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Research Article

A Smartphone APP for Health and Tourism Promotion

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The main purpose of this study is to develop an APP by integrating GPS to provide the digitized information of local cultural spots to guide tourists for tourism promotion and the digitized information of mountaineering trails to monitor energy expenditure (EE) for health promotion. The provided cultural information is also adopted for educational purpose. Extended Technology Acceptance Model (TAM) was used to evaluate the usefulness and behavior intention of the provided information and functions in the developed system. Most users agreed that the system is useful for health promotion, tourism promotion, and folk-culture education. They also showed strong intention and positive attitude toward continuous use of the APP.

1. Introduction

Nowadays the smartphone is becoming increasingly popular through its infinite computing, internet accessing ability, digital media and repository of thousands of APPs, advanced sensors such as accelerometers and GPS, and other advanced functionalities. Smartphones and associated APPs have been widely applied in health care [1], mobile tourism [2, 3], and training and education [4–6].

Daken Scenic Area, known as the Taichung back garden enriched in natural resources and folklore related customs, is located in the suburban mountain area of Taichung City, Taiwan. The area is full of enchanting scenery, interesting plants and animals, religious temples, historic sites, and mountaineering trails. There are local chicken shops, barbeque areas, recreation areas, physical training zones, and hot spring hotels scattering around the area. Due to its natural beauty, abundant leisure facilities, rich on-season farm products, and spectacular cultural settlements, it highly attracts targeted visitors from nearby districts or townships to experience rural tourism, folk-cultural event, and mountaineering activity, especially during the weekend and holiday.

The main purpose of this study is to digitize the folk-culture sites, scenery spots, and mountaineering trails in Daken area for the development of a smartphone APP for folk-cultural education, tourism promotion, and health facilitation. Since the mountaineering trails at Daken area are grouped as one of our themes, extra functions were supplemented for monitoring users' energy expenditure when hiking on the gradient zones to encourage physical activity for health promotion. The system can also be used in schools for folklore education to increase learning effectiveness and be applied as a marketing tool for the promotion of Daken community tourism.

1.1. Community Tourism. Community tourism is deemed as an effective strategy to alleviate poverty and to promote economic development for rural areas. Local agricultural products, festivals, foods, leisure facilities, and folk-cultural contexts are believed to be able to contribute to rural tourism, which in turn can reduce poverty and facilitate community development [7].

Marketing and market access are believed to be the major problems in community tourism, which results in the failure of attracting a sufficient number of tourists [7]. Information and communication technology (ICT) enhances operational effectiveness and has been widely adopted in tourism marketing [8]. It was reported that adoption of ICT in marketing supports the development of new products, facilitates the integration of different agents, breaks down the obstacles to innovation, and favors the differentiation of the new products in the market [8].

1.2. Folklore and Culture Tourism. Folklore refers to unsubstantiated beliefs, legends, and customs, currently existing among the common people [9] or substantiated artifacts, crafts, skills, and rituals, widely governing the living style of the common people [10]. In general, folklore refers to the society and culture tradition of the common people and the customs practiced and beliefs held by the vast majority of people in the cultural mainstream that they have inherited from their ancestors. It includes legends, stories, religious beliefs, festivals, ancestor worship, taboos, ceremonies, leisure activities, music, singing, and dancing [10]. Folklore is believed to be an endangered, marginalized, or misunderstood field. Folk artists are honored to study and inherit the skills built upon earlier generations [11]. After having learned deeply about our own folklore or culture, we can understand more about other cultures [11], which in turn can prevent conflicts among different peoples nurtured in different cultures [12].

Culture contexts are able to contribute positive outcomes of community-based tourism development. Local culture, such as foods, arts, and crafts, can be used as tourism attractions to attract tourists [7]. The mountaineering trails play dual roles as local resources for community tourism promotion and health promotion. The developed Android-based APP includes digitized mountaineering trails containing location and altitude information and the function for supporting calculation of calories consumption. In addition, the developed APP also serves as an e-learning platform used for students taking the folk-culture course included in general education to experience the field learning.

2. System for Tourism Promotion

2.1. Digitization of Cultural and Scenery Spots. In this application, besides the cultural spots and recreational areas, restaurants located in Daken area were also included. In order to make the contents more complete and credible, we supplemented missing information and collected information of the newest attractions. A total of 212 sites have been digitized so far. To enrich the contents and make them more lively and attractive, we shot the images of spots by self-visiting. The attractions were categorized into nine themes, including bridge, cultural site, nature scene, park, restaurant, school, temple, mountaineering trail, and turnabout to make the information searching easier.

