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# Tweet of the Town: A case study of Thailand

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Copyright 2015 © ACM 978-1-4503-3575-1/15/09...\$15.00.  
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## **Abstract**

In this work, we developed a system that allows a user to search and observe the geographic distribution of different Tweet hashtags, namely *Tweet-of-the-Map*. The system also allows the user to export the searched results along with snapshots of their geographic distribution for further analysis. Our first developed prototype covers the entire area of Thailand which is divided into six geographic regions; north, northeastern, central, eastern, western, and southern regions. Twitter API was utilized to harvest Twitter hashtags of the previous seven days. The system provides a graphic information to display the amount of hashtags tweeted (used) in each of the six different regions of Thailand on a map as well as a bar chart system allows three different Hashtags to be searched and displayed simultaneously. The system can be used in many domains, for example, it can be used as a rating system for products or services, it can be used as a recommendation system, and it can also be used for social science research and related fields.

## **Author Keywords**

Twitter, Hashtag, Tweets, Visualization and Map

## **ACM Classification Keywords**

H.5.m. Information interfaces and presentation (e.g., HCI)

## 1 Introduction

Twitter is a microblogging and popular online social network service. It allows the user to send short messages about 140 characters per one send (aka. tweet) and read other messages of following people on newsfeed. People like to share opinions, feeling, complaints for something they encounter on daily basis.

Hashtag is a keyword or common topic with a specific content. User can create a hashtag by placing hash symbol (#) in front of a word such as #Thailand or #Ubicomp2015 or #purba2015. We can do search for particular hashtag on Twitter. For example, if we search for #FastFurious7, then we will get a list of people who are talking (tweeting) about the movie "Fast and Furious 7".

Tweet can also be geotagged so the location information (latitude, longitude) is attached to the geotagged tweet. Here it becomes interesting that these streams of geotagged tweets carry two important contextual information i.e., topic of interest and place where the topic is mentioned. So, we were inspired by this available geotagged data, and interested in seeing this information displayed on the map and believed that this information, statistically and graphically, as a tool, can be very useful for researchers, especially those in non-technical disciplines such as social science and humanity, can use this tool for their preliminary observation for further urban or regional behavior studies or formulating interesting research questions after perhaps observing emerging trends or patterns.

We in this work, we developed a tool that allows the user to observe the geographical distribution of the amount of geotagged tweets on particular topic specified via hashtag. Based on the twitter community, it gives us the sense of; which parts of the country is talking about this particular topic?, and how does it compare with the other parts of the country?

It's like a rating system in a way that it senses the interest of people on a particular brand of product or

service. Thailand is used as a case study for our prototype system development. The user is allowed to search with any keyword of interest, compare different searched keywords, observe the geographical distributions, and export statistical information including displayed graphics.

## 2 Related Work

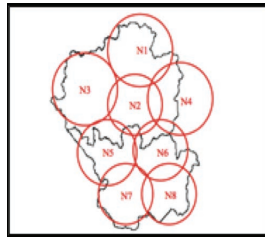
Our work has been inspired by a number of interesting projects, such as *TwitInfo*, *TWEETVIZ*, *TwitterReporter*, and *VacationFinder*. *TwitInfo* [1] is a system that allows users to browse tweets using a timeline-based display that highlights peaks of high tweet activity. *TWEETVIZ* [2] is a web tool for visualizing Twitter data that provides hashtag temporal distribution. *TwitterReporter* [3] is a method for identifying breaking news topics, and displaying results in a geo-temporal visualization. *VacationFinder* [4] is recommendation system that helps the user by suggesting places they should spend their holidays and weekends, based on Twitter data. In contrast with these mentioned projects, our system allows the user to search on a keyword or hashtag and displays geographical distribution along with statistical information on graphs, as well as allows the user to export the results for further analysis.

