LOCATION-BASED GAME: TIC-TAC-TOE

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ABSTRACT

Location-based services (LBS) recently received much attention. This paper includes a combination of geographic information systems, allowing users to be able to tell the location of nearby friends, and Tic-Tac-Toe game as an example of trying to make the model play the more diverse game, get some new source of ideas.

Keywords *LBS; Game; Tic-Tac-Toe*

1. INTRODUCTION

A Location-Based Service (LBS) is an infor*mation or entertainment service* accessible with mobile devices through the mobile network and utilizing the ability to make use of the geographical position of the mobile device [1]. LBS can be used in various contexts, such as health, indoor object search, entertainment, work, personal life, and so on.

Through GPS chip, the phone can accurately get the user's location. GPS (Global Positioning System) strength includes high accuracy, no new network infrastructure required, enhanced privacy for user. GPS weakness includes no indoor service, poor coverage in urban buildings and canyons.

LBS of the game will become an important part of the game industry, but it depends on the rules of the game. People will be more integrated into the surrounding environment. We can support the most recent sports events and include geographical specialty and interest.

In this paper, we propose LBS game using Tic-Tac-Toe as an example designed to run on Apple iPhone.

2. RELATED WORK

Because of GPS information built-in in the phones, users can know their exact present location. Many applications use the location information to provide many convenient services for the users.

Smart phones are widely used due to the popularity of mobile devices. Users can download many applications in the App Store. We survey many LBS APPs and analyze their features and user interface to provide our design reference.

Many related papers are published about LBS game [2] which uses location information and implements A Pac-Man Game and use some algorithms for the shortest path calculation.

Tsai and Yang [3] propose three task assignment strategies for mobile GWAP-based geo-tagging system. Everyone may have a shared resource sharing local scenic information, or switch to the examination of the local task to verify that is true or false.

2.1. Location-Based Service Applications for iOS

There are many APPs on iTunes App Store. Some related brief APP introductions are in [4][5][6].

2.1.1. TaiwanYo

Let TaiwanYo guide you through Taiwan and have a blast all around the island [4]! With TaiwanYo, you will always have the freshest listings of restaurants, coffee shops, bars, movie theaters, night markets in the palm of your hand. TaiwanYo is simply the fastest and most fun way of exploring Taiwan.

Interact and share your shopping, eating, and sleeping experiences with your friends by connecting with them on TaiwanYo. See which places are hot and which places are not with their active community of users. Read other people reviews, see their pictures, or write/post your own and share your experiences.

2.1.2. IM+ Pro

IM+ Pro, one of the best multi-client chat programs for iOS devices, has been updated with a location-based

feature that makes it easy to find random chat participants nearby your current location [5]. Developer Shape Services says Neighbors provide users "the opportunity to find new real life connections and friends with common interests". This is interesting as we have not seen a beneficial integration of location, which is the latest fad, with chat services.

2.1.3. Parking Taipei

This APP provides over 2000 parking lots around Taipei, Taichung, and Kaohsiung city [6]. Some of the parking lots in Taipei provide real time available parking space. Over 2000 gas stations are included. Wi-Fi or 3G connection is needed to display location on the map.

After a survey of many of the APPs, the LBS application on the handheld device can generally be divided into the following classes:

1. Location-based mobile advertising.
2. Location-related information.
3. Social chat service.
4. Combination of AR and map features.
5. Sports tracker.

Fig. 1: TaiwanYo [4].

2.2. Location-Based Games for iOS

LBS game will become an important component of game industry, but it depends on the rule of the game. People want to be more integrated into the surrounding environment. We support the most recent sports events and include geographical location and emotional attachment. We want to play together with neighbors and deal with every day routine. However, LBS services can bring players to this stimulus. LBS games can and must break the inherent limitations. It requires superior gameplay where players love the game completely [7][8][9].

2.2.1. Life Is Crime

Life is Crime uses what Red Robot believes is going to be its critical asset: the R2 Gaming Network platform for making location games [7]. To perform missions, you have to be within range of about 500 meters or so of the location in question. Then the user can take over the building, rob it, leave loot, or search it for information or health packs. You can also gamble and win virtual currency at a location.
The players can be added to the location on the map. The user can operate in small groups, and establish his own reputation, energy, and other statistics. You can customize your avatar, or virtual character, buy clothes. You can upgrade your character and build your criminal reputation. In the end, the top player Tang owns San Francisco or some other major regions. Your own territory can generate money for you.

2.2.2. Shadow Cities

This is the magic of bleeding by bending some magical gateway, this along to destroy our spirit [8]. The players will join a team, fighting spirit and try to lay a claim that their level, the greatest Master in the vicinity of the gateway. Shadow Cities really manages to hit all of the right notes. This is a mobile network game. This is a location-based game; you can also enjoy the comfort of your couch. This is a social, but you will never need to trouble your friends in the real world and play with you.