2.2. System Development. In this study, we developed a mobile APP under the Android platform (Version 2.2 or higher). Application user interface was designed to be user friendly. Figure 1 displays the screenshots of the APP showing the welcome screen (a), bridge-themed attraction (b), search-by-keyword (c), picture of the selected attraction (d), basic information of the attraction (e), and other advanced functions (f), such as route planning (g), direction (h), and information sharing (i).

The basic functions delivered by the APP are described as follows. (1) List the nearest places of interest (POI) (e.g., cultural sites, restaurants, parks, etc.) with their names and distance information from the user's location or show the POIs on the map, Figure 1(b). (2) Display routing information from user's current location to destination by foot, bus, or car. (3) Show the content screen of the chosen spot, including thumbnail image slide show, related description and basic information, address, and telephone number. and (4) Provide additional functions, includes calling, sharing, and energy expenditure (EE) monitoring of the users.

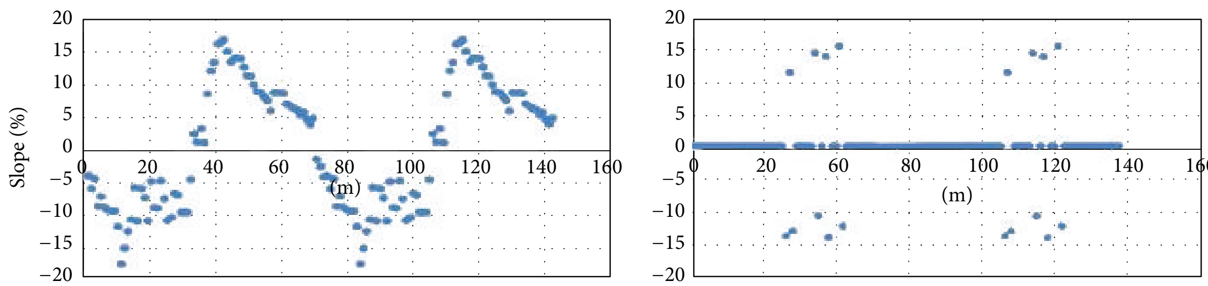
2.3. GPS Core Function. Google places API can be used to return the POIs in nearby locations. Currently, nine categories of the places of interests are included; other categories can easily be added and integrated in the future. The system characteristics are as follows. (1) The interested locations should be found as quickly as possible. (2) The list of venues should be updated when locations change. (3) The list of nearby locations and their detailed information should be available when users are offline. and (4) Location data and other users' data should be handled properly.

3. System for Calculating Energy Expenditure

3.1. Digitization of Mountain Trails. Currently, five of the 10 mountaineering hiking trails at Daken area have been digitized with Garmin Dakota 20, which was proven as a more accurate tool (accuracy: ±3 m; resolution: ±30 cm) than other devices by adopting barometer altitude [13] and Wide Area Augmentation System (WAAS) that provides GPS signal correction by giving an average up to five times better position accuracy. The trails were digitized point by point in every three seconds and represented with Keyhole Markup Language (KML) format. The KML is an Extensible Markup Language (XML) notation for expressing geographic annotation and visualization within Internet-based, two-dimensional maps and three-dimensional Earth browsers. The KML became an international standard of the Open Geospatial Consortium in 2008. Digitized trail data were stored in the memory of the Garmin Dakota 20 and can be loaded to Google's map as a GPX file. When loaded to the Google map, it is automatically converted to KML file. One of the advantages of the KML file is that it includes altitude information digitized with a barometer altimeter of Garmin Dakota 20.

Figure 1: User interfaces of the APP.

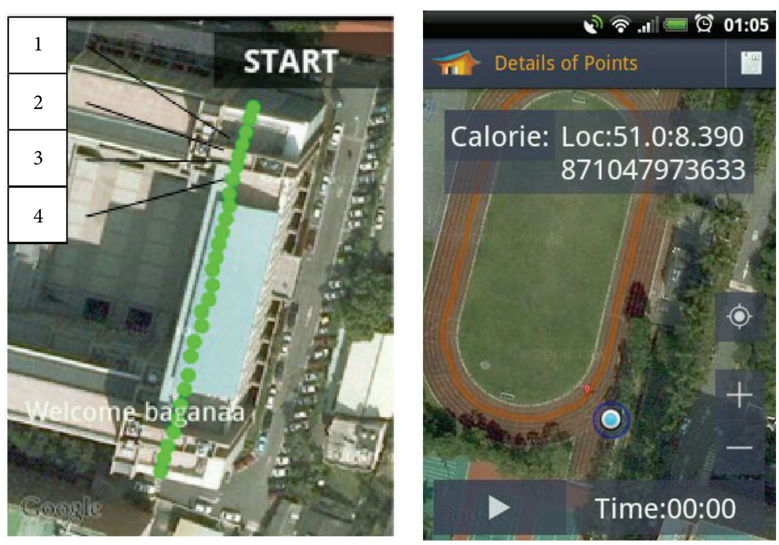
It is difficult to measure the EE accurately using only the mobile sensors because the sensors embedded in the mobile phones are not sufficient for calculating the EE directly. Several currently available APPs (Endomondo, Calorie Counter-MyFitnessPal, Runtastic, Adidas Micoach, Workout Trainer, etc.) adopted accelerometer for EE calculation. In this study, information acquired by the GPS accompanied with the digitized trail data was used to calculate the EE. The trails were digitized every 3 seconds with a distance of 2.5 ± 1.5 m, which can be used to find accurate locations according to the



