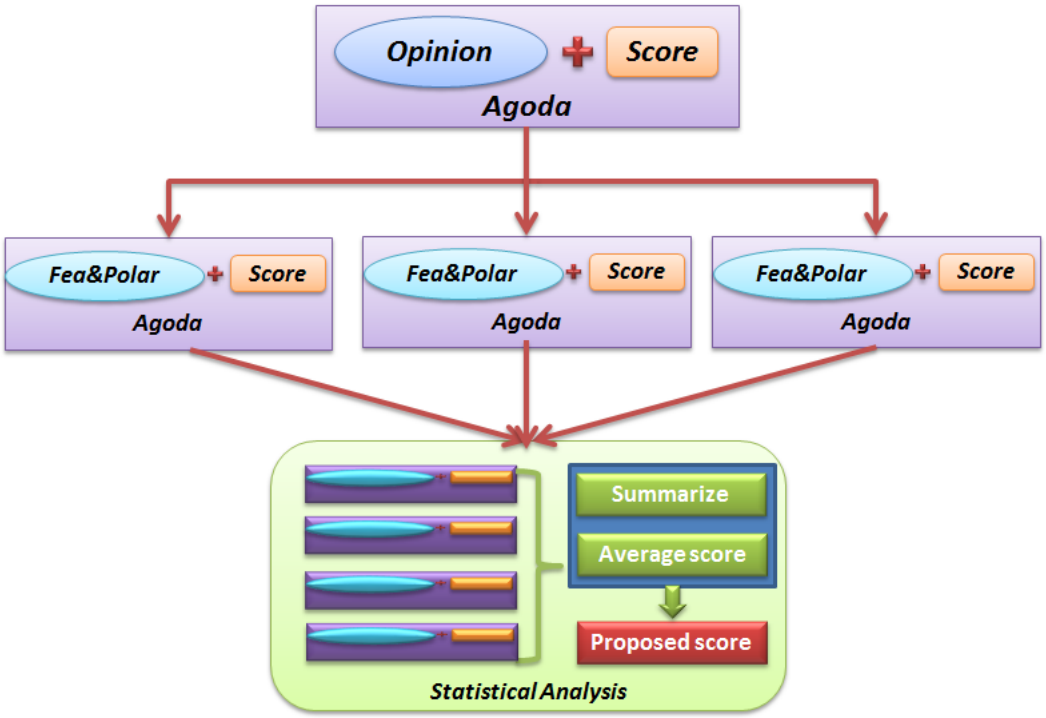

Figure 3.2 The process of Statistical Analysis in framework of feature-based opinion mining.

Moreover, the feature can be able to detect set of associated words which use to define and utilize a feature-entity mapping scheme. Feature entity mapping scheme maps a set of words to a given feature. Previously I discuss about the assets of feature, later I describe another argument “Polar word”. Polar words are sentiment words that represent either positive or negative for viewing on features. Some polar words are used to be domain-independent that is explicit meanings such as "excellent” (ยอดเยี่ยม), “beautiful” (สวย), “clean” (สะอาด) and “expensive” (แพง). For example, the word “quiet” (เงียบ) is generally considered to be positive for the "room comfort" feature. On the other hand, the dimension feature of "location" (ตำแหน่ง) feature, the word “quiet” (เงียบ) might be considered as negative, because it mean to uncomfortable for shopping food/cloth etc. All polar words that indicated by positive and negative will be mapped with score of customers based on different features. The score of polar words are used in statistical analysis for the feature-based opinion mining follow in figure 3.3. The goal in this statistical step is to classify as much opinions as possible that remain form the previous step. Finally, the opinion information of the statistical is aggregated

opinion about the hotel. Our approach different with others in sum up of the opinion scores of different features, I build our combination strategy on subjective logic.

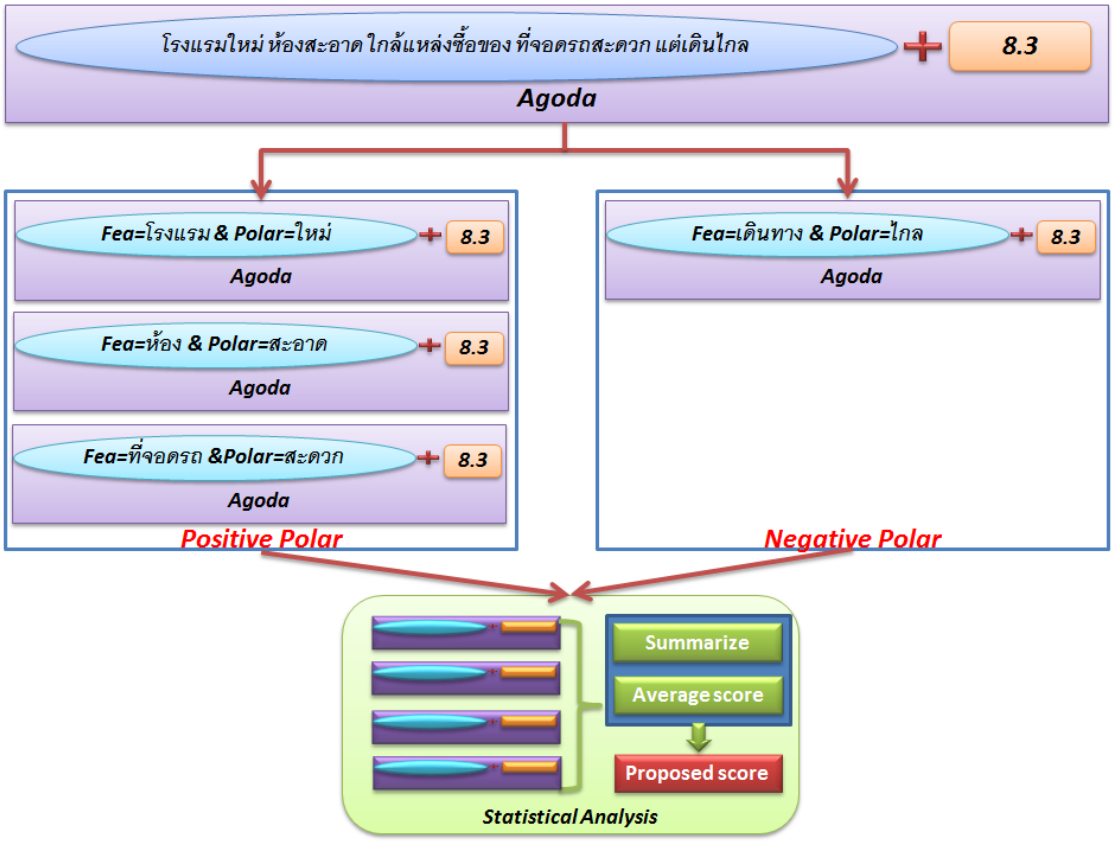

Figure 3.3 The example process of Statistical Analysis in framework of feature-based opinion mining.

3.3 Timeline

Task description	2013				2014				
	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May
Study thory and research of opinion mining.	←	—	→						
Select and collect review from website Agoda.com		←	—	—	—	→			
Extract data				←	—	—	—	→	
Analysis of statistical data from feature-based					←	—	—	—	→
Conclusion							←	—	→

CHAPTER IV
RESULTS AND DISCUSSION

The feature from Agoda and polar words from proposed scoring flow are shown in figure 4.1. It includes all synonyms which could be used to describe in Thai. I denote the positive and negative polar words by placing [+] and [-] after each word. It can be observed that some polar words are dependent on main-features. For example, the polar word “close to shopping" (ใกล้แหล่งช็อปปิ้ง) can only be used for the main-feature “location” (ตำแหน่ง) which is the process to identify score of polar words in feature-based opinion mining. I evaluate polar words score by using score of Agoda and identify score every polar words in both positive polar and negative polar. Consequently, I use statistical analysis for ranking of polar words the high score on every feature. The top 5 polar words core in both positive polar words and negative polar words are shown in table 4.1 and 4.2.

Lexicons	Examples
Features	Value for Money, Location, Staff Performance, Hotel Condition/Cleanliness, Room Comfort/Standard, Food/Dining
Polar words	ดี(good)[+], สะดวก(comfort)[+], ใกล้แหล่งช็อปปิ้ง(close to shopping)[+],สวย(pretty)[+], สะอาด(clean)[+], เก่า(old)[-], ลำบาก(difficult)[-], สกปรก(dirty)[-], แพง(expensive)[-], เสียงดัง (noise)[-], รถติด(traffic jam)[-]

Figure 4.1 Example main feature and polar words.

I calculate statistics analysis the feature-based and polar words score from Agoda every 30 hotels of 3 cities. The comparative scores between proposed score and Agoda score by feature by province as show in table 4.3. And graph show in figure 4.2 until 4.5. The results of polar word compare between real Agoda score and proposed

score every Agoda feature as shown in table. 4.4 And graph show in figure 4.6. They are shown with a little difference.

Table 4.1 Positive polar words (Top 5)

Agoda Features	Positive Polar Words
1. Value for Money	worth (คุ้มค่า), inexpensive (ไม่แพง), appropriate (เหมาะสม), cheap (ราคาถูก), reasonably (สมราคา)
2. Location	comfort (สะดวก), close to shopping place (ใกล้แหล่งช้อปปิ้ง), heart (ใจกลางเมือง), close to travel place (ใกล้แหล่งท่องเที่ยว), convenient (สะดวกสบาย)
3. Staff Performance	Good (ดี) , smiling (ยิ้มแย้ม), very good (ดีมาก), friendly (เป็นมิตร)
4. Hotel Condition/Cleanliness	good (ดี), pretty (สวย), clean (สะอาด), convenient (สะดวกสบาย), beautiful (สวยงาม)
5. Room Comfort/Standard	clean (สะอาด), good (ดี), extensive (กว้างขวาง), fully (ครบครัน), pretty (สวย)
6. Food/Dining	delicious (อร่อย), diverse, good (ดี), many (หลากหลาย), delicious (รสชาติดี)

Table 4.2 Negative polar words (Top 5)

Agoda Feature	Negative Polar Words
1. Value for Money	Expensive (แพง) , high (ราคาสูง), not worth (ไม่คุ้ม)
2. Location	Difficult (ลำบาก), traffic jam (รถติด), far (ไกล), no sea (ไม่ติดทะเล), no beach (ไม่ติดหาด)
3. Staff Performance	Slow (ช้า), poor (แย่), long (รอนาน), little (น้อย), not impressed (ไม่ประทับใจ)
4. Hotel Condition/Cleanliness	Old (เก่า), little (น้อย), restrictive (คับแคบ), noise (เสียงดัง), small (เล็ก)
5. Room Comfort/Standard	Old (เก่า), small (เล็ก), dirty (สกปรก), not free (ไม่ฟรี)
6. Food/Dining	Little (น้อย), unpalatable (ไม่อร่อย), none variety (ไม่หลากหลาย), common (ธรรมดา), expensive (แพง)

Table 4.3 Comparative scores between proposed score and Agoda score by feature by province.

Agoda Feature	Bangkok		Chiang Mai		Phuket	
	Proposed Score	Agoda Score	Proposed Score	Agoda Score	Proposed Score	Agoda Score
1. Value for Money	8.42	8.10	7.67	8.28	6.45	8.16
2. Location	8.59	8.85	8.64	8.68	6.72	8.49
3. Staff Performance	8.39	8.25	8.58	8.54	8.53	8.54
4. Hotel Condition/Cleanliness	8.51	8.39	8.55	8.60	7.60	8.69
5. Room Comfort/Standard	8.31	8.31	8.42	8.60	8.46	8.53
6. Food/Dining	8.63	7.65	8.55	7.98	7.55	7.93

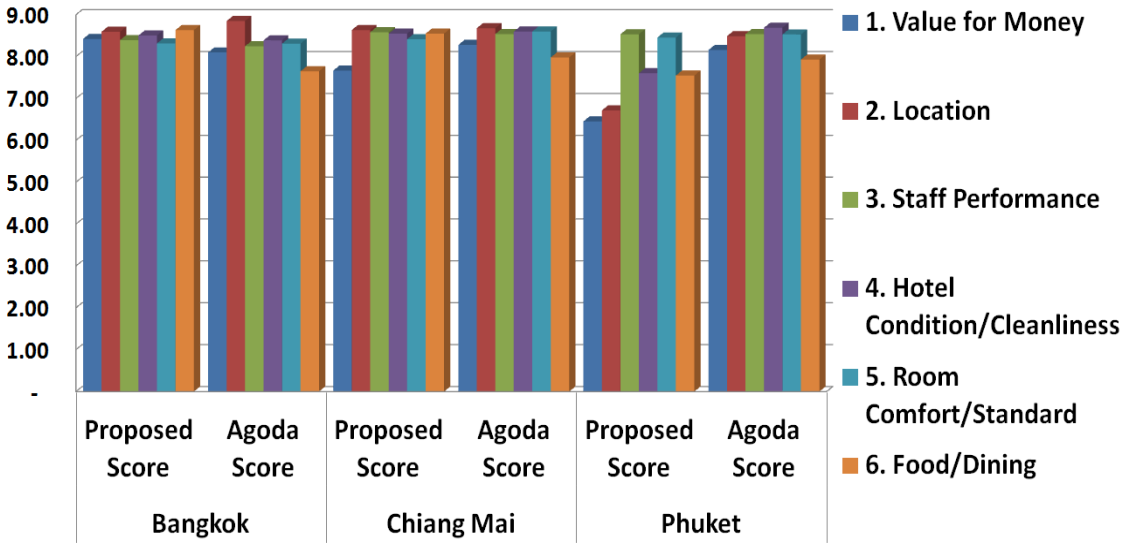

Figure 4.2 Comparative scores between proposed score and Agoda score by feature by province.