## 3 Tweet-of-the-Town Map

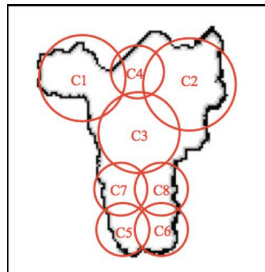
Tweet-of-the-Town Map consists of three parts: data acquisition, data visualization, and data export. The core system was developed using Processing Development Environment (PDE). Processing is a programming language built on Java, suitable for visual and interactive applications, and hence our main system engine was built with it.

### 3.1 Data Acquisition

The Twitter API was utilized to connect and acquire searched hashtag keywords from the Twitter data repository to our system's database. Twitter allows its data be harvested only for the previous seven days (from the date of query submission). Twitter API is



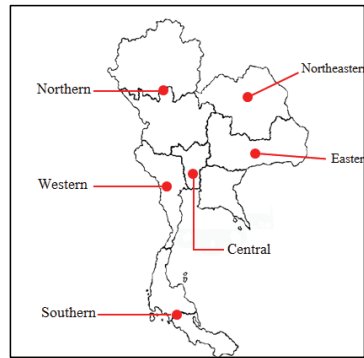
**Figure 2:** Center locations for the northern region.



**Figure 3:** Center locations for the central region.

connected through our separated PHP program that is called by our Processing main engine. In our system makes a query of searched keyword via Twitter API along with a (center) location (latitude, longitude) and a radius (km), then a list of tweets with searched keyword within the radius from the center location is returned for our further visualization.

As Thailand is our case study, the area of the country was divided into six regions; northern, northeastern, central, eastern, western and southern, as shown in Fig. 1.



**Figure 1:** Six geographic parts of collect.

Each region was further divided into eight sectors where each sector was used as the center location for search keyword query. Each center location has its own value of radius, which is different from other locations according to the country's population density. The center locations and corresponding radius values for northern, central, northeastern, eastern, western, and southern regions are shown and listed on Fig. 2 and

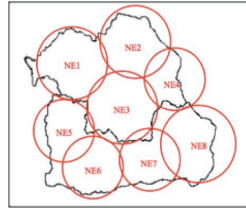
Table 1, Fig. 3 and Table 2, Fig. 4 and Table 3, Fig. 5 and Table 4, Fig. 6 and Table 5, and Fig. 7 and Table 6, respectively.

No.	Latitude/Longitude	Radius(km)
N1	19.781425,99.825575	77
N2	18.817127,99.633314	130
N3	18.869114,98.106215	160
N4	18.973041,101.143934	180
N5	17.145241,98.369886	200
N6	17.124244,100.259535	100
N7	16.229696,100.523207	89
N8	15.669839,99.232313	100

**Table 1:** Radius values for northern region.

No.	Latitude/Longitude	Radius(km)
C1	15.077034,100.038838	45
C2	14.838218,100.989155	78
C3	14.588505,100.450825	50
C4	14.672276,100.636848	21
C5	13.465470,100.072289	42
C6	13.536243,100.750695	42
C7	14.013739,100.179406	42
C8	14.085679,100.800133	42

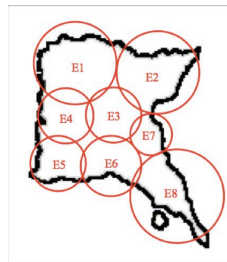
**Table 2:** Radius values for central region.



**Figure 4:** Center locations for the northeastern region.

No.	Latitude/Longitude	Radius(km)
NE1	17.328953,101.690190	120
NE2	18.134704,103.415043	145
NE3	16.351053,103.299687	145
NE4	16.861664,104.705937	72
NE5	15.803692,101.807637	92
NE6	14.530021,102.417378	165
NE7	14.423646,104.054341	132
NE8	15.315583,105.295796	126

**Table 3:** Radius values for northeastern region.



**Figure 5:** Center locations for the eastern region.

No.	Latitude/Longitude	Radius(km)
E1	13.905239,101.377925	82
E2	13.727390,102.239955	82
E3	13.337523,101.734584	70
E4	13.166423,101.256679	70
E5	12.781012,101.152308	70
E6	12.807796,101.657679	82
E7	12.868548,102.334188	45
E8	12.527130,102.404886	96