(a)

(b)

FIGURE 2: (a) Slopes of a sport field obtained from Google Track with a range from −17% to 16%. (b) Slopes of the sport field digitized by Garmin Dakota 20 with some interference. Note: x-axis indicates digitized points along the track and y-axis represents the slope.



(a)

(b)

FIGURE 3: (a) Trail displayed point by point. (b) Current possible location found from the digitized trail data.

digitized trail data using the real-time GPS data acquired by the smartphone.

Figure 2(a) shows the slopes of individual spots of a level sport field in a university campus obtained by Google Track, presenting great errors. The area in the sport field is actually flat level with a slope of 0 degree. Figure 2(b) demonstrates the digitized trail of the sport field using the barometer altimeter in Garmin Dakota 20. Although there is still noise induced during digitizing, the error is much smaller when comparing with the Google Track.

3.2. Localization Based on a Nearest Point from Digitized Trail Data. The user's location is determined based on the longitude and latitude information obtained from the GPS core function service. The route is expressed as an array with an ID number, containing longitude, latitude, and altitude information. In order to get the closest point on the route array, the distances between user's current location and the points within a defined window in the route array are calculated and sorted in another service class.

As can be seen in Figure 3(a), the distance between each green point is calculated and sorted accordingly. When the user launches the calculation service class of EE, the function will automatically show the user's current location and the nearest point in the displayed trail before touching the start button if GPS sensor is available. A small orange pin on the digitized trail path shown in Figure 3(b) represents an actual location of user calculated by the APP and the blue point represents the user's current location detected by GPS.

3.3. Calculation of Energy Expenditure. Minetti et al. [14] proposed the equations to calculate the EEs in J/(Kg-min) of walking and running, as indicated in (1) and (2), respectively. A running episode is defined as the event with a speed greater than 2.80 m/s.

$$\mathrm{EE}^{M}_{\mathrm{Walk}} = 2.5 + 19.6m + 51.9m^2 - 76.8m^3 - 58.7m^4 + 280m^5 \quad (1)$$

$$\mathrm{EE}^{M}_{\mathrm{Run}} = 3.6 + 19.5m + 46.3m^2 - 43.3m^3 - 30.4m^4 + 155.4m^5. \quad (2)$$

In (1) and (2), m represents the slope on the trail surface [14]. Unfortunately, the equations do not explicitly control for speed [15]. In contrast, as shown in (3), Ardigò et al. [16] modified (1) by using the previous data to produce an equation by taking the effect of walking velocity into account:

$$\mathrm{EE}^{A}_{\mathrm{Walk}} = 1.866e^{4.911}mv^2 - 3.773e^{3.416}mv + 45.72m^2 + 18.9m + 4.456 \quad (3)$$

in which v indicates the walking speed. If the conversion factors added to the equation involved body mass of the subject (M_s) and the mass of the carried burden (M_b) as well, the walking energy (Joule) can be modified as

$$E_{\mathrm{Walk}} = \mathrm{EE}^{A}_{\mathrm{Walk}} \left(M_s + M_b\right) T \quad (4)$$

in which $M = M_s + M_b$ is the total mass and $T = 0.1$ min (6 sec) indicates the sampling interval. To consider the effects of wind resistance and gender, the equation appears as

$$E^{\mathrm{Male}}_{\mathrm{Wind}} = 0.00418 \times 0.266 \times \left(128.1M^{0.44}H^{0.6}\right) \times 10^{-5} \times 5.05Tv^3 \quad (5a)$$

$$E^{\mathrm{Female}}_{\mathrm{Wind}} = 0.00418 \times 0.266 \times \left(147.4M^{0.47}H^{0.55}\right) \times 10^{-5} \times 5.05Tv^3 \quad (5b)$$