Fig. 2: IM+ Pro [5].

Fig. 3: Parking Taipei [6].

Fig. 4: Life Is Crime [7].

2.2.3. MyTown 2

MyTown 2 is a LBS app, with global check-in support enabled via the Places Web Service — a new Google Maps API feature that returns the 20 most popular sites nears a given location [9].

This game combines elements of Monopoly and simulation program, players can use real landmark building in the city game. The more popular offers the more gold.

After a survey of many LBS games, they share several common characteristics. Most of the games interact between the players. The real map is mapped to a virtual game world. Players move through the real-life to have a direct impact on the game, and this feature is very different from traditional games.

3. DESIGN AND IMPLEMENTATION

3.1. Analysis of multiplayer game connection

1. Wi-Fi Direct

Wi-Fi Direct at a basic level, supports Wi-Fi wireless technology, allowing multiple Wi-Fi-enabled devices to interact without having to go through the router directly with each other [10]. Wi-Fi Direct will allow you to wirelessly print device or enable two players to play Wi-Fi supported direct cooperation of the video game for two devices with each other. Through this mechanism, the connection speed is very fast and can reach 250 Mbps with the maximum connection distance of 100 meters, thus limiting the distance where the users can interact.

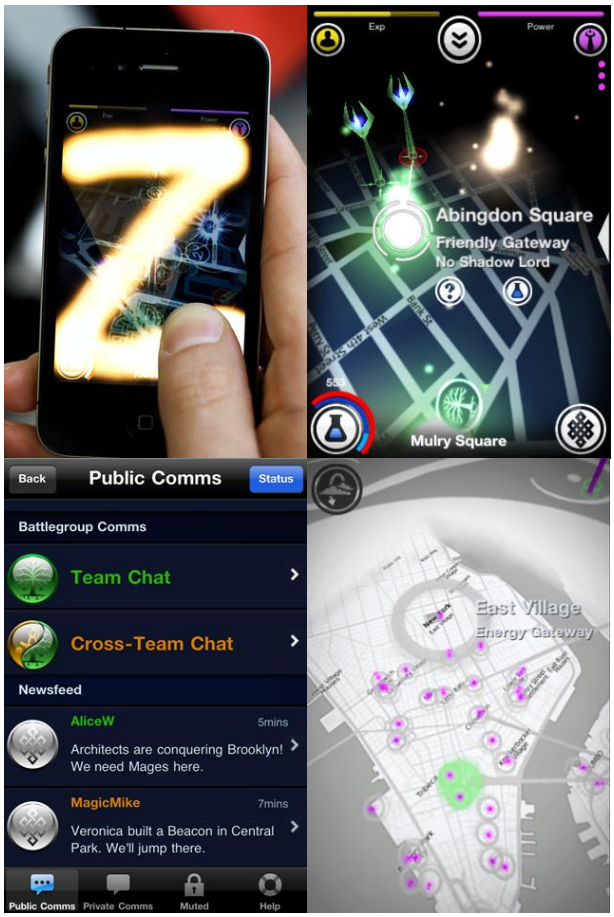

Fig. 5: Shadow Cities [8].

2. Bluetooth

Bluetooth connection mechanism is a very mature development of the connection mechanism. Almost all mobile devices have built-in Bluetooth chip. Advantages include high penetration, simple connection using wireless communication. Connectivity devices are equipped with Bluetooth chips, and the transmission range is from 10 cm to 100 meters.

3. Network

Through the transmission of network packets, TCP or UDP transmission will not have any distance limitations. The connection speed also depends on the ISP. We need to configure a server responsible for handling the connection of all users and maintaining the user coordinate records.

In response to the above analysis, we choose a network connection to carry out the implementation. Server uses the operating system of Windows 7. Database uses MySQL and TCP socket connection

Fig. 6: MyTown 2 [9].

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3.2. Game flowchart

Location-based Tic-Tec-Toe is designed to run on Apple iPhone. Our software was written with xcode, an Integrated Development Environment (IDE) containing a suite of software development tools developed by Apple for developing software for OS X and iOS.

Fig. 7: Game flowchart.