**Table 4:** Radius values for eastern region.

No.	Latitude/Longitude	Radius(km)
W1	15.081040,98.732353	60
W2	15.006771,99.155327	48
W3	14.337206,98.633476	52
W4	14.173949,99.474247	80
W5	13.163368,99.589287	66
W6	12.558215,99.644218	44
W7	11.989251,99.734856	44
W8	11.370621,99.476677	55

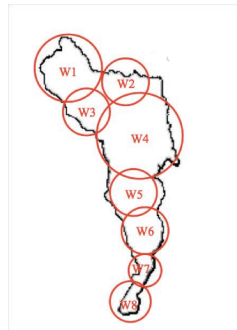
**Table 5:** Radius values for western region.

No.	Latitude/Longitude	Radius(km)
S1	10.043607,98.848617	150
S2	8.981768,98.447616	167
S3	8.047368,99.139755	73
S4	8.580039,99.936263	97
S5	7.511281,100.176201	130
S6	6.734544,100.639389	78
S7	5.921056,101.759994	99
S8	6.835464,99.725762	80

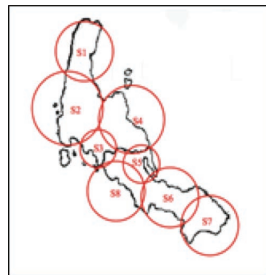
**Table 6:** Radius values for eastern region.

### 3.2 Data Visualization

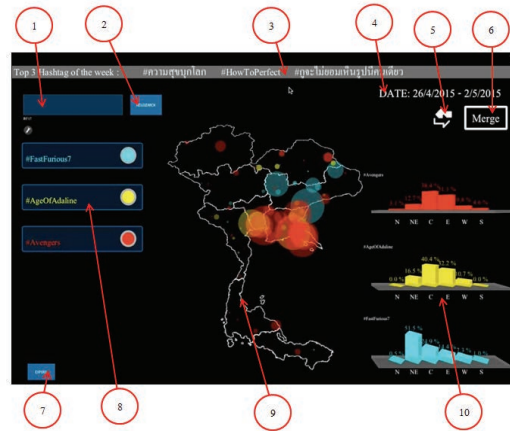
Once the searched keyword results are retrieved in our system, they are processed and displayed on the user interface (developed with PDE). A snapshot of our developed user interface is shown in Fig. 8.



**Figure 6:** Center locations for the western region.



**Figure 7:** Center locations for the southern region.



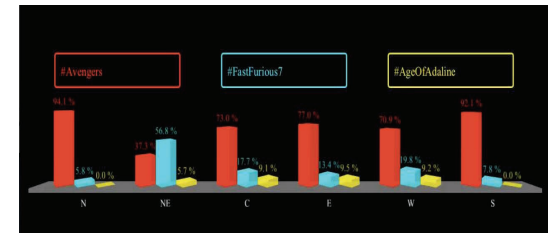
**Figure 8:** System user interface

### 3.2.1 Interface and Features

Here are descriptions of our user interface (Fig. 8):

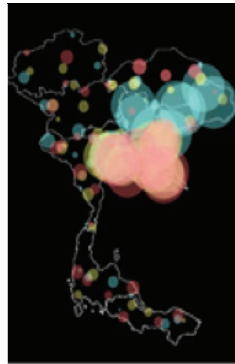
- (1) *Search field*: the user enters keyword search here from the keyboard.
- (2) *Search button*: the user confirms their searched keyword by clicking on this button.
- (3) *Top hashtags scrolling headline*: the system displays a scrolling headline with top three hashtags of the week. If the user clicks on any of these top hashtags in the headline, then the clicked hashtag will become the user's searched keyword. So with this feature, the user gets to know what the current top "tweets of the town" are, if the user is interested in seeing their geographical distribution, the user can do so by selecting these top keywords for our system to process. The top hashtags information is obtained from Thailand Trending (<http://www.lab.in.th/thaitrend/>).

