



## **Design and development of gobang games based on Android**

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**Abstract:** with the popularity of mobile application, in order to allow users can play on mobile devices, make renju game has beautiful interface, easy operation and good visual perception, this design USES the Eclipse development tools and Java development language to develop, implement of man-machine game and everyone's game, the game to design a based on Android gobang game, the game is beneficial to the development of intelligence, can let users in the entertainment at the same time also can increase knowledge, expand thought.

**Keywords:** Android; Java; Gobang. Algorithm.

### **1. Introduction**

With the continuous development of communication technology, network is becoming more and more fast, now people's communication has become more and more convenient, and the mobile phone is also becoming more and more powerful, people can browse news on mobile phones, video chat, watch movies, etc., in order to offer faster better support these software, constantly meet people's needs, phone to also have the technology more and more intelligent and open. In addition to People's Daily life and learning needs, entertainment is also an integral part of people's life. Mobile games based on android platform are more popular with people. Mobile games are not only convenient to play, but also conducive to users to obtain timely entertainment and broaden their horizons. Renju games can exercise thinking, improve patience, memory is also very helpful.

### **2. An overview of the**

#### 2.1 Development status of mobile Internet

Mobile Internet is the combination of mobile communication and the Internet. It is the President of Internet technology, platform, business model and application, as well as

the combination of mobile communication technology and practical activities. The continuous development of communication technology and the extensive use of intelligent mobile terminals provide huge energy for the development of mobile Internet. In the process of the development of the Internet in China, the Internet of PC terminal is approaching saturation day by day, while the mobile Internet is developing rapidly. More and more people hope to access the Internet quickly in the process of mobile to obtain the information they need to achieve what they want to do. Mobile Internet is gradually penetrated into all aspects of people's life and work, all kinds of mobile applications in rapid development, are deeply changes the social life of the information age, mobile Internet after several years of bumpy, finally ushered in the new development peak, mobile terminal price drop and the widespread popularity of wireless networks, the mobile Internet into the era of universal.

## 2.2 Development history of smart phones and Android system

Smartphone is evolved hand-held computers and handheld early is not the function of voice calls, but as people generally use handheld computers to deal with office affairs or all kinds of information, people use of PDA dependence is more and more big, but the PDA is not convenient to carry, so manufacturers to provide services of handheld computers powerful system grafted to the traditional phone, then have appeared on the smartphone. Smartphones are more powerful than traditional phones. They have powerful computing power and fast computing speed. The most mainstream operating systems are: Microsoft's Windows Phone system, apple's iOS system and Google's Android system.

### 2.2.1 Smart phones

Smart phones have their own independent running memory and relatively independent operating system. Users can install the software they need just like computers. These software can make the mobile phone more powerful and process all kinds of information to meet their needs. Currently, mobile phone manufacturers all over the world are making smart phones, among which samsung, apple, HTC and other brands are widely known.

Smart phone has six characteristics: 1, can rely on wireless network to achieve wireless Internet access. 2. More user-friendly, users can better enjoy the upgrade service of the mobile phone itself. 3. It has the operating system with lower permission limit, and can install software according to its own needs to meet the needs, and expand the functions of the mobile phone. 4. With the function of palmtop, users can handle work, chat online and play games while moving. 5, powerful, not only can install the software provided by the service provider, also can install the software provided by the third party. The phone is fast and has a powerful processor.

### 2.2.2 Basic introduction of Android system

Android is developed on the Linux operating system, widely applicable to mobile devices, because the Android operating system for developers operating rights requirements are relatively low, and more intelligent and human, is loved by the majority of people, the development is getting better and better. Android is released by Google in 2007 company, due to its powerful features and humanized operation, overturned the idea of people, make people's lives have changed, and more accord with people's actual need, so the Android market share also gradually to increase, and the rapid development, the development until now, the Android system has occupies most of the market in all intelligent operating system, it also updated a lot of version, by September 2008 the Android1.1 version (first edition), By 2016, various service providers began to push version 6.0 gradually, you can see the continuous progress of android system, its development prospects are very big, is unlimited.

## 2.3 Project status and application prospect

### 2.3.1 Introduction to backgammon

Gobang chess comes from one of the traditional black and white chess in ancient China. It is full of philosophy, which enables users to increase their knowledge and expand their thinking while entertaining, and is conducive to the development of body and mind, so that life can be inspired and influenced. Renju see its name can understand its meaning, its game method is in horizontal, longitudinal, oblique direction and anti-oblique direction, as long as there is the same color of the pieces, connected into 5, you can judge the game's victory and defeat, the requirements of the game is very simple, but its instant change makes it do not lose boring.