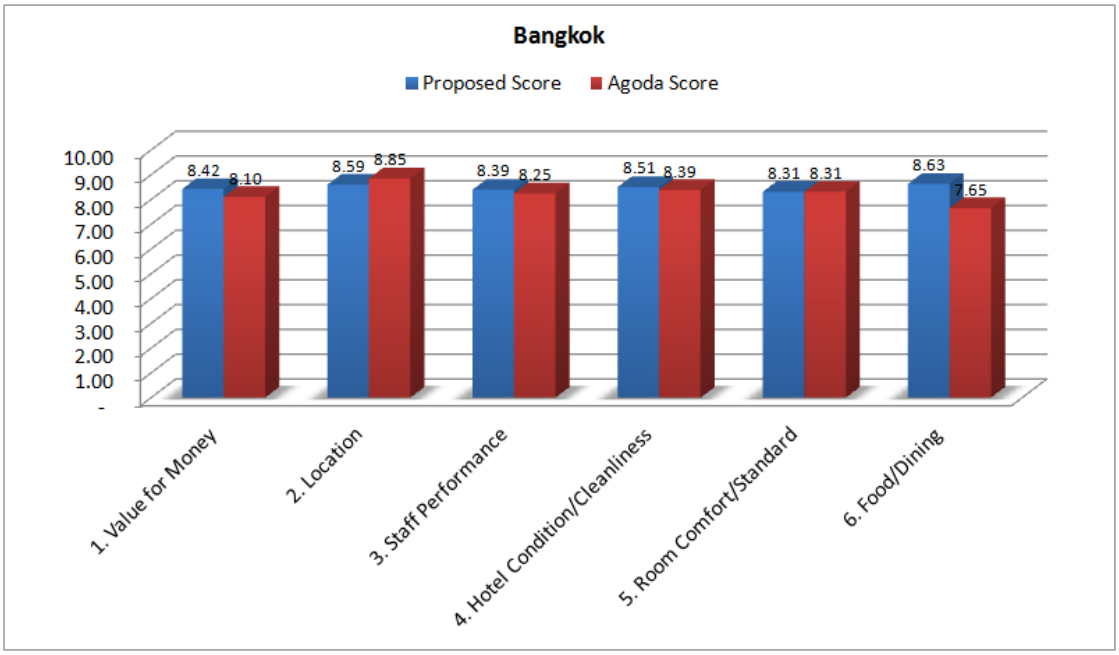

Figure 4.3 Comparative scores between proposed score and Agoda score by feature of Bangkok Province.

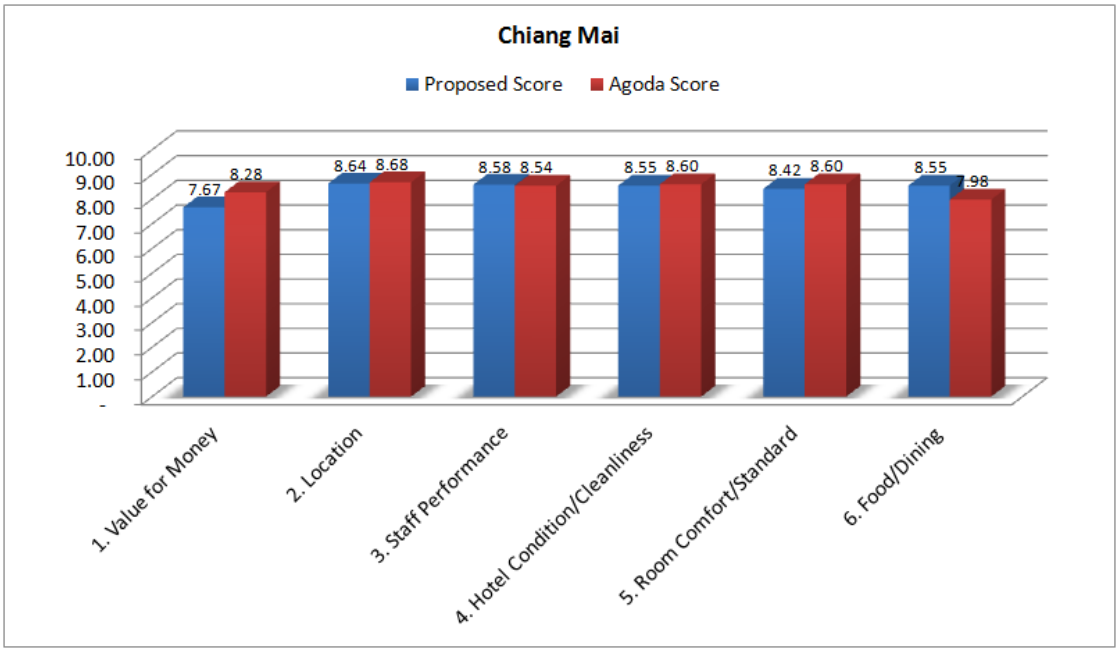

Figure 4.4 Comparative scores between proposed score and Agoda score by feature of Chiang Mai Province.

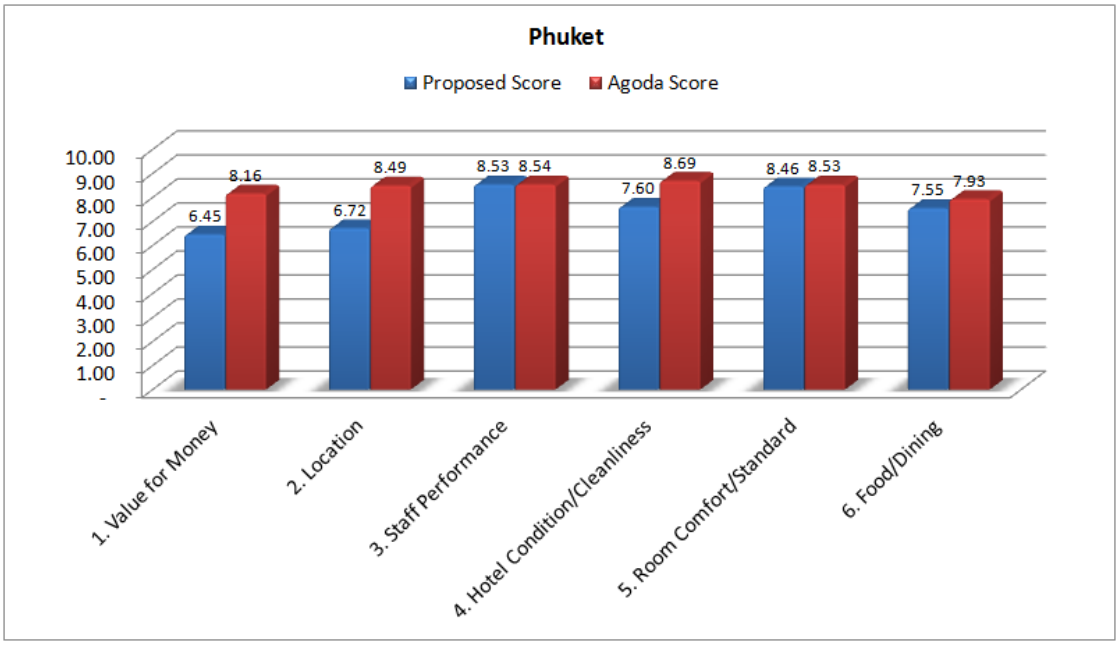

Figure 4.5 Comparative scores between proposed score and Agoda score by feature of Phuket Province.

Table 4.4 Comparative scores between proposed score and Agoda score by Agoda Feature.

Agoda Feature	Proposed Score	Agoda Score
1. Value for Money	7.51	8.18
2. Location	7.98	8.67
3. Staff Performance	8.50	8.44
4. Hotel Condition/Cleanliness	8.22	8.56
5. Room Comfort/Standard	8.40	8.48
6. Food/Dining	8.24	7.85

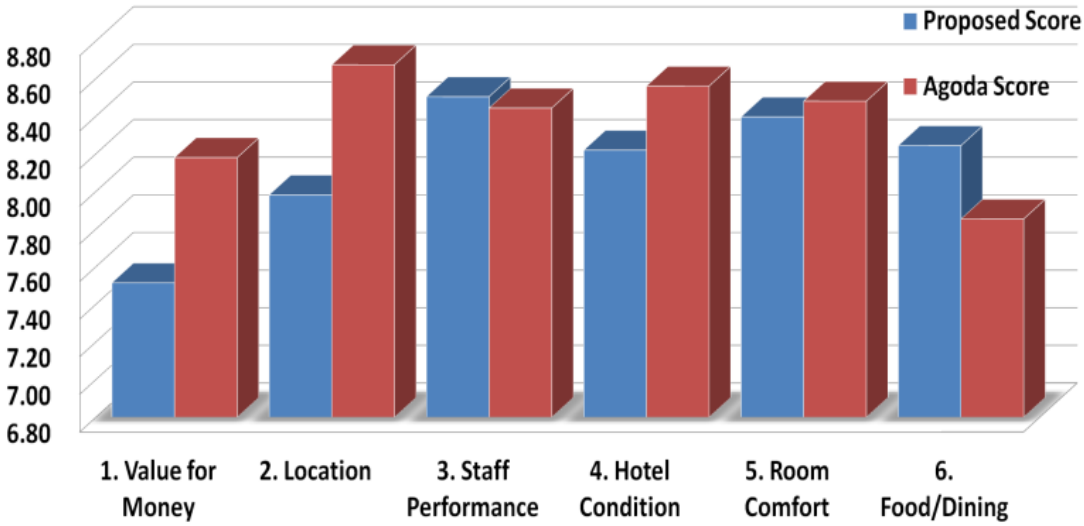

Figure 4.6 Comparative scores between proposed score and Agoda score by Agoda Feature.

The percentage scores difference between proposed score and Agoda Score are around 0.06% to 0.69%, as shown in table 4.5. This difference comes from the frequency of number of opinion.

Table 4.5 Precent of score difference between proposed score and Agoda score.

Agoda Feature	Difference
1. Value for Money	0.67%
2. Location	0.69%
3. Staff Performance	0.06%
4. Hotel Condition/Cleanliness	0.34%
5. Room Comfort/Standard	0.08%
6. Food/Dining	0.39%

CHAPTER V
CONCLUSION

5.1 Discussion and Conclusion

The proposed a scoring method based on polar lexiconizing framework of feature-based opinion mining in tourism industry, with an opinion dataset of 30 hotels in 3 cities. The experiments on the Agoda dataset seem to indicate the polar words for customer use make decision. I evaluated our approach based on data collected from Agoda and compared with the existing scores. The outcome of our approach is scores that indicate to real opinion of customers. Scoring is estimated by polar words rating that is proposed approach to maintain the textual of opinion customer. Evaluated results show the acceptable performance that suitable to apply in real life. The results show that this achieves sufficiently high performance. The feature-based between Agoda score and proposed score there show little different. Because, result of evaluate show in the same way. Our proposed scoring is an accurately from estimate polar words rating using overall textual opinion.

Our approach works well when a sufficient number of best polar words exist for each feature. This might not be the case for some hotels, which may not have many opinions. Or, they may have features that are not easily distinguishable. For example, the Agoda feature "Staff Performance" and polar words "smiling" are often both mentioned in many opinions because one important aspect of service is their smiling. This is a major advantage for a solution, because the polar words can detect the opinion by feature-based, which the method can plug-in text retrieval application development for automatic customer's opinion classification and detection.

5.2 Future Works

I may make use of this framework a lexiconizing framework of feature-based opinion mining in the tourism industry in other domains. Moreover and

technically, I plan to use lexical semantics to enhance the more accurate opinion mining and scoring system. The proposed scoring method is proven for the effectiveness of the score from Agoda and could facilitate the further text retrieval application development for the benefit of automatic customer's opinion detection.