in which H is the body height. Therefore, the total energy for walking can be expressed as the sum of the walking energy and the wind resistance energy, as shown in the following equation:

$$E_{\mathrm{GPS}} = E_{\mathrm{Walk}} + E_{\mathrm{Wind}}. \quad (6)$$

In this study, we aimed to include most of the important POIs in the APP. Mountain trails at Daken area are very popular recreational areas for citizens and visitors. Users can see not only the trails information and the routing to the trails, they can also monitor their EEs when hiking in the mountaineering trails. The users just need to input their information such as gender, height, and weight. Ardigò et al. [16] considered the effect of gradient on locomotion in gradient terrain ranging from −20% to 20% slope. Kramer [17] predicted the EE using the best-fit theoretical equation (7), which was verified to be able to explain 87% of the variation in EE [17]:

$$E_{\mathrm{Pred}} = 5.4v^2 + 0.37M + 0.0054Mmv + 0.0011m^2v - 3.8X - 17 \quad (7)$$

in which v indicates the speed (m/s), M denotes the mass (kg), m represents the slope or gradient, and X is the gender (0 = female; 1 = male) of the subject.

Table 1: Digitized trails.

Trail	Distance (Km)	Max. slope	Altitude (m)
Level trail	0.232	0	0
Number 10	1.120	±2.40	151.4
Number 9	1.580	±1.56	167.7
Number 7	1.740	±1.08	141.8
Number 6	1.680	±1.44	173.1
Number 2	1.630	±3.65	186.0

Table 2: Demographic information of subjects.

Subjects	Age	Gender	Height (cm)	Weight (kg)
S 1	23	Female	158	55
S 2	21	Female	160	50
S 3	27	Male	174	69
S 4	24	Male	175	60
S 5	24	Male	178	68

3.4. Digitized Mountain Trails. In this research, five of the ten mountaineering trails in Daken area and a university sport field were digitized. Table 1 shows general information about the trails digitized with Garmin Dakota 20. For the level trail of the sport field, the perimeter is 232 meters with a slope of 0 degree. Among the mountaineering trails, Trail number 2 seems to be the most difficult one according to its slope (from −365% to 365%). In contrast, the difficulty of Trails numbers 6, 7, and 9 are easier with smaller slopes. An example of digitized information for Trail number 7 is shown in Figure 4(a). The graph delineating the elevation against the distance from the starting point of a trail is shown in Figure 4(b). Other digitized trails and their corresponding elevation against distance plots are shown in Figure 5.

3.5. Energy Expenditure on Level Walking. To verify effectiveness of the system, 5 healthy subjects were recruited for the experiments. The demographic information of subjects are displayed in Table 2, including age (23.8 ± 2.2 years), height (169 ± 9.2 cm), and body weight (60.4 ± 8.2 kg). Subjects were asked to walk on an elliptic path with a perimeter of 216 meters on the sport field and the mountain trails. In the sport field, the subjects walked with self-paced velocities in 20 minutes. On the mountain trails, the subjects were asked to hike in a round trip for each mountaineering trail such that one trip is dominated by uphill hiking and another by downhill hiking. The mobile phones used for the experiments include the HTC Explorer A310e and Samsung Galaxy S3.

During the test, one subject was asked to walk on the level trail of a sport field with a perimeter of 232 m for about 20 minutes. He was asked to carry out the tests repeatedly for 9 times along the level track. As shown in Table 3, under an average walking speed of 1.45 ± 0.13 m/sec, the mean consumed energy was 5.47 ± 0.66 kcal/min measured by the developed APP, which is not significantly different (Student's t-test, $P > 0.05$) from the value (4.82 ± 0.66 kcal/min) calculated using Kramer's equation shown in (7). The result indicates consistency and accuracy of the developed APP.

Table 3: Energy expenditure on level walking.