- (4) *Date*: the system displays the dates of coverage i.e., recent seven days.
- (5) *Map display option*: If the user clicks on the Map display option button, then the dynamic map (Fig. 10) will switch to static map (Fig. 11) and vice versa.
- (6) *Merge button*: the user can merge bar charts displayed on the right-hand side of the screen into one bar chart for comparison (Fig. 9) by clicking the Merge button. Merged car charts will be displayed in the middle of the screen.



**Figure 9:** Merged bar charts.

- (7) *Export button*: the user can export the results as a CSV file or image file or both (explained in Section 3.3).
- (8) *List of searched keywords*: up to three keywords can be searched with results displayed simultaneously. The user can select to show the results of particular keywords, and delete or replace displayed keyword with new searched keyword from this list by clicking the color circle button on the right of the keyword.
- (9) *Map area*: geographical distribution of search keywords is displayed in this area on the map. The default display is dynamic map (Fig. 10) where the size of the circle corresponds to the density. By



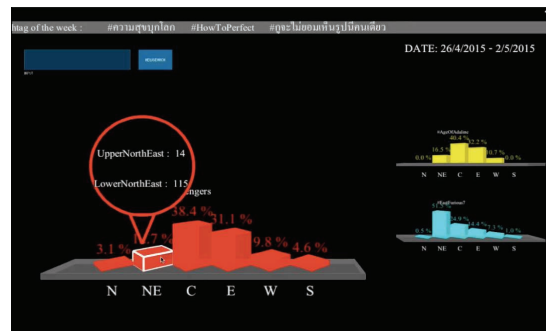
**Figure 10:** Dynamic map displays density of searched keywords with color circles.



**Figure 11:** Static Map displays density of searched keywords with color intensity.

clicking Map display option (5), the user can change the default dynamic map to a static map (Fig. 11) where the distribution of the searched keywords is represented by the color intensity in different divided regions.

- (10) *Bar chart area:* percentages of keyword distributions are showed with bar charts. The user can click on each bar chart to zoom in, and examine the actual number of keyword tweeted in different regions by pointing the mouse on the specified region on the bar chart (as shown in Fig. 12).



**Figure 12:** Zoom-in bar chart with

### 3.3 Data Export

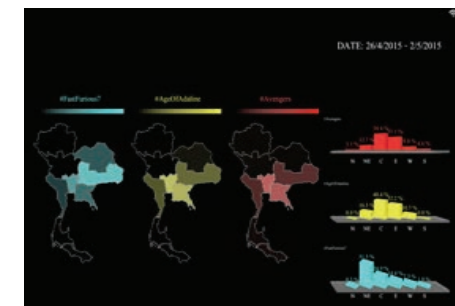
The users of our system can be researchers who may be interested in using the results displayed in our system for their further studies, thus our system also allows the user to export the resulting data, both as CSV file that contains statistical information such as numbers of searched keywords in different regions along with calculated percentages (an example CSV file is shown in Fig. 13), as well as image files i.e., a snapshot of the user interface that includes distribution map and bar charts (an example image file is shown in Fig. 14). As there are two map display options, the user

can choose to export either or both map options as JPG files. An example of exported image with the dynamic map option is shown in Fig. 15.

When using export function, the system will create and save the exported files and images to the folder "dataExportFile" in the same directory where the system application is installed. In the folder, the CSV file will be saved in the "dataExportFile/Data" directory while the image files will be saved in the "dataExportFile/Picture" directory.