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APPENDICES

APPENDIX A
TABLE OF RESULTS

Table A.1 Summary Proposed Score and Frequently by Hotel by Province

Province	Hotel Name	Proposed Score	Frequency
Bangkok	Arnoma Hotel	5,016.40	635
Bangkok	Baiyoke Sky Hotel	4,122.20	536
Bangkok	Centara Grand at Central World Hotel	4,448.10	512
Bangkok	Chatrium Hotel Riverside Bangkok	2,087.50	229
Bangkok	Grand Diamond Suites Hotel	6,174.20	759
Bangkok	Grande Centre Point Hotel Ratchadamri	5,428.40	618
Bangkok	Grande Centre Point Hotel Terminal 21	7,538.70	858
Bangkok	lebua at State Tower Hotel	5,178.70	585
Bangkok	Pathumwan Princess Hotel	2,100.00	238
Bangkok	The Berkeley Hotel Pratunam	2,149.10	276
Chiang Mai	Anantara Chiang Mai Resort & Spa	4,332.20	477
Chiang Mai	Centara Duangtawan Hotel	10,996.70	1,453
Chiang Mai	Chiang Mai Plaza Hotel	3,530.40	459
Chiang Mai	Dhara Dhevi Hotel Chiang Mai	1,076.80	119
Chiang Mai	Le Meridien Chiang Mai Hotel	5,495.80	626
Chiang Mai	Panviman Chiangmai Spa Resort	5,075.70	565
Chiang Mai	Royal Princess Chiangmai Hotel	4,647.00	568
Chiang Mai	Shangri-La Hotel	2,151.50	239
Chiang Mai	Siripanna Villa Resort & Spa Chiangmai	11,819.80	1,335
Chiang Mai	Suriwongse Hotel	4,579.80	574
Phuket	Angsana Laguna Phuket Hotel	294.80	34
Phuket	Avista Hideaway Resort & Spa Phuket	947.60	108
Phuket	Baan Laimai Beach Resort	4,751.80	616
Phuket	Burasari Resort Phuket	2,816.50	335
Phuket	Katathani Phuket Beach Resort	2,136.50	258
Phuket	Metadee Resort and Villas	1,867.20	206
Phuket	Millennium Resort	3,797.20	462
Phuket	Outrigger Laguna Phuket Beach Resort	63.20	7
Phuket	The Kee Resort & Spa	2,972.80	360
Phuket	The Nap Patong Hotel	1,827.70	213

Table A.2 Comparison Between Proposed Score And Agoda Score by Agoda Feature by Hotel

Hotel Name	Agoda Feature	Proposed Score	Agoda Score	Different
The Berkeley Hotel Pratunam	**1. Value for Money**	8.08	7.90	0.17
	2. Location	7.91	8.50	-0.59
	3. Staff Performance	6.84	7.10	-0.26
	4. Hotel Condition/Cleanliness	8.44	8.00	0.44
	5. Room Comfort/Standard	7.68	8.10	-0.42
	6. Food/Dining	8.08	6.90	1.18
Arnoma Hotel	**1. Value for Money**	8.38	7.70	0.68
	2. Location	7.95	9.20	-1.25
	3. Staff Performance	8.16	7.40	0.76
	4. Hotel Condition/Cleanliness	7.84	7.40	0.44
	5. Room Comfort/Standard	7.62	7.60	0.02
	6. Food/Dining	7.74	6.90	0.84
Grande Centre Point Hotel Terminal 21	**1. Value for Money**	9.40	8.20	1.20
	2. Location	8.84	9.50	-0.66
	3. Staff Performance	8.52	8.60	-0.08
	4. Hotel Condition/Cleanliness	8.93	8.90	0.03
	5. Room Comfort/Standard	8.71	8.40	0.31
	6. Food/Dining	8.87	7.70	1.17
Grande Centre Point Hotel Ratchadamri	**1. Value for Money**	8.94	8.60	0.34
	2. Location	8.76	9.00	-0.24
	3. Staff Performance	9.07	8.80	0.27
	4. Hotel Condition/Cleanliness	8.81	9.10	-0.29
	5. Room Comfort/Standard	8.70	8.80	-0.10
	6. Food/Dining	8.44	7.40	1.04
Baiyoke Sky Hotel	**1. Value for Money**	7.33	7.50	-0.17
	2. Location	7.90	8.30	-0.40
	3. Staff Performance	7.71	7.60	0.11
	4. Hotel Condition/Cleanliness	7.62	7.40	0.22
	5. Room Comfort/Standard	7.55	7.60	-0.05
	6. Food/Dining	7.99	7.60	0.39
lebua at State Tower Hotel	**1. Value for Money**	8.42	8.60	-0.18
	2. Location	9.22	8.20	1.02
	3. Staff Performance	8.90	9.10	-0.20
	4. Hotel Condition/Cleanliness	8.80	9.20	-0.40
	5. Room Comfort/Standard	8.84	9.00	-0.16
	6. Food/Dining	8.90	8.80	0.10

Table A.2 Comparison Between Proposed Score And Agoda Score by Agoda Feature by Hotel (Cont.)l

Hotel Name	Agoda Feature	Proposed Score	Agoda Score	Different
Centara Grand at Central World Hotel	**1. Value for Money**	9.07	8.00	1.07
	2. Location	8.79	9.30	-0.51
	3. Staff Performance	8.66	8.50	0.16
	4. Hotel Condition/Cleanliness	8.68	8.60	0.08
	5. Room Comfort/Standard	8.53	8.40	0.13
	6. Food/Dining	9.17	7.90	1.27
Chatrium Hotel Riverside Bangkok	**1. Value for Money**	8.80	8.70	0.10
	2. Location	9.23	8.40	0.83
	3. Staff Performance	9.08	9.00	0.08
	4. Hotel Condition/Cleanliness	9.04	8.90	0.14
	5. Room Comfort/Standard	9.07	8.90	0.17
	6. Food/Dining	9.59	8.20	1.39
Pathumwan Princess Hotel	**1. Value for Money**	7.65	8.20	-0.55
	2. Location	8.99	9.30	-0.31
	3. Staff Performance	8.92	8.80	0.12
	4. Hotel Condition/Cleanliness	8.80	8.90	-0.10
	5. Room Comfort/Standard	8.62	8.70	-0.08
	6. Food/Dining	9.02	8.10	0.92
Grand Diamond Suites Hotel	**1. Value for Money**	8.17	7.60	0.57
	2. Location	8.35	8.80	-0.45
	3. Staff Performance	8.07	7.60	0.47
	4. Hotel Condition/Cleanliness	8.10	7.50	0.60
	5. Room Comfort/Standard	7.84	7.60	0.24
	6. Food/Dining	8.54	7.00	1.54
Dhara Dhevi Hotel Chiang Mai	**1. Value for Money**	8.30	8.30	-
	2. Location	9.07	8.40	0.67
	3. Staff Performance	9.13	9.30	-0.18
	4. Hotel Condition/Cleanliness	9.11	9.60	-0.49
	5. Room Comfort/Standard	9.08	9.40	-0.32
	6. Food/Dining	8.92	8.70	0.22
Panviman Chiangmai Spa Resort	**1. Value for Money**	8.98	8.50	0.48
	2. Location	9.29	8.40	0.89
	3. Staff Performance	8.99	8.70	0.29
	4. Hotel Condition/Cleanliness	8.89	8.80	0.09
	5. Room Comfort/Standard	8.98	8.80	0.18
	6. Food/Dining	9.11	8.40	0.71

Table A.2 Comparison Between Proposed Score And Agoda Score by Agoda Feature by Hotel (Cont.)

Hotel Name	Agoda Feature	Proposed Score	Agoda Score	Different
Anantara Chiang Mai Resort & Spa	**1. Value for Money**	7.73	8.80	-1.07
	2. Location	9.00	9.20	-0.20
	3. Staff Performance	9.17	9.30	-0.13
	4. Hotel Condition/Cleanliness	9.13	9.50	-0.37
	5. Room Comfort/Standard	9.20	9.40	-0.20
	6. Food/Dining	8.88	8.80	0.08
Shangri-La Hotel	**1. Value for Money**	2.00	8.70	-6.70
	2. Location	9.23	8.80	0.43
	3. Staff Performance	8.95	9.20	-0.25
	4. Hotel Condition/Cleanliness	8.77	9.30	-0.53
	5. Room Comfort/Standard	9.00	9.10	-0.10
	6. Food/Dining	9.56	8.30	1.26
Le Meridien Chiang Mai Hotel	**1. Value for Money**	9.23	8.30	0.93
	2. Location	8.88	9.20	-0.32
	3. Staff Performance	8.64	8.80	-0.16
	4. Hotel Condition/Cleanliness	8.82	9.10	-0.28
	5. Room Comfort/Standard	8.76	9.00	-0.24
	6. Food/Dining	8.74	8.00	0.74
Centara Duangtawan Hotel	**1. Value for Money**	7.40	7.80	-0.40
	2. Location	7.88	8.80	-0.92
	3. Staff Performance	7.55	7.50	0.05
	4. Hotel Condition/Cleanliness	7.81	7.40	0.41
	5. Room Comfort/Standard	7.28	7.50	-0.22
	6. Food/Dining	7.65	7.50	0.15
Siripanna Villa Resort & Spa Chiangmai	**1. Value for Money**	8.69	8.70	-0.01
	2. Location	8.86	7.60	1.26
	3. Staff Performance	8.96	9.20	-0.24
	4. Hotel Condition/Cleanliness	8.82	9.30	-0.48
	5. Room Comfort/Standard	8.79	9.20	-0.41
	6. Food/Dining	8.94	8.30	0.64
Chiang Mai Plaza Hotel	**1. Value for Money**	8.53	7.90	0.63
	2. Location	7.88	8.40	-0.52
	3. Staff Performance	7.58	7.50	0.08
	4. Hotel Condition/Cleanliness	7.99	7.60	0.39
	5. Room Comfort/Standard	7.25	7.50	-0.25
	6. Food/Dining	7.65	7.30	0.35

Table A.2 Comparison Between Proposed Score And Agoda Score by Agoda Feature by Hote (Cont.)

Hotel Name	Agoda Feature	Proposed Score	Agoda Score	Different
Suriwongse Hotel	**1. Value for Money**	7.81	7.70	0.11
	2. Location	8.01	8.90	-0.89
	3. Staff Performance	8.39	7.80	0.59
	4. Hotel Condition/Cleanliness	7.96	7.30	0.66
	5. Room Comfort/Standard	7.86	7.80	0.06
	6. Food/Dining	7.72	7.30	0.42
Royal Princess Chiangmai Hotel	**1. Value for Money**	7.98	8.10	-0.12
	2. Location	8.25	9.10	-0.85
	3. Staff Performance	8.47	8.10	0.37
	4. Hotel Condition/Cleanliness	8.19	8.10	0.09
	5. Room Comfort/Standard	7.96	8.30	-0.34
	6. Food/Dining	8.33	7.20	1.13
Avista Hideaway Resort & Spa Phuket	**1. Value for Money**	-	8.40	-8.40
	2. Location	8.50	7.50	1.00
	3. Staff Performance	9.00	8.80	0.20
	4. Hotel Condition/Cleanliness	8.63	9.10	-0.47
	5. Room Comfort/Standard	8.67	9.10	-0.43
	6. Food/Dining	9.52	8.30	1.22
Metadee Resort and Villas	**1. Value for Money**	9.00	8.60	0.40
	2. Location	8.66	8.10	0.56
	3. Staff Performance	9.09	8.90	0.19
	4. Hotel Condition/Cleanliness	9.11	8.90	0.21
	5. Room Comfort/Standard	9.13	8.80	0.33
	6. Food/Dining	8.86	8.10	0.76
The Kee Resort & Spa	**1. Value for Money**	7.93	8.00	-0.07
	2. Location	8.48	9.20	-0.72
	3. Staff Performance	8.25	8.50	-0.25
	4. Hotel Condition/Cleanliness	8.21	8.70	-0.49
	5. Room Comfort/Standard	8.40	8.10	0.30
	6. Food/Dining	6.71	7.40	-0.69
Baan Laimai Beach Resort	**1. Value for Money**	7.56	7.50	0.06
	2. Location	7.76	8.90	-1.14
	3. Staff Performance	7.26	7.40	-0.14
	4. Hotel Condition/Cleanliness	7.86	7.50	0.36
	5. Room Comfort/Standard	7.68	7.30	0.38
	6. Food/Dining	8.24	7.50	0.74

Table A.2 Comparison Between Proposed Score And Agoda Score by Agoda Feature by Hote (Cont.)

Hotel Name	Agoda Feature	Proposed Score	Agoda Score	Different
Angsana Laguna Phuket Hotel	**1. Value for Money**	8.00	8.20	-0.20
	2. Location		7.90	-7.90
	3. Staff Performance	8.85	8.70	0.15
	4. Hotel Condition/Cleanliness	8.60	8.80	-0.20
	5. Room Comfort/Standard	8.83	8.80	0.02
	6. Food/Dining	8.57	7.90	0.67
Outrigger Laguna Phuket Beach Resort	**1. Value for Money**		8.50	-8.50
	2. Location		8.40	-8.40
	3. Staff Performance	8.87	9.20	-0.33
	4. Hotel Condition/Cleanliness		9.20	-9.20
	5. Room Comfort/Standard	9.15	9.10	0.05
	6. Food/Dining		7.70	-7.70
Burasari Resort Phuket	**1. Value for Money**	9.26	8.10	1.16
	2. Location	8.37	8.80	-0.43
	3. Staff Performance	8.74	8.30	0.44
	4. Hotel Condition/Cleanliness	8.40	8.40	-0.00
	5. Room Comfort/Standard	8.06	8.40	-0.34
	6. Food/Dining	8.35	8.20	0.15
Katathani Phuket Beach Resort	**1. Value for Money**	6.85	7.80	-0.95
	2. Location	8.37	8.40	-0.03
	3. Staff Performance	8.57	8.30	0.27
	4. Hotel Condition/Cleanliness	8.41	8.60	-0.19
	5. Room Comfort/Standard	8.01	8.50	-0.49
	6. Food/Dining	8.11	8.00	0.11
Millennium Resort	**1. Value for Money**	8.18	8.00	0.18
	2. Location	8.28	9.10	-0.82
	3. Staff Performance	8.42	8.30	0.12
	4. Hotel Condition/Cleanliness	8.44	8.60	-0.16
	5. Room Comfort/Standard	7.86	8.40	-0.54
	6. Food/Dining	8.34	8.00	0.34
The Nap Patong Hotel	**1. Value for Money**	7.77	8.50	-0.73
	2. Location	8.74	8.60	0.14
	3. Staff Performance	8.31	9.00	-0.69
	4. Hotel Condition/Cleanliness	8.40	9.10	-0.70
	5. Room Comfort/Standard	8.79	8.80	-0.01
	6. Food/Dining	8.77	8.20	0.57

Table A.3 Positive Polar word by Agoda Feature

Agoda Feature	Positive Polar word	Frequency
1. value for money	คุ้มค่า	89
1. value for money	ไม่แพง	27
1. value for money	เหมาะสม	21
1. value for money	ถูก	20
1. value for money	สมเหตุสมผล	7
1. value for money	ประหยัด	4
1. value for money	คุ้ม	4
1. value for money	ดี	4
1. value for money	สมราคา	3
1. value for money	ไม่สูง	2
1. value for money	มาตราฐาน	1
1. value for money	มิตรภาพ	1
1. value for money	พอรับได้	1
1. value for money	โปรโมชั่น	1
1. value for money	สมเหตุผล	1
1. value for money	ย่อมเยา	1
1. value for money	น่าพอใจ	1
1. value for money	ใช้ได้	1
1. value for money	ประทับใจ	1
2. location	สะดวก	501
2. location	ใกล้แหล่งช๊อปปิ้ง	370
2. location	ใจกลางเมือง	134
2. location	ใกล้แหล่งท่องเที่ยว	53
2. location	สะดวกสบาย	15
2. location	ใกล้ห้าง	13
2. location	ใกล้	11
2. location	ติดหาด	11
2. location	ง่าย	9
2. location	อยู่ใจกลางเมือง	9
2. location	ใกล้ไนท์บาร์ซาร์	7
2. location	ติดทะเล	6
2. location	ไม่ไกล	5
2. location	ใกล้ไนท์บาซาร์	5
2. location	เดินทางสะดวก	5
2. location	ใกล้หาด	5

Table A.3 Positive Polar word by Agoda Feature (Cont.)