Number	Average speed in m/sec (min. : max.)	Duration (min.)	EE in O_2 mL/kg/min (min. : max.)	Total EE in O_2 mL (Kcal)	Average EE in Kcal/min (min. : max.)
1	1.62 ± 0.64 (0.23 : 3.3)	23	18.7 ± 11.53 (4.06 : 65.87)	21058 (103.34)	6.4 ± 3.9 (1.39 : 22.62)
2	1.29 ± 0.51 (0.25 : 2.58)	20	15.22 ± 8 (3.58 : 42.92)	14064 (71)	4.6 ± 2.44 (1.23 : 14.74)
3	1.38 ± 0.65 (0.3 : 3.15)	10.5	15.37 ± 11.9 (4.06 : 65.7)	5297 (26.7)	5.2 ± 4.1 (1.39 : 22.56)
4	1.44 ± 0.6 (0.24 : 0.7)	6.0	15.7 ± 9 (4.13 : 40.83)	4939 (24.9)	5.39 ± 3.12 (1.42 : 14.02)
5	1.29 ± 0.66 (0.4 : 2.44)	10.0	16.04 ± 11.23 (5.2 : 36.56)	7230 (36.5)	4.8 ± 3.4 (1.58 : 11.08)
6	1.51 ± 0.57 (0.35 : 2.4)	10.0	16.65 ± 9 (4.06 : 40.85)	8450 (42.67)	5.71 ± 3.11 (1.4 : 14.03)
7	1.46 ± 0.6 (0.5 : 2.57)	11.0	15.95 ± 9.3 (4.23 : 54.98)	9843 (49.7)	5.4 ± 3.2 (1.45 : 13.83)
8	1.69 ± 0.55 (0.67 : 3.27)	5.0	19.42 ± 10.6 (4.23 : 32.8)	5092 (25.71)	6.57 ± 3.6 (1.4 : 18.8)
9	1.44 ± 0.5 (0.33 : 2.4)	5.0	15.15 ± 7.23 (4.23 : 32.8)	5065 (25.57)	5.2 ± 2.4 (1.45 : 11.27)
Avg.	1.46 ± 0.13	11.16 ± 6.36	16.47 ± 1.55	9004.2 ± 5433.1	5.47 ± 0.66

Table 4: Energy expenditure hiking on a trail (number 9).

Number	Uphill			Downhill		
	Duration	Speed	EE	Duration	Speed	EE
1	24.3	1.4 ± 0.6	15.0 ± 18.7	22.1	1.5 ± 0.8	11.6 ± 11.8
2	24.2	1.5 ± 0.6	13.7 ± 17.0	24.2	1.3 ± 0.8	10.0 ± 14.8
3	26.0	1.3 ± 0.6	13.0 ± 16.0	20.0	1.2 ± 0.3	9.6 ± 11.8
4	20.0	1.4 ± 0.7	14.3 ± 16.4	25.0	1.2 ± 0.6	8.2 ± 14.1
5	23.0	1.4 ± 0.7	14.0 ± 17.4	20.0	1.6 ± 0.7	10.4 ± 12.8
6	27.0	1.4 ± 0.7	13.7 ± 16.4	20.0	1.5 ± 0.6	9.6 ± 12.4
Avg.	23.92 ± 2.22	1.40 ± 0.05	14.03 ± 0.55	21.88 ± 2.27	1.37 ± 0.18	9.90 ± 1.13

3.6. Energy Expenditure on Mountain Trails. For gradient walking, a subject was asked to walk on each digitized trail for a round trip consisting of an uphill trip and a downhill trip by carrying a smartphone with the developed APP installed for real-time EE calculation. Most of the trips in the former are uphill trail segments, while in the latter mostly downhill trail segments. The subject was asked to hike on one of the trails (number 9) repeatedly for 6 times to test the consistency and accuracy of the developed APP system. Each time, the subject hiked on the mountain trails in a round trip by trying to keep similar mean speed and duration during uphill and downhill trips.

As shown in Table 4, it can be observed that, by keeping similar speed and duration (ANOVA, $P > 0.05$) among 6 round trips, hiking uphill (14.03 ± 0.55) consumes more energy than downhill (9.90 ± 1.13) ($P < 0.05$). This result is again matched with the theory proposed in the previous investigation.

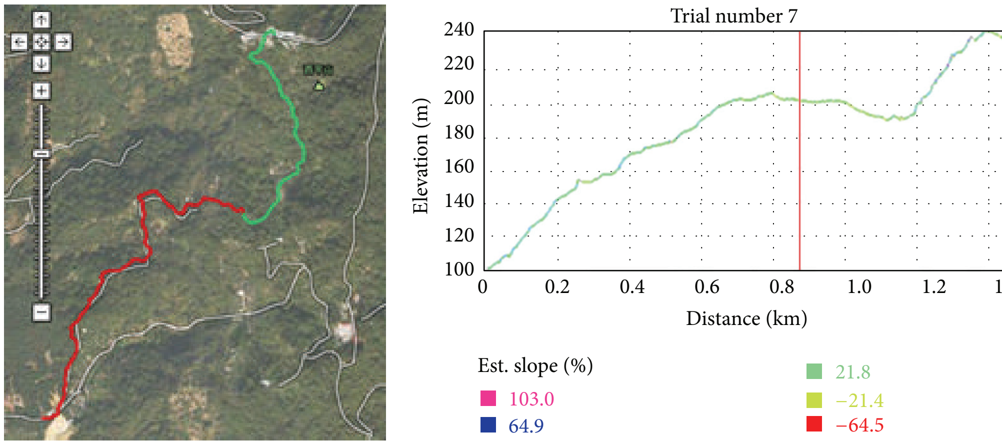
4. System Evaluation

4.1. Subjects. A total of 157 students and teachers of a university and a high school were recruited for this study. The age of most subjects (92.2%) is within 15–20 and 20–25 years old. In addition, 54.2% of the subjects are female, and 81.5% of them are university students. All participants were asked to answer a questionnaire after using the mobile APP for 2 months.