Date:	26/4/2015-2/5/2015									
Total	UpperNorth	LowerNorth	UpperNorthEast	LowerNorthEast	Central	Bangkok	East	West	UpperSouth	LowerSouth
FastFurious?	0	2	43	153	0	95	55	28	0	4
AgeOfAdalin	0	0	3	17	0	49	39	13	0	0
Avengers	15	17	14	115	7	383	316	100	22	25
Percentage	UpperNorth	LowerNorth	UpperNorthEast	LowerNorthEast	Central	Bangkok	East	West	UpperSouth	LowerSouth
FastFurious?	0.00%	0.32%	11.31%	40.28%	0.00%	25.00%	14.47%	7.36%	0.00%	1.85%
AgeOfAdalin	0.00%	0.00%	2.47%	14.04%	0.00%	40.49%	32.23%	10.74%	0.00%	0.00%
Avengers	1.47%	1.67%	1.38%	11.34%	0.69%	37.77%	31.16%	9.86%	2.16%	2.46%

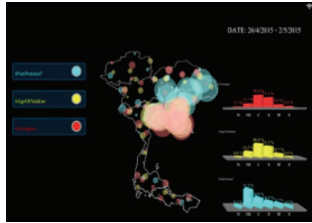
**Figure 13:** An example of exported CSV file.



**Figure 14:** An example of exported image file.

### 3.4 Demo

For demonstration of how our developed system works, a video clip showing a few example search keywords and results is available at <https://youtu.be/gG9jQNPapko>.



**Figure 15:** Exported image file (with dynamic map option).

**แบบสอบถามการประเมินการใช้งาน**  
(User Experience Questionnaire)

ชื่อ (Name)  นามสกุล (Surname)  อายุ (Age)  เพศ (Gender)  ระดับการศึกษา (Education level)  สถานะการจ้างงาน (Employment status)

อาชีพ (Occupation)  หน่วยงาน (Organization)  สาขาวิชา (Major)  ปีที่ศึกษา (Year of study)

ระดับชั้นปีการศึกษา (Year of study) 1 - ชั้นปีที่ 1 (Level 1) 2 - ชั้นปีที่ 2 (Level 2) 3 - ชั้นปีที่ 3 (Level 3) 4 - ชั้นปีที่ 4 (Level 4) 5 - ชั้นปีที่ 5 (Level 5) 6 - ชั้นปีที่ 6 (Level 6)

ข้อ	ระดับการเห็นด้วย (Scale of agreement)				
	1	2	3	4	5
1. ระบบนี้ใช้งานได้ (It is useful)					
2. ระบบนี้ใช้งานง่าย (It is easy to use)					
3. ระบบนี้ใช้งานง่าย (It is easy to start using)					
4. ระบบนี้ใช้งานง่าย (It is fun and engaging)					

ขอขอบคุณที่ตอบแบบสอบถามนี้ (Comments and suggestions)

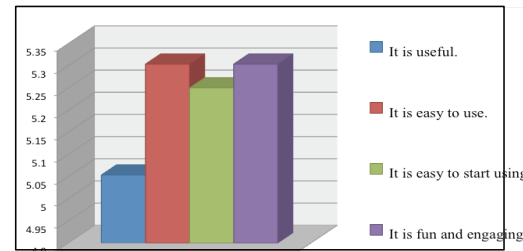
**Figure 16:** User experience questionnaire.

#### 4 User Experience Study

After the system development was completed, we tested our system’s usability with real users. Based on the theory of four elements of user experience [5], we used the 1-to-7 Disagree-Agree response scale questionnaire with four statements: It is useful; It is easy to use; It is easy to start using; It is fun and engaging. We randomly chose the user subjects to test out our system. We had a total of 56 subjects in different genders, ages, and occupations. Our questionnaire is shown in Fig. 16.

#### 4.1 Overall

The overall result is shown in Fig. 17. The users rated “It is useful” with the average scale of 5.05. “It is easy to use” statement has an average of 5.30. “It is easy to start using” has an average of 5.25. “It is fun and engaging” has an average of 5.30.



**Figure 17:** Average agreement scales from 56 users.

The average scales of agreement from 56 users were close to each other. Among the four statements, the system being “easy to use and engaging” has the highest average scale (5.30), while being “useful” has the lowest average scale (5.053). Although the scales

are close, it suggests that the users think that the system is more enjoyable but not useful enough. This may be due to lack of some useful and important details of the displays. For example, one of the female subjects (21-30 years old) suggested that “the system should also display more details at province level, such as boundaries and names”. Hence, the current system needs to improve on its usefulness, such as adding more useful contextual information.