Agoda Feature	Positive Polar word	Frequency
2. location	ดี	5
2. location	ติดห้างสรรพสินค้า	4
2. location	ใกล้ชายหาด	4
2. location	ใกล้ตลาด	4
2. location	ติดชายหาด	4
2. location	ใกล้ศูนย์การค้า	4
2. location	ใกล้ร้านอาหาร	4
2. location	ใจกลางไนท์บาซาร์	4
2. location	ใกล้แหล่งบันเทิง	3
2. location	ใกล้เมือง	3
2. location	อยู่ติดหาด	3
2. location	ใกล้ไนท์บาร์ซ่า	3
2. location	ใกล้ห้างสรรพสินค้า	3
2. location	กลางใจเมือง	3
2. location	ใกล้ถนนคนเดิน	3
2. location	ไม่ไกลจากหาด	3
2. location	ใกล้ไนท์บาซ่า	2
2. location	ใกล้สถานบันเทิง	2
2. location	เชื่อมกับห้างจังซีลอน	2
2. location	ใกล้ที่ช๊อปปิ้ง	2
2. location	ใกล้ไนท์บาร์ซา	2
2. location	ใกล้สถานที่ท่องเที่ยว	2
2. location	เดินไปห้างช๊อปปิ้ง	2
2. location	ใกล้ทะเล	2
2. location	กลางแหล่งท่องเที่ยว	2
2. location	สะดวกในการช๊อปปิ้ง	2
2. location	หาง่าย	2
2. location	อยู่กลางเมือง	2
2. location	อยู่ใกล้ไนท์บาร์ซ่า	2
2. location	อยู่ติดห้าง	2
2. location	อยู่ในห้าง	2
2. location	อยู่บนห้าง	2
2. location	ใกล้แหล่งซื้อของ	2
2. location	กลางไนท์บาร์ซาร์	2
2. location	กลางแหล่งช๊อปปิ้ง	2
2. location	ติดถนน	2

Table A.3 Positive Polar word by Agoda Feature (Cont.)

Agoda Feature	Positive Polar word	Frequency
2. location	ใกล้ Night BaZaar	2
2. location	ในเมือง	2
2. location	ในตัวเมือง	2
2. location	กลางเมือง	2
2. location	ใกล้แหล่ง shopping	1
2. location	ใกล้สนามบิน	1
2. location	ใกล้ไนท์บาซา	1
2. location	ใกล้กับแหล่งของกิน	1
2. location	ใกล้กับแหล่งท่องเที่ยว	1
2. location	ใกล้ขนส่งมวลชน	1
2. location	กลางของไนท์บาร์ซาร์	1
2. location	ใกล้แหล่งกินเที่ยว	1
2. location	ใกล้ถนน	1
2. location	ใกล้คูเมือง	1
2. location	ใกล้แหล่งชุมชน	1
2. location	ใกล้ตลาดไนท์บาร์ซาร์	1
2. location	ใกล้หาดป่าตอง	1
2. location	ใกล้สถานีรถไฟฟ้า	1
2. location	กลางตัวเมือง	1
2. location	ใกล้กับสถานีรถไฟฟ้า	1
2. location	ใกล้สถานที่ซื้อของ	1
2. location	ใกล้สถานที่ช๊อปปิ้ง	1
2. location	ใกล้ตัวเมือง	1
2. location	ใกล้กับไนท์บาร์ซาร์	1
2. location	ใกล้กับถนนคนเดิน	1
2. location	ใกล้ร้านสะดวกซื้อ	1
2. location	ใกล้รถไฟฟ้า	1
2. location	ใกล้ night plaza	1
2. location	ใกล้กับตลาด	1
2. location	ใกล้ย่านช๊อปปิ้ง	1
2. location	ใกล้กับห้างจางซีลอน	1
2. location	ไม่ห่างจากตัวเมือง	1
2. location	สะดวกมาก	1
2. location	สะดวกในการเดินทาง	1
2. location	สะดวกในการเดินช๊อปปิ้ง	1
2. location	สะดวกต่อการช๊อปปิ้ง	1

Table A.3 Positive Polar word by Agoda Feature (Cont.)

Agoda Feature	Positive Polar word	Frequency
2. location	สะดวกดี	1
2. location	สวยงาม	1
2. location	สงบเงียบ	1
2. location	รถไม่ติด	1
2. location	ไนท์บาร์ซ่าร์อยู่ตรงหน้า	1
2. location	ย่านช๊อปปิ้ง	1
2. location	สุดยอด	1
2. location	ไม่ไกลแหล่งช๊อปปิ้ง	1
2. location	ไม่ไกลตัวเมือง	1
2. location	ไม่ไกลจากแหล่งช๊อปปิ้ง	1
2. location	ไม่ไกลจากสนามบิน	1
2. location	ไม่ไกลจากชายหาด	1
2. location	มีหาดส่วนตัว	1
2. location	มีชายหาดสวย	1
2. location	มีชายหาด	1
2. location	ไปจุดต่างๆได้ง่าย	1
2. location	ย่านไนท์พลาซ่า	1
2. location	อย่างสบาย	1
2. location	ใจกลางไนท์บาซา	1
2. location	ใกล้แหล่งที่เที่ยว	1
2. location	อยู่บริเวณเดียวกับห้าง	1
2. location	อยู่ในย่านตัวเมือง	1
2. location	อยู่ในบริเวณช้อปปิ้ง	1
2. location	อยู่ติดกับห้าง	1
2. location	อยู่ติดกับไนท์บาร์ซาร์	1
2. location	อยู่ใจกลางป่าตอง	1
2. location	อยู่ใกล้ถนน	1
2. location	สะอาด	1
2. location	อยู่กลางใจเมือง	1
2. location	สามารถเดินไปหาด	1
2. location	ใหญ่โต	1
2. location	เหมาะสำหรับการ shopping	1
2. location	เหมาะแก่การช๊อปปิ้ง	1
2. location	หาไม่ยาก	1
2. location	หาดสวย	1
2. location	หาดส่วนตัว	1

Table A.3 Positive Polar word by Agoda Feature (Cont.)

Agoda Feature	Positive Polar word	Frequency
2. location	ห้างอยู่ติดกับโรงแรม	1
2. location	ห่างจากทะเลนิดหน่อย	1
2. location	อยู่ในตัวเมือง	1
2. location	อยู่กลางไนท์บาซาร์	1
2. location	ใจกลางถนนคนเดิน	1
2. location	ตรงข้ามกับชายหาด	1
2. location	ตรงกลางไนท์บาร์ซาร์	1
2. location	เดินไปแหล่งช๊อปปิ้งสะดวก	1
2. location	เดินทางไปในท์บาซาร์ได้	1
2. location	เดินช๊อปปิ้งห้างจังซีลอนได้สะดวก	1
2. location	เดินช๊อปปิ้งได้หลายแหล่ง	1
2. location	ดีมากๆ	1
2. location	ช๊อปปิ้งสะดวก	1
2. location	ตรงข้ามไนท์บาร์ซ่า	1
2. location	ใจกลางแหล่งช๊อปปิ้ง	1
2. location	ใจกลางไนท์บาร์ซ่า	1
2. location	ใจกลางชุมชน	1
2. location	ใจกลางกทม	1
2. location	ใจกลาง	1
2. location	ง่ายต่อการช๊อปปิ้ง	1
2. location	คนผลุกพล่าน	1
2. location	ใกล้แหล่งป่าตอง	1
2. location	ไนท์บาซา	1
2. location	ข้ามถนนไปเซ็นทรัลเวิร์ล	1
2. location	อยู่ในเมือง	1
2. location	ช้อปปิ้งสะดวก	1
2. location	ทำเลดี	1
2. location	ในย่างแหล่งท่องเที่ยว	1
2. location	ในแหล่งช๊อปปิ้ง	1
2. location	เที่ยวในตัวเมืองสะดวก	1
2. location	ตรงไนท์บาร์ซาร์	1
2. location	นอกเมือง	1
2. location	ทำเลเยี่ยม	1
2. location	ติดแหล่งช๊อปปิ้ง	1
2. location	ติดแหล่งช้อปปิ้ง	1
2. location	ติดแหล่งช๊อป	1

Table A.3 Positive Polar word by Agoda Feature (Cont.)

Agoda Feature	Positive Polar word	Frequency
2. location	ติดห้างจังซีลอน	1
2. location	ติดกับห้างสรรพสินค้า	1
2. location	ติดสถานบันเทิง	1
2. location	ติดกับจังซีลอน	1
2. location	ติดกับทะเล	1
2. location	ติดกับห้าง	1
2. location	ติด Night Bazaar	1
2. location	ติดไนท์บาซ่า	1
2. location	ติดไนท์บาซ่าร์	1
2. location	ตั้งอยู่ย่านธุรกิจ	1
2. location	ติดริมทะเล	1
2. location	ตรงหน้าหาด	1
3. staff performance	ดี	435
3. staff performance	ยิ้มแย้ม	82
3. staff performance	ดีมาก	59
3. staff performance	เป็นกันเอง	41
3. staff performance	เป็นมิตร	31
3. staff performance	สุภาพ	28
3. staff performance	เร็ว	22
3. staff performance	รวดเร็ว	20
3. staff performance	ดีเยี่ยม	17
3. staff performance	น่ารัก	16
3. staff performance	อัธยาศัยดี	16
3. staff performance	ประทับใจ	13
3. staff performance	เอาใจใส่	13
3. staff performance	ยอดเยี่ยม	11
3. staff performance	ยิ้มแย้มแจ่มใส	8
3. staff performance	เยี่ยม	7
3. staff performance	ดูแลดี	6
3. staff performance	ด้วยรอยยิ้ม	5
3. staff performance	อบอุ่น	4
3. staff performance	ช่วยเหลือ	4
3. staff performance	รอยยิ้ม	2
3. staff performance	สะดวกสบาย	2
3. staff performance	ให้การช่วยเหลือ	2
3. staff performance	ให้ความช่วยเหลือ	2

Table A.3 Positive Polar word by Agoda Feature (Cont.)

Agoda Feature	Positive Polar word	Frequency
3. staff performance	น่าสนใจ	2
3. staff performance	กันเอง	2
3. staff performance	ดูแลเอาใจใส่	2
3. staff performance	ต้อนรับดี	2
3. staff performance	ก่อนเวลา	2
3. staff performance	เยี่ยมมาก	1
3. staff performance	แย่	1
3. staff performance	ด้วยมิตรภาพ	1
3. staff performance	ช่วยเหลือทุกอย่าง	1
3. staff performance	ใจดี	1
3. staff performance	สมกับเป็นระดับห้าดาว	1
3. staff performance	สมกับระดับของโรงแรม	1
3. staff performance	จดจำเราได้	1
3. staff performance	ง่าย	1
3. staff performance	ดีมากๆ	1
3. staff performance	อัทธยาศัยดี	1
3. staff performance	เอาใจใส่ดูแล	1
3. staff performance	อัธยาศัยดีมาก	1
3. staff performance	อัธยาศัยไม่ตรีดี	1
3. staff performance	อำนวนความสะดวก	1
3. staff performance	กระตือรือล้น	1
3. staff performance	เอาใจใส่ดี	1
3. staff performance	น่ารักมาก	1
3. staff performance	เอาใจใส่ลูกค้า	1
3. staff performance	ใส่ใจ	1
3. staff performance	คุ้มค่ากับราคา	1
3. staff performance	มารยาทดี	1
3. staff performance	ดูแลดีมาก	1
3. staff performance	กระตือรือร้น	1
3. staff performance	นิสัยดี	1
3. staff performance	น่ารักดี	1
3. staff performance	ประทับใจมาก	1
3. staff performance	ทักษะด้านภาษาดี	1
3. staff performance	พอใจ	1
3. staff performance	พอใช้	1
3. staff performance	พูดจาดี	1

Table A.3 Positive Polar word by Agoda Feature (Cont.)