4.2. Theoretical Framework. In order to evaluate users' attitude toward using the developed APP and how computer self-efficacy impacts on decision to use, the extended questionnaires based on Technology Acceptance Model (TAM) proposed by Davis [18] was adopted for system evaluation. The model was originally designed to predict user's acceptance of information technology and usage in an organizational context. TAM focuses on the attitude interpretation of intention to use a specific technology or service; it has become one of the most applied models for user acceptance and usage [19]. According to [18], two important factors that influence users' decision about how and when they will use a new technology are perceived usefulness (PU) and perceived ease of use (PEU).

Computer self-efficacy is the belief or judgment that one has the capability to perform a specific task [20]. It indicates an individual's belief about his or her ability to successfully use a technology to accomplish a specific task and is an important factor in determining an individual's intention to engage in current or future use of an information system [21]. This study tested the following hypotheses.

Hypothesis 1. The computer self-efficacy (CSE) will positively affect perceived ease of use (PEU).



(a) (b)

Figure 4: An example of digitized mountain trail. (a) Digitized information of Trail number 7 shown on the Google map and (b) its relative elevation against the distance from the starting point.

Hypothesis 2. The computer self-efficacy (CSE) will positively affect perceived usefulness (PU).

Hypothesis 3. Perceived ease of use (PEU) will positively affect perceived usefulness (PU).

Hypothesis 4. Perceived usefulness (PU) will positively affect users' behavior intention (BI) to use the mobile application.

Hypothesis 5. Perceived ease of use (PEU) will positively affect users' behavior intention (BI) to use the mobile application.

4.3. Questionnaire. The questionnaire was developed based on the extended Technology Acceptance Model (TAM) to evaluate perceived usefulness (PU), perceived ease of use (PEU), and behavior intention (BI) as well as an additional behavioral construct, computer self-efficacy (CSE), included in the model to improve the TAM's predictive value for the mobile APP. The question items were scored on a Likert 5-point scale.

4.4. Structural Equation Model Analysis. The analytic results show that all the values of composite reliabilities are greater than the benchmark of 0.6 [22]. The average variance extracted (AVE) measures the amount of variance captured by the construct compared to the variance due to measurement error [23]. Besides AVE of perceived usefulness (PU) that fell down slightly from the cutoff value of 0.5, all other measures were acceptable. Altogether, the data suggests that the four constructs exhibit acceptable levels of reliability. Moreover, all the standardized factor loadings show values which are greater than 0.4 with significance, indicating that all the variables have construct validity [24]. Moreover, most of the R^2 of the variables are greater than 0.5 indicating that the research variables have convergent validity [25].

We examined causal relationship between the constructs (e.g., PEU, PU, BI, and CSE) using structural equation model. Hatcher [26] suggested that the path coefficient t-value should exceed 1.96 at the $P < 0.05$ level, 2.58 at the $P < 0.01$ level, and 3.30 at $P < 0.001$ level. The results showed that the t-value of Hypothesis 2 (H2) and Hypothesis 5 (H5) were below the cutoff level of 1.96, indicating that the 2 proposed hypotheses failed to reach statistical significance. On the other hand, Hypothesis 1 shows that the computer self-efficacy has a positive effect on perceived ease of use with t-value of 4.958 and β of 0.457; Hypothesis 3 stands for that the perceived ease of use shows a positive effect on perceived usefulness with t-value of 5.272 and β of 0.528; and Hypothesis 4 depicts that the perceived usefulness has positive impact on behavior intention with t-value of 5.239 and β of 0.679.

5. Discussions and Conclusions

Digital content development with applications to the preservation of artifacts related to the arts, languages, ecology, living styles, and so forth has been exhaustively studied and implemented worldwide over these years. Over the past 8 years, we have endeavored to digitize Taiwanese folklore artifacts and activities [10, 27]. In this study, folk-culture sites containing folklore contexts have been digitized. They are not only useful for tourism promotion but also for folk-culture education.