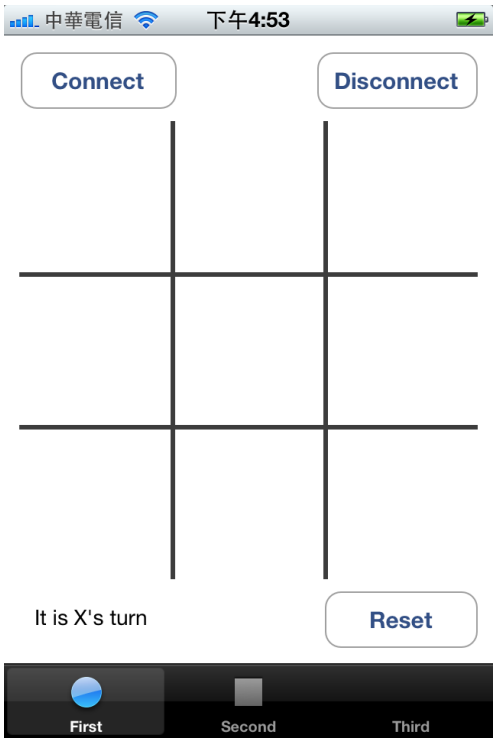

Fig. 8: Game screen.

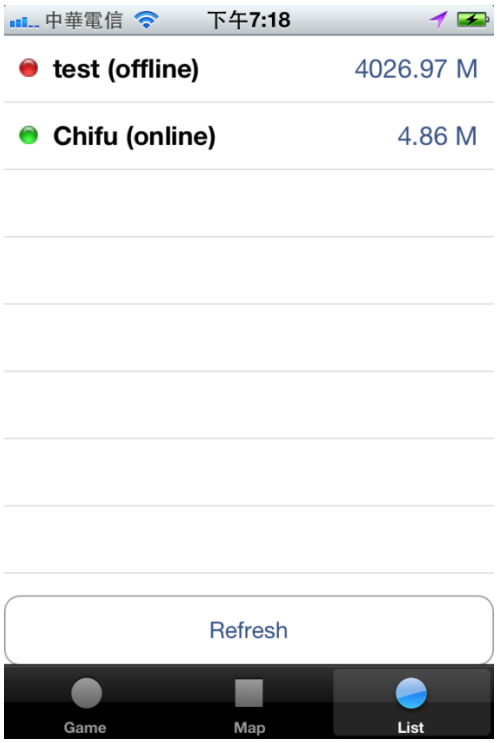

Fig. 10: Friends list screen.

Fig. 9: Game start screen.

Fig. 11: Map view screen.

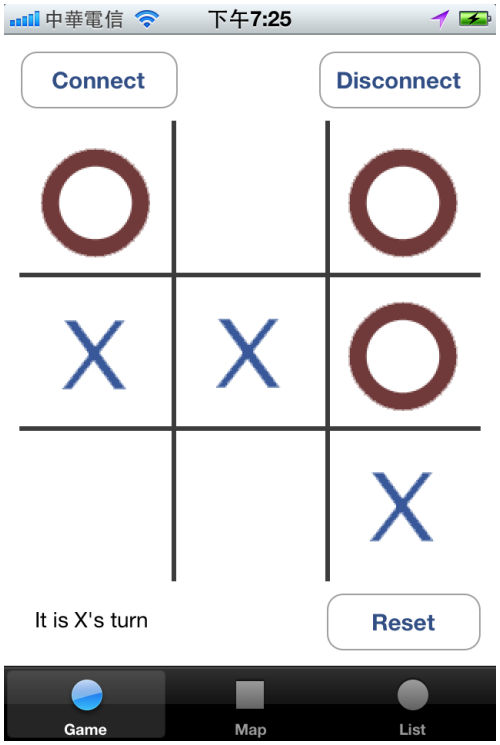

Fig. 12: Game playing screen.

Table 1: Experimental Setup

	Description
Environment	NTU CSIE Network.
Mobile device	iPhone 4 & iPhone 4S
iOS Version	iOS 4.3.3
Server O.S.	Windows 7
Database	MySQL Version 5.0.51b
System Language	Objective C
Sensors	GPS

We designed a combination of geographic information system to let users know the locations of their nearby friends. Also, for making more modals and diversities when playing the game, we use Tic-Tac-Toe as an example to get more sources of ideas. The structure of program design can be divided into two parts:

1. Mobile phone client
2. Server-side

Mobile-side is based on Apple iPhone4 as an experimental tool. When the users open the program, they will see several different functions. The function of map can show the locations of nearby friends by browsing the map. Friends' locations will be shown by a pin mark (Fig. 11). When the user clicks on a friend, you can invite your friend to join the game. After the friend confirms the request, the game will start. In this essay, we use Tic-Tac-Toe to be our example (Fig. 12). The function of friends list will show how far the friends are from the user, whether they are online or not (Fig. 10). Friends can only be invited when they are online.

For server side, we establish two parts: game server and database. On the game server-side, we use Twisted in python as a connection to handle the game platform for package processing. We mainly use TCP socket to connect. The game server processes the connection of all game initialization, game logic rules to judge. The database is MySQL to store user information, record user latitude and longitude coordinates, when the user's mobile phone opens this program, and regularly update database of coordinates of the information.