Agoda Feature	Positive Polar word	Frequency
3. staff performance	พูดจาไพเราะ	1
3. staff performance	มนุษยสัมพันธ์ดี	1
3. staff performance	มีรอยยิ้ม	1
3. staff performance	ยิ้มแย้มแจ่งใส	1
3. staff performance	ได้ก่อนเวลา	1
3. staff performance	ไม่ยิ้มแย้ม	1
3. staff performance	ไม่ช้า	1
3. staff performance	พูดเพราะ	1
3. staff performance	มีอัธยาศัย	1
3. staff performance	มีน้ำใจ	1
3. staff performance	มีมารยาท	1
3. staff performance	มีประสิทธิภาพ	1
3. staff performance	มืออาชีพ	1
4. hotel condition/cleanliness	ดี	357
4. hotel condition/cleanliness	สวย	171
4. hotel condition/cleanliness	สะอาด	95
4. hotel condition/cleanliness	สวยงาม	68
4. hotel condition/cleanliness	สะดวกสบาย	64
4. hotel condition/cleanliness	สะดวก	53
4. hotel condition/cleanliness	ใหญ่	43
4. hotel condition/cleanliness	ปลอดภัย	39
4. hotel condition/cleanliness	ใหม่	38
4. hotel condition/cleanliness	เงียบสงบ	35
4. hotel condition/cleanliness	ประทับใจ	32
4. hotel condition/cleanliness	ดีมาก	22
4. hotel condition/cleanliness	สงบ	19
4. hotel condition/cleanliness	กว้างขวาง	16
4. hotel condition/cleanliness	หรูหรา	15
4. hotel condition/cleanliness	ทันสมัย	13
4. hotel condition/cleanliness	มีสระว่ายน้ำ	12
4. hotel condition/cleanliness	สวยมาก	10
4. hotel condition/cleanliness	ส่วนตัว	9
4. hotel condition/cleanliness	เยอะ	8
4. hotel condition/cleanliness	กว้าง	8
4. hotel condition/cleanliness	โรแมนติก	7
4. hotel condition/cleanliness	ชอบ	6

Table A.3 Positive Polar word by Agoda Feature (Cont.)

Agoda Feature	Positive Polar word	Frequency
4. hotel condition/cleanliness	เป็นส่วนตัว	6
4. hotel condition/cleanliness	หรู	5
4. hotel condition/cleanliness	ร่มรื่น	5
4. hotel condition/cleanliness	อบอุ่น	5
4. hotel condition/cleanliness	ยอดเยี่ยม	4
4. hotel condition/cleanliness	วิวสวย	4
4. hotel condition/cleanliness	ธรรมชาติ	4
4. hotel condition/cleanliness	เยี่ยมมาก	3
4. hotel condition/cleanliness	สูง	3
4. hotel condition/cleanliness	น่าอยู่	3
4. hotel condition/cleanliness	เยี่ยม	3
4. hotel condition/cleanliness	เก่า	3
4. hotel condition/cleanliness	มาก	3
4. hotel condition/cleanliness	โอเค	3
4. hotel condition/cleanliness	น่าว่าย	3
4. hotel condition/cleanliness	สระว่ายน้ำใหญ่	2
4. hotel condition/cleanliness	กลางธรรมชาติ	2
4. hotel condition/cleanliness	สวยดี	2
4. hotel condition/cleanliness	เพียงพอ	2
4. hotel condition/cleanliness	มีกลิ่นหอม	2
4. hotel condition/cleanliness	คุ้มค่า	2
4. hotel condition/cleanliness	เป็นกันเอง	2
4. hotel condition/cleanliness	สงบเงียบ	2
4. hotel condition/cleanliness	เงียบดี	2
4. hotel condition/cleanliness	สบาย	2
4. hotel condition/cleanliness	ดีเยี่ยม	2
4. hotel condition/cleanliness	น่าพัก	2
4. hotel condition/cleanliness	มีสระน้ำ	2
4. hotel condition/cleanliness	ตกแต่งดี	2
4. hotel condition/cleanliness	สดชื่น	2
4. hotel condition/cleanliness	ถูกใจ	2
4. hotel condition/cleanliness	สระว่ายน้ำสวย	1
4. hotel condition/cleanliness	สมัยใหม่	1
4. hotel condition/cleanliness	สบายๆ	1
4. hotel condition/cleanliness	สงบร่มเย็น	1
4. hotel condition/cleanliness	เหมาะแก่การพักผ่อน	1

Table A.3 Positive Polar word by Agoda Feature (Cont.)

Agoda Feature	Positive Polar word	Frequency
4. hotel condition/cleanliness	อลังการ	1
4. hotel condition/cleanliness	อยู่ใจกลางเมือง	1
4. hotel condition/cleanliness	อยู่ใกล้ตัวเมือง	1
4. hotel condition/cleanliness	อยากกลับไปพัก	1
4. hotel condition/cleanliness	ใหญ่มาก	1
4. hotel condition/cleanliness	ใหญ่โต	1
4. hotel condition/cleanliness	เหมือนอยู่สวรรค์	1
4. hotel condition/cleanliness	เหมือนวิมาน	1
4. hotel condition/cleanliness	เหมาะสำหรับการพักผ่อน	1
4. hotel condition/cleanliness	เหมาะสำหรับคู่รัก	1
4. hotel condition/cleanliness	เหมาะแก่การว่าย	1
4. hotel condition/cleanliness	สว่างดี	1
4. hotel condition/cleanliness	หาไม่ยาก	1
4. hotel condition/cleanliness	หาดสวย	1
4. hotel condition/cleanliness	หาดทรายสวย	1
4. hotel condition/cleanliness	ห่างตัวเมืองเล็กน้อย	1
4. hotel condition/cleanliness	สุดยอด	1
4. hotel condition/cleanliness	สะอาดสะอ้าน	1
4. hotel condition/cleanliness	สะอาดมาก	1
4. hotel condition/cleanliness	สะอาดดี	1
4. hotel condition/cleanliness	สะดวกมากมาย	1
4. hotel condition/cleanliness	สะดวก ปลอดภัย	1
4. hotel condition/cleanliness	เหมาะมากกับการนอนพักผ่อน	1
4. hotel condition/cleanliness	ชายหาดส่วนตัว	1
4. hotel condition/cleanliness	แบบไทยๆ	1
4. hotel condition/cleanliness	บริเวณกว้างขวาง	1
4. hotel condition/cleanliness	แนว Modern	1
4. hotel condition/cleanliness	น่ารัก	1
4. hotel condition/cleanliness	น่าไป	1
4. hotel condition/cleanliness	น่าเข้าพัก	1
4. hotel condition/cleanliness	ที่ดี	1
4. hotel condition/cleanliness	ติดถนนใหญ่	1
4. hotel condition/cleanliness	ตกแต่งสวยงาม	1
4. hotel condition/cleanliness	ตกแต่งได้สวย	1
4. hotel condition/cleanliness	ประทับใจมาก	1
4. hotel condition/cleanliness	ดีที่สุด	1

Table A.3 Positive Polar word by Agoda Feature (Cont.)

Agoda Feature	Positive Polar word	Frequency
4. hotel condition/cleanliness	ขนาดใหญ่	1
4. hotel condition/cleanliness	ชอบมาก	1
4. hotel condition/cleanliness	ใจกลางเมือง	1
4. hotel condition/cleanliness	เงียบ	1
4. hotel condition/cleanliness	งดงาม	1
4. hotel condition/cleanliness	คุณภาพที่ดี	1
4. hotel condition/cleanliness	ครบวงจร	1
4. hotel condition/cleanliness	วิวดี	1
4. hotel condition/cleanliness	ใกล้แหล่งท่องเที่ยว	1
4. hotel condition/cleanliness	ปรับปรุงใหม่	1
4. hotel condition/cleanliness	กว้างขวาง	1
4. hotel condition/cleanliness	ได้มาตรฐาน	1
4. hotel condition/cleanliness	ไม่พลุพล่าน	1
4. hotel condition/cleanliness	กว้างใหญ่	1
4. hotel condition/cleanliness	ปลอดโปร่ง	1
4. hotel condition/cleanliness	เล็ก	1
4. hotel condition/cleanliness	รู้สึกดี	1
4. hotel condition/cleanliness	ยาว	1
4. hotel condition/cleanliness	ไม่ผิดหวัง	1
4. hotel condition/cleanliness	ไม่ประทับใจ	1
4. hotel condition/cleanliness	มีสิ่งอำนวยความสะดวก	1
4. hotel condition/cleanliness	มีศูนย์การค้า	1
4. hotel condition/cleanliness	มีระดับ	1
4. hotel condition/cleanliness	มีไมโครเวฟ	1
4. hotel condition/cleanliness	พิถีพิถัน	1
4. hotel condition/cleanliness	ผ่อนคลาย เงียบ สงบ	1
4. hotel condition/cleanliness	ริมทะเล	1
4. hotel condition/cleanliness	มีฟิตเนส	1
4. hotel condition/cleanliness	ผ่อนคลาย	1
4. hotel condition/cleanliness	ผ่อนคลาย ทันสมัย	1
4. hotel condition/cleanliness	พอใจมาก	1
4. hotel condition/cleanliness	พึ่งพอใจ	1
4. hotel condition/cleanliness	มาตราฐาน	1
4. hotel condition/cleanliness	มีความปลอดภัยสูง	1
4. hotel condition/cleanliness	มีความสุขมาก	1
4. hotel condition/cleanliness	มีคุณภาพ	1

Table A.3 Positive Polar word by Agoda Feature (Cont.)

Agoda Feature	Positive Polar word	Frequency
4. hotel condition/cleanliness	มีบริการรถรับส่ง	1
5. room comfort/standard	สะอาด	421
5. room comfort/standard	ดี	385
5. room comfort/standard	กว้างขวาง	161
5. room comfort/standard	ครบครัน	151
5. room comfort/standard	สวย	106
5. room comfort/standard	สะดวกสบาย	87
5. room comfort/standard	ใหญ่	82
5. room comfort/standard	กว้าง	80
5. room comfort/standard	ประทับใจ	40
5. room comfort/standard	สวยงาม	36
5. room comfort/standard	สบาย	28
5. room comfort/standard	ฟรี	25
5. room comfort/standard	ดีมาก	25
5. room comfort/standard	ครบ	24
5. room comfort/standard	ดีเยี่ยม	23
5. room comfort/standard	ใหม่	20
5. room comfort/standard	ทันสมัย	18
5. room comfort/standard	รวดเร็ว	18
5. room comfort/standard	สะดวก	14
5. room comfort/standard	หรูหรา	11
5. room comfort/standard	เร็ว	11
5. room comfort/standard	เป็นกันเอง	11
5. room comfort/standard	ยอดเยี่ยม	10
5. room comfort/standard	ยิ้มแย้ม	8
5. room comfort/standard	เยี่ยม	6
5. room comfort/standard	เป็นมิตร	4
5. room comfort/standard	ใช้ได้	4
5. room comfort/standard	เงียบสงบ	4
5. room comfort/standard	พอใช้	4
5. room comfort/standard	ครบถ้วน	4
5. room comfort/standard	หรู	4
5. room comfort/standard	โอเค	3
5. room comfort/standard	เป็นสัดส่วน	3
5. room comfort/standard	โอเค	3
5. room comfort/standard	ปลอดภัย	3

Table A.3 Positive Polar word by Agoda Feature (Cont.)

Agoda Feature	Positive Polar word	Frequency
5. room comfort/standard	เอาใจใส่	3
5. room comfort/standard	เงียบ	3
5. room comfort/standard	สวยมาก	3
5. room comfort/standard	วิวห้องพักเห็นทะเล	2
5. room comfort/standard	พร้อม	2
5. room comfort/standard	เหมาะสม	2
5. room comfort/standard	มีคุณภาพ	2
5. room comfort/standard	เยี่ยมมาก	2
5. room comfort/standard	เล็ก	2
5. room comfort/standard	สะดวก สบาย	2
5. room comfort/standard	สมบูรณ์	2
5. room comfort/standard	โรแมนติก	2
5. room comfort/standard	ขนาดใหญ่	2
5. room comfort/standard	ครบชุด	1
5. room comfort/standard	สงบ	1
5. room comfort/standard	สะอาดดีเยี่ยม	1
5. room comfort/standard	สะอาดดี	1
5. room comfort/standard	ขนาดพอเหมาะ	1
5. room comfort/standard	สะดวกรวดเร็ว	1
5. room comfort/standard	สะอาดเรียบร้อย	1
5. room comfort/standard	คนเยอะ	1
5. room comfort/standard	สะอาดสะอ้าน	1
5. room comfort/standard	ระดับนานาชาติ	1
5. room comfort/standard	สวยดี	1
5. room comfort/standard	คุณภาพดี	1
5. room comfort/standard	ชอบ	1
5. room comfort/standard	สมราคา	1
5. room comfort/standard	ชอบการออกแบบ	1
5. room comfort/standard	ด้วยรอยยิ้ม	1
5. room comfort/standard	สะดวกมาก	1
5. room comfort/standard	กว้างใหญ่	1
5. room comfort/standard	ปรับปรุง	1
5. room comfort/standard	โอ่โถง	1
5. room comfort/standard	สวยดี	1
5. room comfort/standard	แอร์เย็น	1
5. room comfort/standard	ฟรี	1

Table A.3 Positive Polar word by Agoda Feature (Cont.)