Digitization makes interpretation or teaching free from the constraints of time and distance. E-learning delivers content through electronic information and communications technologies (ICTs) with less cost and greater flexibility without time restriction. On the other hand, Mobile learning (M-learning) as a supplementary teaching technique can eliminate both geography and time constraints through portability of the technology [28]. It has been widely used in both indoor learning, such as museum guide and learning

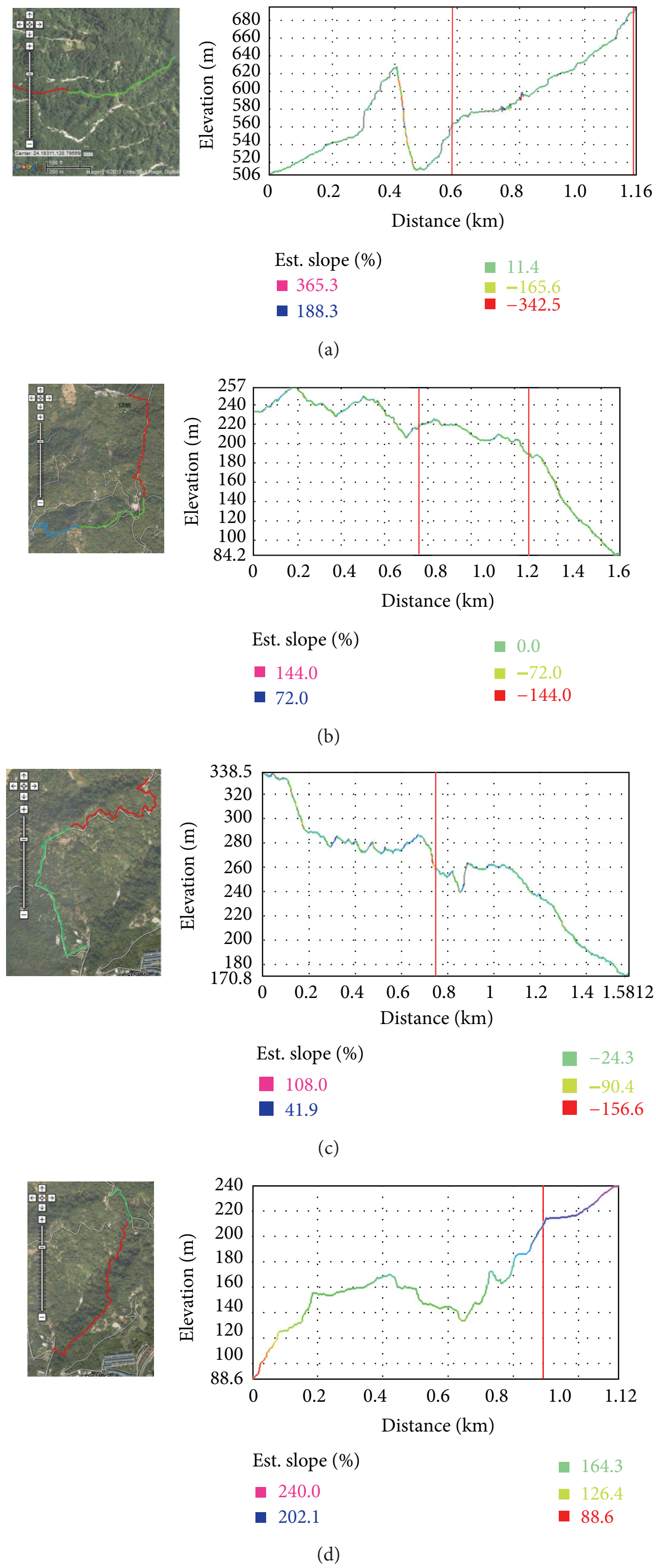


Figure 5: Digitized mountain trail information and their corresponding elevation against distance plots for (a) Trail number 2, (b) Trail number 6, (c) Trail number 9, and (d) Trail number 10.

[29], and outdoor learning, such as ecology and science education [28, 30].

Although local community tourism is not significant in macroeconomics, it can improve local economy and livelihood diversification [7]. In rural communities, agriculture supplies the raw products and food production, culture supports folklore history, and authenticity, and tourism provides the infrastructure and services. In the developed system, all the digitized contents and related tourism information has been integrated to make the Android-based APP a useful tool for tourism promotion and folk-culture education.

Short message service (SMS) provided through mobile phones has been shown to be effective in improving quality of life for patients with chronic diseases, such as diabetes, hypertension, obesity, and bladder pain syndrome/interstitial cystitis [31]. Recently, abundant applications developed for smartphones including APPs for accessing patient medical records, clinical guidelines, drug references, medical images, lab orders and reports, as well as medical calculating and decision support tools, have been developed [32]. In our developed APP, the EE calculator provides a useful tool for calculating calories consumed during hiking in mountain trails.