#### 4.2 User genders and ages

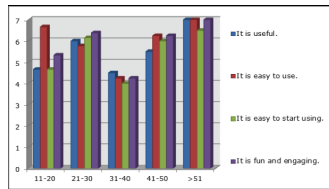
The average scales of agreement from 26 male users, categorized by age range (three users were 11-20 years old, 13 users were 21-30 years old, four users were 31-40 years old, four users were 41-50 years old, in Fig. 18.

The average scales of agreement from 30 female users, categorized by age ranges (one user was 11-20 years old, 15 users were 21-30 years old, eight users were 31-40 years old, two users were years old, and four users were more than 51 years old) are shown in Fig. 19.

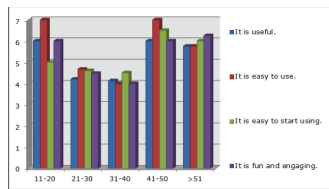
The average agreement scales from male users are slightly higher than female users. We suspected that this may be due to the fact that most male users are in general more into technologies than female users, who are on the other hand more interested in the artistic aspects of the system. For example, some comments from female users that we received are; “Red circles in map are not clearly visible. It should be improved.” and “The font does not look attractive. It should be more artistic.”

Moreover, young users didn’t quite find that the system to be as useful as older users (41 years old up). This

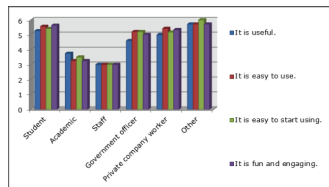




**Figure 18:** Average agreement scales from 26 male users.



**Figure 19:** Average agreement scales from 30 female users.



**Figure 20:** Average agreement scales from different occupations.

may be due to being more experience and so older users see more potential applications of the system. For example, male users (41-50 years old) commented that *"The system can be used for checking rating of products and services"*, another user saying that *"The system can be used as a tool to study the evolution of Thai language."*

### 4.3 User occupations

In terms of occupation, from 56 users, there were 27 students, four academics, one staff, five government officers, 12 private company workers, and seven others (business owner, self-employed, etc.). The summary average agreement scales is shown in Fig. 20.

The average agreement scales are relatively high from users who were students, government and private company workers, and others. Private company workers and others think that the system is useful for product rating, which can be beneficial to the company in improving their products. For example, the comments from private company workers are *"This can be used as a tool for checking feedback from customers, for example, what are the most popular brands and in which part of Thailand?"* and *"The managers can use this information for their decision making."*

### 5 Conclusion

In this work, we developed a user interactive system that allows that user to search on a geotagged tweet keyword or hashtag, and observe its geographical distribution along with bar charts for comparison across different geographical regions. Thailand is used as a showcase for the developed system. For demonstration,

the area of the country is divided into six regions. The system allows that user to enter up to three keywords and display the resulting distributions as well as bar charts for comparison. The user can also export the results as a CSV file for numerical information such as numbers or percentages of regional searched keywords, as well as an image file of resulting geographical distribution and bar charts, for their further analysis.

To test out the usability of our system, we conducted a user experience study, using questionnaire with randomly selected 56 subject users who were different in ages, genders, and occupation. Overall, the users found the system to be useful as a tool for product or service rating. Some of the users suggested that the system should include more useful detailed information on the province level, such as province boundaries and names. Most users thought that the system was most beneficial to businesses. Some users liked the system as a tool for searching interesting keywords for personal fun, or even a group game where friends make guesses about which regions are most or least interested in the search keywords, for instance. A few female users commented on artistic aspects of the system, such as fonts, colors, shapes that are needed to be improved.

Based on the user feedbacks, the system needs to improve on its usability, information provided, and artistic aspects (appearance). In addition, as part of our future, we will also improve the usability of the system by making it available online as a Web application, so that it is put up for the real user testing and beneficial to broader audiences.



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