Agoda Feature	Positive Polar word	Frequency
5. room comfort/standard	อบอุ่น	1
5. room comfort/standard	สะอาดมาก	1
5. room comfort/standard	ใหญ่มาก	1
5. room comfort/standard	สวยงามมากๆ	1
5. room comfort/standard	ให้ความช่วยเหลือ	1
5. room comfort/standard	เหมาะสำหรับคู่รัก	1
5. room comfort/standard	เก่า	1
5. room comfort/standard	หลากหลาย	1
5. room comfort/standard	เก่ามาก	1
5. room comfort/standard	หรูสะดวกสบาย	1
5. room comfort/standard	ใกล้แหล่งช๊อปปิ้ง	1
5. room comfort/standard	กว้างมาก	1
5. room comfort/standard	นำรถไปเก็บ	1
5. room comfort/standard	ไม่อึดอัด	1
5. room comfort/standard	ไม่คิดค่าบริการ	1
5. room comfort/standard	ดีเลิศ	1
5. room comfort/standard	ความใส่ใจ	1
5. room comfort/standard	มีให้มากกว่าที่ขอไป	1
5. room comfort/standard	มีน้ำใจ	1
5. room comfort/standard	มีอ่างอาบน้ำ	1
5. room comfort/standard	มี	1
5. room comfort/standard	แบ่งเป็นสัดส่วน	1
5. room comfort/standard	พอใช้ได้	1
5. room comfort/standard	นุ่ม	1
5. room comfort/standard	พร้อมสรรพ	1
5. room comfort/standard	นุ่มสบาย	1
5. room comfort/standard	เน้นการบริการ	1
5. room comfort/standard	เป็นส่วนตัว	1
5. room comfort/standard	บรรยากาศดี	1
5. room comfort/standard	น่าผักผ่อน	1
5. room comfort/standard	เยอะ	1
5. room comfort/standard	ระดับพรี่เมี่ยม	1
5. room comfort/standard	ระดับห้าดาว	1
5. room comfort/standard	ไม่ผิดหวัง	1
5. room comfort/standard	ตกแต่งสวย	1
5. room comfort/standard	ธรรมชาติ	1

Table A.3 Positive Polar word by Agoda Feature (Cont.)

Agoda Feature	Positive Polar word	Frequency
5. room comfort/standard	ระดับมืออาชีพ	1
5. room comfort/standard	ถูก	1
5. room comfort/standard	เต็ม	1
5. room comfort/standard	ตกแต่งได้ดี	1
5. room comfort/standard	เย็นเร็ว	1
5. room comfort/standard	เย็น	1
5. room comfort/standard	ดูดี	1
5. room comfort/standard	ทำเลดี	1
5. room comfort/standard	ยิ้ม	1
5. room comfort/standard	เลิศ	1
5. room comfort/standard	กว้างขวาง	1
6. food/dining	อร่อย	232
6. food/dining	หลากหลาย	166
6. food/dining	ดี	64
6. food/dining	มากมาย	11
6. food/dining	อร่อยมาก	9
6. food/dining	ดีมาก	7
6. food/dining	มีให้เลือกเยอะ	7
6. food/dining	เยอะ	7
6. food/dining	ใช้ได้	6
6. food/dining	รสชาติดี	6
6. food/dining	โอเค	5
6. food/dining	มีให้เลือก	3
6. food/dining	ประทับใจ	3
6. food/dining	ยอดเยี่ยม	3
6. food/dining	มีให้เลือกมากมาย	2
6. food/dining	พอใช้	2
6. food/dining	สะอาด	2
6. food/dining	น้อย	2
6. food/dining	ค่อนข้างดี	2
6. food/dining	เลิศ	1
6. food/dining	รวดเร็ว	1
6. food/dining	สะอาดและสด	1
6. food/dining	เยี่ยมยอด	1
6. food/dining	สุดยอด	1
6. food/dining	หลายอย่าง	1

Table A.3 Positive Polar word by Agoda Feature (Cont.)

Agoda Feature	Positive Polar word	Frequency
6. food/dining	เยี่ยมมาก	1
6. food/dining	อร่อยดี	1
6. food/dining	เยี่ยม	1
6. food/dining	มีให้เลือกเยอะมาก	1
6. food/dining	มีให้เลือกมาก	1
6. food/dining	ฟรี	1
6. food/dining	พอได้	1
6. food/dining	พอใช้ได้	1
6. food/dining	พอใช้ได้	1
6. food/dining	บรรยากาศดี	1
6. food/dining	ถูกใจ	1
6. food/dining	เติมตลอด	1
6. food/dining	เซ็ตใหญมาก	1
6. food/dining	คุณภาพดี	1
6. food/dining	คุณภาพ	1
6. food/dining	กินได้	1
6. food/dining	ถูก	1

Table A.4 Negative Polar word by Agoda Feature

Agoda Feature	Negative Polar word	Frequently
1. value for money	แพง	44
1. value for money	สูง	13
1. value for money	ไม่คุ้ม	3
1. value for money	ไม่คุ้มค่า	2
1. value for money	ไม่ค่อยคุ้ม	2
1. value for money	ไม่ค่อยคุ้มค่า	1
1. value for money	ไม่สมราคา	1
1. value for money	เสียความรู้สึก	1
1. value for money	ค่อนข้างสูง	1
1. value for money	ไม่สมกับราคา	1
2. location	ลำบาก	27
2. location	รถติด	11
2. location	ไกล	8
2. location	ไม่ติดทะเล	3
2. location	ไม่ติดหาด	3
2. location	ห่างไกล	2
2. location	หายาก	1
2. location	ลึก	1
2. location	สับสน	1
2. location	ห่างไกลเมือง	1
2. location	หาทางเข้าไม่พบ	1
2. location	หาไม่เจอ	1
2. location	อยู่ห่างตัวเมือง	1
2. location	ห่างตัวเมือง	1
2. location	ไกลจากแหล่งช๊อปปิ้ง	1
2. location	ไม่สะดุดตา	1
2. location	อยู่ในซอยลึก	1
2. location	ไกลจากสนามบิน	1
2. location	ไกลตัวเมือง	1
2. location	ไกลถนน	1
2. location	ไม่ได้ติดทะเล	1
2. location	ไม่มี	1
2. location	ไม่สะดวก	1
2. location	ไกลจากตัวเมือง	1
3. staff performance	ช้า	64

Table A.4 Negative Polar word by Agoda Feature (Cont.)

Agoda Feature	Negative Polar word	Frequently
3. staff performance	แย่	28
3. staff performance	ไม่ประทับใจ	8
3. staff performance	นาน	8
3. staff performance	น้อย	8
3. staff performance	ไม่ดี	7
3. staff performance	ไม่สนใจ	4
3. staff performance	ไม่สุภาพ	4
3. staff performance	ปรับปรุง	4
3. staff performance	ไม่ค่อยดี	3
3. staff performance	หน้าบูด	3
3. staff performance	แคบ	3
3. staff performance	รอนาน	3
3. staff performance	ต้องรอ	3
3. staff performance	หน้าหงิก	2
3. staff performance	ล่าช้า	2
3. staff performance	พูดจาหยาบคาย	2
3. staff performance	เสียความรู้สึก	2
3. staff performance	ขาดทักษะ	2
3. staff performance	ไม่ค่อยสุภาพ	2
3. staff performance	เฉยๆ	2
3. staff performance	ไม่มี	2
3. staff performance	ไม่พอ	2
3. staff performance	ไม่มีความชำนาญ	1
3. staff performance	ไม่มีการบริการ	1
3. staff performance	ไม่ตรงความต้องการ	1
3. staff performance	ไม่มีประทับใจ	1
3. staff performance	ไม่ได้	1
3. staff performance	ไม่ค่อยให้เกียรติ	1
3. staff performance	late	1
3. staff performance	อัธยาศัยไม่ดี	1
3. staff performance	ไม่มืออาชีพ	1
3. staff performance	ไม่ยิ้มแย้ม	1
3. staff performance	ยุ่งยาก	1
3. staff performance	ไม่ใส่ใจ	1
3. staff performance	ไม่ใส่ใจลูกค้า	1
3. staff performance	ไม่เอาใจใส่	1

Table A.4 Negative Polar word by Agoda Feature (Cont.)

Agoda Feature	Negative Polar word	Frequently
3. staff performance	ไม่ค่อยสนใจ	1
3. staff performance	ไม่ได้เรื่อง	1
3. staff performance	แย่มากๆ	1
3. staff performance	รอเก็บของ	1
3. staff performance	ระบุเวลาไม่ได้	1
3. staff performance	เลท	1
3. staff performance	เสียงรบกวน	1
3. staff performance	ห่างไกลกับมาตรฐาน	1
3. staff performance	ตกหล่น	1
3. staff performance	พอใช้	1
3. staff performance	ผิดพลาด	1
3. staff performance	ปานกลาง	1
3. staff performance	นั่งรอ	1
3. staff performance	ธรรมดา	1
3. staff performance	ติดขัด	1
3. staff performance	พูดจากระด้าง	1
3. staff performance	ไม่ค่อยยิ้มแย้ม	1
3. staff performance	ตะคอกใส่	1
3. staff performance	ไม่ทำความสะอาด	1
3. staff performance	จำนวนมาก	1
3. staff performance	ควรปรับปรุง	1
3. staff performance	ขาดพนักงานเอาใจใส่	1
3. staff performance	แก้ไข	1
3. staff performance	เกือบครึ่งชั่วโมง	1
3. staff performance	กว่าจะได้	1
3. staff performance	ต่ำกว่ามาตรฐาน	1
3. staff performance	มีปัญหา	1
3. staff performance	ไม่ค่อยพอใจ	1
3. staff performance	ไม่ค่อยเป็นมิตร	1
3. staff performance	ไม่คอยบริการ	1
3. staff performance	ช้ามาก	1
3. staff performance	ไม่ควรเก็บ	1
3. staff performance	พูดจาไม่ดี	1
3. staff performance	มือไม้แข็ง	1
3. staff performance	ไม่ค่อยมีมนุษยสัมพันธ์	1
3. staff performance	มีน้อย	1

Table A.4 Negative Polar word by Agoda Feature (Cont.)

Agoda Feature	Negative Polar word	Frequently
3. staff performance	มีข้อติ.	1
3. staff performance	มั่ว	1
3. staff performance	ภาษาไม่ดี	1
3. staff performance	พูดไม่เพราะ	1
3. staff performance	พูดจาไม่สุภาพ	1
3. staff performance	พูดจาไม่ไพเราะ	1
3. staff performance	ไม่ Friendly	1
4. hotel condition/cleanliness	เก่า	46
4. hotel condition/cleanliness	น้อย	19
4. hotel condition/cleanliness	คับแคบ	17
4. hotel condition/cleanliness	เสียงดัง	13
4. hotel condition/cleanliness	เยอะ	13
4. hotel condition/cleanliness	เล็ก	10
4. hotel condition/cleanliness	แคบ	8
4. hotel condition/cleanliness	แออัด	8
4. hotel condition/cleanliness	ไม่ประทับใจ	6
4. hotel condition/cleanliness	กำลังปรับปรุง	6
4. hotel condition/cleanliness	ไม่สะดวก	5
4. hotel condition/cleanliness	แย่	4
4. hotel condition/cleanliness	รอลิฟต์นาน	4
4. hotel condition/cleanliness	ไกล	4
4. hotel condition/cleanliness	น่ากลัว	3
4. hotel condition/cleanliness	ไม่มี	3
4. hotel condition/cleanliness	มีกลิ่น	3
4. hotel condition/cleanliness	มีกลิ่นอับ	2
4. hotel condition/cleanliness	ลิฟต์น้อย	2
4. hotel condition/cleanliness	มีกลิ่นบุหรี่	2
4. hotel condition/cleanliness	ไม่สวย	2
4. hotel condition/cleanliness	เปลี่ยว	2
4. hotel condition/cleanliness	สกปรก	2
4. hotel condition/cleanliness	ธรรมดา	2
4. hotel condition/cleanliness	สับสน	2
4. hotel condition/cleanliness	หายาก	2
4. hotel condition/cleanliness	วุ่นวาย	2
4. hotel condition/cleanliness	เสียเงิน	1
4. hotel condition/cleanliness	ไม่มีบริการ	1

Table A.4 Negative Polar word by Agoda Feature (Cont.)