The game process can be divided into the following five steps: (See Fig. 7)

1. Initial Google Map

First initialize the Google map, the phone will be the current location through GPS positioning. The user will see on the phone near the current location of the map information, including his own position to be blue dot (Fig. 11).

2. Locate Nearby People

Mobile phone connects to the server. The first sends his current location coordinates to update the database, and then get the latest location information of the friends from the database. When the data transfer is finished, the phone will use a pin on a map to show the location of friend. The user can easily know which of your friends in the vicinity.

3. Show Information

Users click on the pins of friends' on the map to show the friends' information to provide the user to decide whether to invite a friend for the game.

4. Invite to Join Game

If the user selects and is ready to play games with friends, press the Enter key to send out invitation packets to the game servers (Fig. 13). Game servers will forward packets to a friend's mobile terminal when the mobile terminal receives an invitation packet message displayed on the screen after a friend invites on the game menu. If you choose to agree, the two sides will begin to enter the game battle.

5. Play Tic-Tac-Toe

As general Tic-Tac-Toe, the two sides take turns in the direction pad to select a mark: X or O. The party who gets in a line first wins.

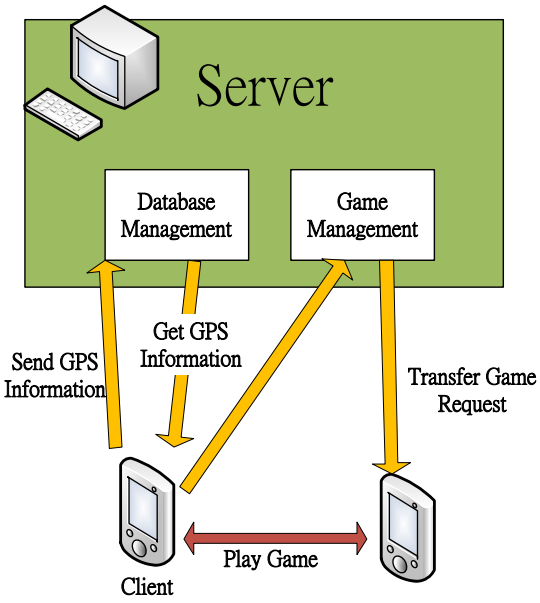

Fig. 13: System Architecture.

4. CONCLUSION

In this paper, we propose LBS game and use Tic-Tac-Toe as an example. We hope to combine social networking and games against the interaction between the users through this program more closely. Different from the general Internet Game where users do not know the actual locations of each other, we add geographic information, so that users can have a more realistic interaction, not only confined to the network virtual space.

People like games and are very curios to explore the unknown things to get freshness and fun. Combination of positioning and the game is excellent. In the future, we will construct suitable LBS game modes for a more in-depth discussion and implementation.

REFERENCES

[1] C. Xin, "Location Based Service Application in Mobile Phone Serious Game," *Proceedings of IJCAI*, California, USA, pp. 50-52, 2009.

[2] S. R. Tsai, J. C. Wang, and Y. C. Chuang, "A Pac-Man Game on Campus Using GPS Location Information and Shortest Path Algorithm," *Proceedings of DIGITEL*, Kaohsiung, Taiwan, pp. 202-206, 2010.

[3] T. C. Tsai, and T. R. Yang, "GWAP Design for a Mobile Geo-Tagging System with Confident Verification," *Proceedings of CSE*, Dalian, China, pp. 302-307, 2011.

[4] Ploutos Inc., "TaiwanYo on the iTunes App Store," http://itunes.apple.com/us/app/taiwanyo-tai-wan-you/id345008600, 2012

[5] SHAPE Services, "IM+ Pro on the iTunes App Store," http://itunes.apple.com/us/app/im+-pro/id296246130, 2012.

[6] AnVision, "Parking Taipei on the iTunes App Store," http://itunes.apple.com/us/app/parking-taipei/id436107488, 2011.

[7] Red Robot Labs Inc., "Life is Crime on the iTunes App Store," http://itunes.apple.com/us/app/life-is-crime/id456706034, 2011.

[8] Grey Area Ltd, "Shadow Cities on the iTunes App Store," http://itunes.apple.com/us/app/shadow-cities/id387962119, 2011.

[9] Booyah, Inc., "My Town 2 on the iTunes App Store," http://itunes.apple.com/tw/app/my-town-2/id442345455, 2012.

[10] Wi-Fi Alliance and Wakefield Research, "Wi-Fi CERTIFIED Wi-Fi Direct™:Personal, portable Wi-Fi® that goes with you anywhere, anytime," http://www.wi-fi.org/discover-and-learn/wi-fi-direct, 2010.