In conclusion, we developed an Android-based APP which integrates digitized information of folk-culture sites, scenery spots, and mountaineering trails. The system provides location- based services for quickly searching and guiding the tourists to reach their interested sites. In addition, the system also accommodates abundant digitized contents useful for folk-culture education, as well as digitized mountain trails and a tool for calculating energy expenditure which are shown to be useful for health promotion. The APP has been shown to be useful for community tourism and health promotion in Daken area and effective for conducting field learning of folk-culture education.

Conflict of Interests

The authors declare that there is no conflict of interests regarding the publication of this paper.

Authors' Contribution

Ker-Cheng Lin and Lin-Sheng Chang contributed equally to this work.

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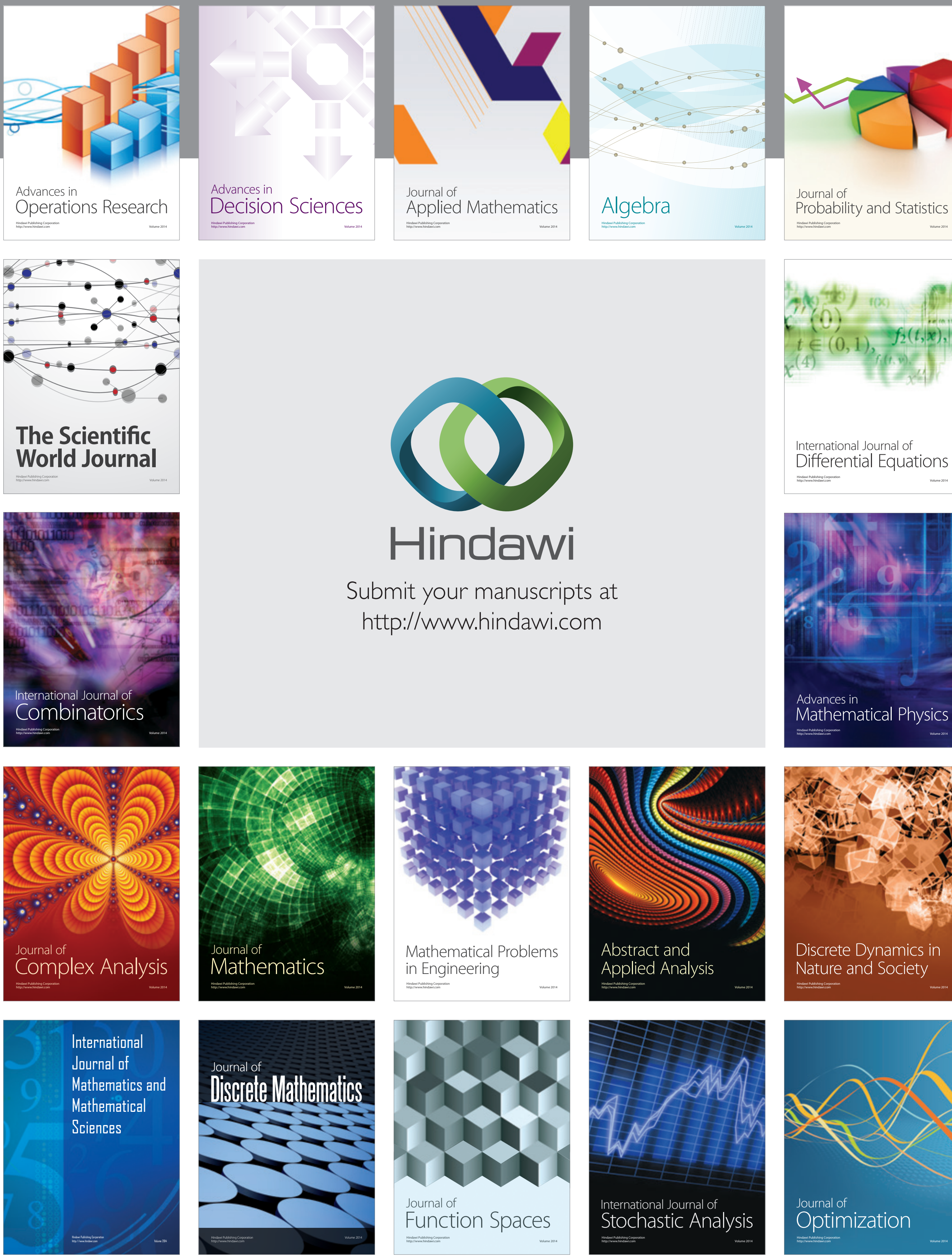

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