Agoda Feature	Negative Polar word	Frequently
4. hotel condition/cleanliness	ไม่เรียบร้อย	1
4. hotel condition/cleanliness	ไม่ค่อยสะดวก	1
4. hotel condition/cleanliness	อยู่ระหว่างปรับปรุง	1
4. hotel condition/cleanliness	เหม็น	1
4. hotel condition/cleanliness	หาเจอยาก	1
4. hotel condition/cleanliness	ไม่สะดวกสบาย	1
4. hotel condition/cleanliness	ไม่ใหม่มาก	1
4. hotel condition/cleanliness	วกวน	1
4. hotel condition/cleanliness	รกมาก	1
4. hotel condition/cleanliness	สระว่ายน้ำน่าจะใหญ่	1
4. hotel condition/cleanliness	ลำบาก	1
4. hotel condition/cleanliness	วิวสวย	1
4. hotel condition/cleanliness	ไม่เห็นวิว	1
4. hotel condition/cleanliness	ค่อนข้างน้อย	1
4. hotel condition/cleanliness	ไม่ติดทะเล	1
4. hotel condition/cleanliness	ไม่พอ	1
4. hotel condition/cleanliness	กำลังก่อสร้าง	1
4. hotel condition/cleanliness	ขนาดเล็ก	1
4. hotel condition/cleanliness	ควรปรับปรุง	1
4. hotel condition/cleanliness	ดี	1
4. hotel condition/cleanliness	ต้องจอดริมถนน	1
4. hotel condition/cleanliness	โทรม	1
4. hotel condition/cleanliness	น้ำเหม็นกลิ่นเหล็ก	1
4. hotel condition/cleanliness	ปรับปรุง	1
4. hotel condition/cleanliness	ป้ายเล็ก	1
4. hotel condition/cleanliness	ผิดหวัง	1
4. hotel condition/cleanliness	ไม่กว้าง	1
4. hotel condition/cleanliness	ขาดการดูแล	1
4. hotel condition/cleanliness	ฝุ่นเยอะ	1
4. hotel condition/cleanliness	ไม่เด่น	1
4. hotel condition/cleanliness	ไม่ค่อยปลอดภัย	1
4. hotel condition/cleanliness	ไม่กี่คัน	1
4. hotel condition/cleanliness	ไม่โปร่ง	1
4. hotel condition/cleanliness	ไม่ OK	1
4. hotel condition/cleanliness	มืดและอับ	1
4. hotel condition/cleanliness	มีเสียงรบกวน	1

Table A.4 Negative Polar word by Agoda Feature (Cont.)

Agoda Feature	Negative Polar word	Frequently
4. hotel condition/cleanliness	มีเสียงดัง	1
4. hotel condition/cleanliness	มียุง	1
4. hotel condition/cleanliness	มีกลิ่นเหม็น	1
4. hotel condition/cleanliness	มีกลิ่นสี	1
5. room comfort/standard	เก่า	100
5. room comfort/standard	เล็ก	46
5. room comfort/standard	สกปรก	30
5. room comfort/standard	มีกลิ่น	23
5. room comfort/standard	ไม่ฟรี	21
5. room comfort/standard	เสียงดัง	19
5. room comfort/standard	ไม่สะอาด	18
5. room comfort/standard	แคบ	13
5. room comfort/standard	ช้า	10
5. room comfort/standard	ไม่เย็น	10
5. room comfort/standard	น้อย	7
5. room comfort/standard	ยุงเยอะ	6
5. room comfort/standard	เสีย	5
5. room comfort/standard	มืด	5
5. room comfort/standard	มีกลิ่นอับ	5
5. room comfort/standard	ไม่มี	5
5. room comfort/standard	ไม่สะดวก	4
5. room comfort/standard	แย่	4
5. room comfort/standard	ไม่ค่อยสะอาด	4
5. room comfort/standard	ไม่ครบ	3
5. room comfort/standard	ไม่เก็บเสียง	3
5. room comfort/standard	แพง	3
5. room comfort/standard	ควรปรับปรุง	3
5. room comfort/standard	ธรรมดา	3
5. room comfort/standard	ใช้ไม่ได้	3
5. room comfort/standard	ดัง	2
5. room comfort/standard	ไม่มีที่ฉีดน้ำล้างก้น	2
5. room comfort/standard	มีเสียงรบกวน	2
5. room comfort/standard	มีเสียงดัง	2
5. room comfort/standard	แออัด	2
5. room comfort/standard	ไม่มีสายชำระ	2
5. room comfort/standard	แอร์ไม่เย็น	2

Table A.4 Negative Polar word by Agoda Feature (Cont.)

Agoda Feature	Negative Polar word	Frequently
5. room comfort/standard	มีกลิ่นเหม็น	2
5. room comfort/standard	ไม่ได้ทำความสะอาด	2
5. room comfort/standard	มีกลิ่นบุหรี่	2
5. room comfort/standard	เหม็น	2
5. room comfort/standard	เสียงรบกวน	2
5. room comfort/standard	ฝุ่นเยอะ	2
5. room comfort/standard	ยุบ	1
5. room comfort/standard	ไม่พอ	1
5. room comfort/standard	ไม่เพียงพอ	1
5. room comfort/standard	กลิ่นบุหรี่	1
5. room comfort/standard	กลิ่นเหม็นอับ	1
5. room comfort/standard	เก็บเสียงไม่ได้	1
5. room comfort/standard	แคบไป	1
5. room comfort/standard	ไม่มี internet ฟรี	1
5. room comfort/standard	ไม่มีconnecting room	1
5. room comfort/standard	ไม่มีคุณภาพ	1
5. room comfort/standard	เกรดต่ำ	1
5. room comfort/standard	ไม่มีฝักบัวชำระ	1
5. room comfort/standard	ไม่ส่วนตัว	1
5. room comfort/standard	ไม่มีสัญญาณ	1
5. room comfort/standard	ไกล	1
5. room comfort/standard	ของไม่พร้อม	1
5. room comfort/standard	ระบายไม่ทัน	1
5. room comfort/standard	แข็ง	1
5. room comfort/standard	ไม่พร้อม	1
5. room comfort/standard	ไม่ไหล	1
5. room comfort/standard	ไม่ใหม่	1
5. room comfort/standard	สะอาด	1
5. room comfort/standard	ไม่สามารถเปิดห้อง	1
5. room comfort/standard	ไม่สามารถย้ายได้	1
5. room comfort/standard	เย็นมาก	1
5. room comfort/standard	น้ำไหลออกนอกห้อง	1
5. room comfort/standard	ต้องปรับปรุง	1
5. room comfort/standard	พอได้	1
5. room comfort/standard	ฝุ่น	1
5. room comfort/standard	เปียก	1

Table A.4 Negative Polar word by Agoda Feature (Cont.)

Agoda Feature	Negative Polar word	Frequently
5. room comfort/standard	เป็นสนิม	1
5. room comfort/standard	ปรับปรุงเรื่องแมลงสาบ	1
5. room comfort/standard	ไม่ดี	1
5. room comfort/standard	น้ำแอร์หยด	1
5. room comfort/standard	ตกแต่งไม่สวย	1
5. room comfort/standard	น้ำหยุดไหล	1
5. room comfort/standard	น้ำล้น	1
5. room comfort/standard	น้ำรั่ว	1
5. room comfort/standard	น้ำไม่แรง	1
5. room comfort/standard	น่าจะมีบริการอินเตอร์เน็ตฟรี	1
5. room comfort/standard	น่าจะฟรี	1
5. room comfort/standard	ปรับปรุง	1
5. room comfort/standard	เดินไกล	1
5. room comfort/standard	ไม่ได้ใหญ่	1
5. room comfort/standard	คับแคบ	1
5. room comfort/standard	ไม่ชัด	1
5. room comfort/standard	ไม่ค่อยสบาย	1
5. room comfort/standard	ไม่ค่อยเย็น	1
5. room comfort/standard	ไม่ค่อยดี	1
5. room comfort/standard	ต้องจ่าย	1
5. room comfort/standard	ดี	1
5. room comfort/standard	มีกลิ่นสี	1
5. room comfort/standard	เดียวร้อนเดียวเย็น	1
5. room comfort/standard	มีเสียงรถยนต์	1
5. room comfort/standard	มียุงเยอะ	1
5. room comfort/standard	มียุง	1
5. room comfort/standard	มีไม่พร้อม	1
5. room comfort/standard	มีฝุ่นเยอะ	1
5. room comfort/standard	ไม่ประทับใจ	1
5. room comfort/standard	ไม่ค่อยเก็บเสียง	1
5. room comfort/standard	เหม็นบุหรี่	1
5. room comfort/standard	รั่ว	1
5. room comfort/standard	แอร์เสียงดัง	1
5. room comfort/standard	แอร์เย็นน้อย	1
5. room comfort/standard	อุปกรณ์เสีย	1
5. room comfort/standard	เหม็นอับ	1

Table A.4 Negative Polar word by Agoda Feature (Cont.)

Agoda Feature	Negative Polar word	Frequently
5. room comfort/standard	ห่วย	1
5. room comfort/standard	เสียเงินเพิ่ม	1
5. room comfort/standard	เสียงน้ำจากห้องน้ำดัง	1
5. room comfort/standard	สัญญาณอ่อน	1
5. room comfort/standard	สะอาดน้อยลง	1
5. room comfort/standard	สบาย	1
5. room comfort/standard	สะดุดหกล้มได้	1
5. room comfort/standard	อยากให้มี	1
6. food/dining	น้อย	39
6. food/dining	ไม่อร่อย	19
6. food/dining	ไม่หลากหลาย	15
6. food/dining	แพง	7
6. food/dining	ธรรมดา	7
6. food/dining	มีให้เลือกน้อย	3
6. food/dining	แย่	3
6. food/dining	ปรับปรุง	3
6. food/dining	ไม่มี	3
6. food/dining	ไม่ค่อยหลากหลาย	2
6. food/dining	คับแคบ	2
6. food/dining	คนเยอะ	2
6. food/dining	แพงมาก	2
6. food/dining	ไม่ประทับใจ	1
6. food/dining	รสชาติกลางๆ	1
6. food/dining	รสชาติควรปรับปรุง	1
6. food/dining	อร่อย	1
6. food/dining	รสชาติจืด	1
6. food/dining	รสชาติพอใช้ได้	1
6. food/dining	รสชาติไม่ถูกปาก	1
6. food/dining	ราคาสูง	1
6. food/dining	เลือกทานน้อย	1
6. food/dining	เลือกน้อย	1
6. food/dining	สกปรก	1
6. food/dining	เสียงดัง	1
6. food/dining	หลากหลาย	1
6. food/dining	ไม่ถูกปากคนไทย	1
6. food/dining	เหมือนเดิม	1

Table A.4 Negative Polar word by Agoda Feature (Cont.)

Agoda Feature	Negative Polar word	Frequently
6. food/dining	อันตราย	1
6. food/dining	เหมือนกันทุกวัน	1
6. food/dining	ต้องปรับปรุง	1
6. food/dining	แออัด	1
6. food/dining	กลางๆ	1
6. food/dining	เก็บเร็ว	1
6. food/dining	คนทานแน่น	1
6. food/dining	ควรปรับ	1
6. food/dining	คิวยาว	1
6. food/dining	คุณภาพต่ำ	1
6. food/dining	จืด	1
6. food/dining	เติมช้า	1
6. food/dining	ใช้ได้	1
6. food/dining	ไม่ถูกปาก	1
6. food/dining	ปรับปรุงรสชาติ	1
6. food/dining	ปานกลาง	1
6. food/dining	ผิดหวัง	1
6. food/dining	พอประมาณ	1
6. food/dining	มีเลือกน้อย	1
6. food/dining	ไม่ค่อยสด	1
6. food/dining	ไม่ค่อยอร่อย	1
6. food/dining	ไม่ดี	1
6. food/dining	ไม่ได้เรื่อง	1
6. food/dining	ช้า	1

APPENDIX B

Publication

A Lexiconizing Framework of Feature-based Opinion Mining in Tourism Industry

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Abstract— **Among of the travel agency business in Thailand, Agoda (www.agoda.com) has boomed in recent years with the number of online agents offering for hotels booking. When customers need to make decision, they typically explore by investigating the opinions attached with each hotel in online agent. This paper proposes a framework of feature-based opinion mining by using scores which essentially relies on the usage of two main lexiconizing levels, features and polar words. An approach for extracting features and polar words from textual opinion is based on syntactic pattern analysis. The evaluation is performed with existing opinions and compared the statistical resulted scores with the existing scores of each hotel. The proposed scoring method is proven for the effectiveness of the score from Agoda and could facilitate the further text retrieval application development for the benefit of automatic customer's opinion detection.**

Keywords— **Opinion Mining; Lexiconizing; Travel Agency; Text Mining; Hotel Agency.**

I. INTRODUCTION

The tourism industry is important in the world since the tourism industry is responsible for the economic and social growth. The rising of the Web 2.0, a great number of travellers generate reviews, comments and opinions about their travelling experiences. This communication channel is increasing based on a number of customer using the reviews, comment and opinion and score in each feature to make better decision. Especially for hotel agent booking process, a lot of users usually survey the opinions of the previous traveller before making a decision in hotel booking.

Latterly, the web Agoda has been the most popular hotel agency because it stores and presents a scoring, rating and opining of previous travellers. Typically, when a customer needs to choose a hotel, they will find the general published opinions according to the products and service of their interested. For this reason, Agoda conducts to the research and surveys. Agoda is important the growth in economic and social of Thailand, especially by the explosive growth of the generated opinions the web users. Normally, Agoda separates users into two types: travellers and hotels. Firstly, a traveller reviews the efficiency of hotels by reading the opinion of the previous travellers and reserves the chosen hotel via Agoda directly. Secondly, a hotel achieves benefit from score and opinion. Thus, Agoda has no necessary to conduct surveys, to organize focused group, or to employ external consultants in order to find consumer opinions or sentiments about its products and those of its competitors. Consequently, an automatic system which can extract and retrieve the opinion related to their interest might be essential.

Opinion mining, an application in the field of text mining, provides some methodologies for rule and knowledge discovering from textual data. One related task of the opinion mining is to classify the opinions in different scales. In a number of cases, the purpose is to identify opinions in a text and classify them into positive, negative classes [1]. In other occasions, the goal is not to assign different rates e.g. ''worth'', ''dirty'', ''very poor'', ''good'', ''very good'', or ''pretty''. The sentiments just use the ''positive'' or ''negative'' labelling [2].

In this paper, we propose a framework for constructing of feature-based opinion mining in Thai language. It essentially relies on the use of two main lexicons, features and polar words. For clarification, the term "features" means the categories of opinion, which were pre-classified into six groups. The term "polar words" means the lexicons which can identify the feature such as good, bad, expensive, etc. Our approach for extracting them from opinion text is based on syntactic pattern analysis [3] and calculating the scores. Our proposed scoring method is based on lexiconizing analysis and selects the top five ranking of polar words. The evaluation is performed and compared with scores of case study on hotel opinions.

The remainder of the paper is organized as follows: The next section reviews the existing literature in the feature-based opinion mining in the tourism industry, Thai word tokenization and the polar ranking method. Section three introduces the architectural framework of Feature-based Opinion mining and methodology to calculate statistical analysis the feature-based and polar words score. Section four presents the experimental results and discussion of technical issues. Finally, we conclude the paper and suggest some directions for future research.

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II. RELATED WORKS

In this section, we discuss related works and theories in opinion mining. Opinion mining (also known as sentiment analysis) aims to assist users to automatically detect relevant opinions within a large volume of opinions collection and create a coherent overview of them. Reviewed comments are usually classified into two categories of opinions: positive and negative. Several approaches were proposed for the overall of opinion information that concentrates in document or sentence level of commendation. A positive comment on an object does not always mean to the positive opinion of all aspects or features of the object. A feature-level opinion mining has been proposed to extend on studying the detail of product review based on aspects or features of the object.

A. Feature-based Opinion Mining in Tourism Industry

According to feature-based method of Liu [4], the customer opinions mean to the customer ratings about the hotels. Customer rating is information that is useful for customer opinion analysis. Normally, the customer opinion is free-text that can use to be informative more than the rating and scoring. That means the free-text of customers provide concrete and descriptive information of their opinions. However, the free-text of customer comment needs the manual analysis. This problem is solved by using opinion mining technique of Wu [5] that proposed the customer opinion extracting approach.

B. Thai Words Tokenization

Typically, Thai words do not use spaces for a segmentation of word, which is usually implemented by seeing if a word can be subdivided into multiple words that appear in a vocabulary list. LexToPlus [6] was designed to handle the intentional errors caused by the repeated characters at the end of words. It is a dictionary-based parser which detects existing terms in a dictionary. Unknown tokens with repeated characters are merged and removed. It performed statistical analysis and evaluated the performance of the proposed approach by using a Twitter corpus. The experimental results show that the proposed algorithm yields an accuracy of 96.3% on a test data set.

LexToPlus selects an appropriate approach for tokenizing and normalizing social media texts, it first performs a comparison between two approaches, dictionary-based (DCB) and machine learning based (MLB) [7]. For machine learning based approach, that adopts the conditional random fields (CRFs) algorithm [8] to train the tokenization model. The dictionary-based approach is a lexicon-based parser which solves the ambiguity with a longest matching heuristic.

The DCB approach can correctly tokenize all the terms which are included in the dictionary. The repeated word-ending characters are merged into a chunk. The DCB-Norm algorithm is shown in Figure 1. The algorithm performs text parsing with longest matching strategy (*LM_PARSE*). The strategy is used to solve the ambiguity problem in which there are more than one possible path to select in the parsing tree. The *LM_PARSE* uses the heuristic such that longer terms contain better semantic than shorter terms.

```
Algorithm: DCB-Norm (input_text)
1 Input: A set of N terms, T, from dictionary
2 Output: tokenized_text
3 load T into TRIE data structure
4 while (not end of string)
5     token, token_type ← LM_PARSE (input_text, TRIE)
6     if (token_type equal to unknown)
7         if (token not equal repeated characters)
8             merge unknown token into chunk
9             append (chunk +|) to tokenized_text
10    else
11        append (token +|) to tokenized_text
12 return tokenized_text
Note:|denotes a word boundary maker
```

Fig. 1. DCB-Norm algorithm.

C. Scoring system in Agoda

Agoda is an online hotel reservation and booking website that popular in current. The Agoda supports 37 languages that widely used in the world. Moreover, it collects more than 250,000 hotels around the 37,000 cities worldwide to be significant information for customers booking. Agoda website welcome to keep a customer feedback that review affiliated hotels.

The Agoda achieves customer opinions when they finish their trip. Generally a customer opinion will accord to Location, Cleanness, Service, Staff performance, Food and Comfort. The hotel scores are calculated from rating of customer that review according to the hotel. The top-rank hotel in 2017 of Agoda website achieved from the summation of the whole customer rating on a particular hotel divided the number of reviews that get the hotel ranking.

III. METHODOLOGY

In this section, we give a methodology of feature-based opinion mining. Our methodology is carried out using data collected from Agoda (www.agoda.com). This Website agent hotel collects the information from cities across the world. To analyse and compare customer opinions from different aspects, hotel managers and tourism industry usually need to classify customer opinions into different categories (or features) such as service, place, and cleanliness [9, 10]. For our experiment, we collect an opinion feedback of normally customers. A customer will give a number of ratings (1 is lowest, 10 is highest) that is the satisfactory scoring of customer with hotel. Moreover, we will also keep a textual opinion of customers to comparative analysis with previous score ratings in different features of hotels (e.g., value, service, rooms).

The favourite tourism industry cities of Thailand: Bangkok, Chiang Mai and Phuket. For customer opinion, we collected overall ratings, textual opinions, and score ratings for six features: value for money, location, staff performance, hotel condition/cleanliness, room comfort/standard and food/dining. The significance of a feature was rated by users scoring that

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comment in each feature. Table 1 shows the summarized of the dataset that is used in our experiment [11]. It consists of a number of Hotel, Opinion and Opinion with feature score of each Location. The number of opinions in each hotel of this dataset was considered to be enough for evaluation of the significance of our experiment because it covers all the necessary features [12].

TABLE I
Summary of The Dataset

Location	# Hotels	# Opinion	# Opinion with feature score
Bangkok	10	784	6537.2
Chiang Mai	10	1031	8511.8
Phuket	10	365	2987.6

Thus, we use a feature-based opinion mining method to extract opinions from the customer opinions and calculating the new scores. The method works as follows as Figure 2 [13]. First, opinion corpus has to pre-process by dividing its information into segments. Each segment is a part of the sentence that gives the opinion of the hotel. Associated information that can be used as feature will be extracted to tag based on lexicon types. The whole steps of pre-processing are supported by LexToPus.

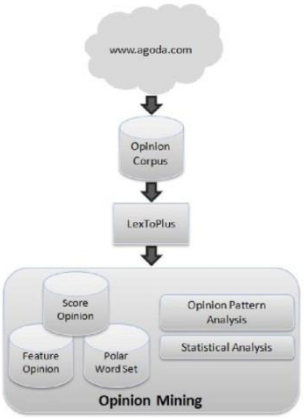

Fig. 2. The lexiconizing framework of feature-based opinion mining.

Next, the result of the pre-processing step is a pattern of the segment that contains both features and polar words. A feature is information that associated with the given domain. For instance, the features of the hotel domain could be, for instance, “price”, “location” and “service”. Another domain-dependent lexicon is polar words. In this phase, we define a sentiment keyword dictionary with “positive” and “negative” which are adjective words of customer sentiment. In the opinion mining process, we focus on six features that Agoda used to describe the hotels (i.e. value for money, location, staff performance, hotel condition/cleanliness, room comfort/standard, food/dining). In real dialog, customers use the specific word to describe its feature. Moreover, the feature can be able to detect a set of associated words which use to define and utilize a feature-entity mapping scheme. Feature entity mapping scheme maps a set of words to a given feature. Previously we discuss about the assets of feature, later we describe another argument “Polar word”. Polar words are sentiment words that represent either positive or negative for viewing on features. Some polar words are used to be domain-independent that is explicit meanings such as "excellent”, “beautiful”, “clean” and “expensive”. For example, the word “quiet” is generally considered to be positive for the "room comfort" feature. On the other hand, the dimension feature of "location" feature, the word “quiet” might be considered as negative, because it means to uncomfortable for shopping, food/cloth, etc. All polar words that indicated by positive and negative will be mapped with a score of customers based on different features. The score of polar words is used in statistical analysis for the feature-based opinion mining. The goal in this statistical step is to classify as much opinions as possible that remains form the previous step. Finally, the opinion information of the statistical is aggregated opinion about the hotel. Our approach different with others in sum up of the opinion scores of different features, we build our combination strategy on subjective logic.

IV. EXPERIMENTAL RESULTS

The feature from Agoda and polar words from proposed scoring flow are shown in Figure 3. It includes all synonyms which could be used to describe in Thai. We denote the positive and negative polar words by placing [+] and [-] after each word. It can be observed that some polar words are dependent on the main-features. For example, the polar word “close to shopping" can only be used for the main-feature “location” which is the process to identify scores of polar words in feature-based opinion mining. We evaluate polar words score by using score of Agoda and identify score every polar words in both positive polar and negative polar. Consequently, we use statistical analysis for ranking of polar words the high score on every feature. The top 5 polar words core in both positive polar words and negative polar words are shown in Table 2 and 3.

Lexicons	Examples
Features	Value for Money, Location, Staff Performance, Hotel Condition/Cleanliness, Room Comfort/Standard, Food/Dining
Polar words	ดี(good)[+], สะดวก(comfort)[+], ใกล้แหล่งชื้อปปิ้ง(close to shopping)[+],สวย(pretty)[+], สะอาด(clean)[+], เก่า(old)[-], ลำบาก(difficult)[-], สกปรก(dirty)[-], แพง(expensive)[-], เสียงดัง (noise)[-], รถติด(traffic jam)[-]

Fig. 3. Example main feature and polar words.

We then calculate statistics analysis the feature-based and polar words score from Agoda every 30 hotels of 3 cities. The

results of polar word compare between real Agoda score and proposed score every Agoda feature as shown in Fig. 4 and 5 which are shown with a little difference.

TABLE II
Positive polar words (Top 5)

Agoda Features	Positive Polar Words
1. value for money	worth, inexpensive, appropriate, cheap, reasonably
2. location	comfort, close to shopping place, downtown, near the city, convenient
3. staff performance	good, smiling, very good, friendly
4. hotel condition/cleanliness	good, pretty, clean, convenient, beautiful
5. room comfort/standard	clean, good, extensive, fully, pretty
6. food/dining	delicious, diverse, good, many

TABLE III
Negative polar words (Top 5)

Agoda Feature	Negative Polar Words
1. value for money	expensive, high, not worth
2. location	difficult, traffic jam, far, no sea, no beach
3. staff performance	slow, poor, long, little, not impressed
4. hotel condition/cleanliness	old, little, restrictive, noise, small
5. room comfort/standard	old, small, dirty, not free, smells
6. food/dining	little, unpalatable, variety, common, expensive

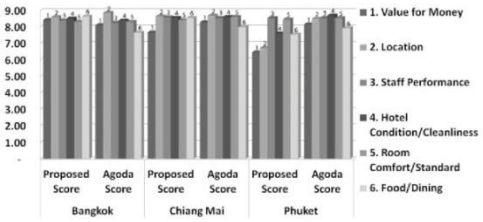

Fig. 4. Comparative scores by feature.

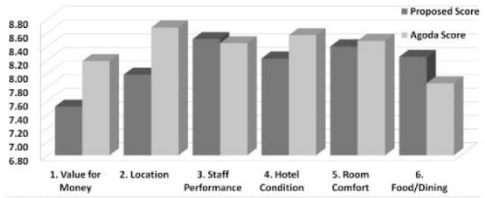

Fig. 5. Comparative scores between proposed score and Agoda score.

The percentage score difference between proposed score and Agoda Score are around 0.06% to 0.69%, as shown in Table 4. This difference comes from the frequency of a number of opinions.

TABLE IV
Percent of score difference between proposed score and Agoda score.

Agoda Feature	Difference
1. Value for Money	-0.67%
2. Location	-0.69%
3. Staff Performance	0.06%
4. Hotel Condition/Cleanliness	-0.34%
5. Room Comfort/Standard	-0.08%
6. Food/Dining	0.39%

V. CONCLUSION

In this paper, we have proposed a scoring method based on the polar lexiconizing framework of feature-based opinion mining in the tourism industry. The experiments on the Agoda dataset seem to indicate the polar words for customer use make a decision. We proposed an approach for opinion evaluation based on data set that is collected from Agoda. The outcome of our approach is scores that indicate to real opinion of customers. Scoring is estimated by polar words rating that is proposed approach to maintain the textual of opinion customer. Evaluated results show the acceptable performance that suitable to apply in real life.

Our approach works very well when a number of the best polar words sufficient for each feature. The sufficient number of customers might not be case for overall hotels. So, some hotel might not have a feature enough to distinguishable the polar easily. For example, the Agoda feature "Staff Performance" and polar words "smiling" are often both mentioned in many opinions Fig. 4. For example, the Agoda feature "Staff Performance" and polar words "smiling" are often both mentioned in many opinions because one important aspect of service is their smiling. This is a major advantage of a solution, because the polar words can detect the opinion by feature-based, which the method can plug-in text retrieval application development for automatic customer's opinion classification and detection. For future works, we may make use of this lexiconizing-based opinion mining in other domains. Moreover and technically, we plan to apply

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lexical semantics to enhance the more accurate opinion mining and scoring system.

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