### 2.3.2 Current situation and prospect

Games can be said in People's Daily life, in addition to work and study, make people relax one of the entertainment. From ancient times to today, different regions and nationalities have different ways of playing games, and each way of playing brings different feelings to people. Due to the continuous development of modern industrial technology and communication technology, the continuous improvement of living standards, smart phones are lower in cost, and it is very convenient to use, so that the smartphone is being used more and more people, become one of the necessary communication tools, and the development of game on the android will also has a great prospect. Now mobile phones have not previously traditional can be compared, it not only can realize the function of traditional mobile phone, but also can deal with all kinds of data, for the communication and exchange of information, such as read online news, online chat, smart phones have been able to strong like a computer, and run a small network game on mobile phones or casual games can be fully competent,

leisure board games, compared with online games for the performance of the mobile phone and the strength of the network traffic demand is low, and with the game time is relatively short, this way of a few games for many times, can bring in a timely manner to users of entertainment, It can also prevent users from indulging in the game to delay things. This game is based on the Android renju game is a kind of board game, the rules are simple and easy to learn, and the game nature of the ever-changing, making it more in line with the taste of the public.

### **3. Set up the system development environment**

This design is based on the PC environment built virtual machine, to carry out the design and development of gobang chess, with human-machine chess, everyone chess and other functions. This design is based on Windows8 (64-bit) operating system, android virtual system 4.4.2 version to design. The JDK is a software development kit for the Java language that provides a Java development and runtime environment. Android SDK is an android-specific development kit, which is a collection package of some function libraries and other resources needed for developing Android software. The development language is Java, which is one of the necessary components for Android program development. Android ADT is a plug-in specially designed for developing Android programs for Eclipse. The ADT plug-in greatly expands the performance of the Eclipse integrated environment, making the generation and debugging of Android applications easy and fast.

## **4. Overall design of the system**

### **4.1 Demand analysis of the system**

Smartphone along with time in constant development, and to cater to the needs of different users different manufacturers, production out of the different types and different screen size of mobile phone, in order to get a good game when play renju game users experience, also need to consider different screen size, mobile phone display effect, and design a simple game interface, with simple and convenient operation, at the same time provide all game and the man-machine game for players to choose two game modes, especially in people game mode, as far as possible in a shortened system of intelligent algorithm at the same time, to guarantee a certain level of intelligence, for players to challenge.

### **4.2 General design of the system**

When the gobang game starts to run, the initial entry into the game will pop up a welcome interface, the user click the menu button will enter the main menu options, in the menu can choose the different functions of the game, respectively: start game,

double game, about and exit. If users click to start the game, the default is human-computer chess, that is, single-player game, and artificial intelligence game; Clicking on a two-player game allows two users to play the game on one device. If you click on about, it will show the rules of the game renju; If you click exit, you will directly end and exit the game. If the user chooses any one of the modes of human-machine chess and human chess, after the game determines the winner, he can click the menu to select any one of the functions.

#### 4.2.1 Layout of renju interface

No matter what the content of a game is, it is important to make a first impression with a beautiful and simple interface. Game interface layout includes: the welcome screen of the game, the game model of the main interface and game menu to select the main interface, the following mainly introduces the main interface, when the game is mainly composed of two parts, the upper part is main board, according to the lower left for android small robot, according to the right is white and black chess box, respectively, in which a party to play chess, turn your finger will point to which side of the game box, to play chess.

#### 4.2.2 Core algorithm of man-machine battle

After choosing to start the game, the default mode is man-machine chess mode. The game in this mode requires the participation of artificial intelligence, and the artificial intelligence algorithm will play the game with the players. This algorithm can be divided into three parts: first, according to the current situation of chess pieces played by the two sides, it is assumed that the two sides will randomly play a piece of chess for themselves and the other side, and judge whether the game will bring advantages to us or the enemy. Second, according to the previous step of the chess pieces, and combined with each step of the two sides of the chess pieces caused by all the results; Finally, according to the rules of the previous step under the chessmen results in order, and select the best drop position.

## **5. Detailed design of the system**

### 5.1 Description of the board and pieces

The checkerboard and the pieces are both a picture. The checkerboard is a square, a solid circle with a diameter of 16 pixels. It is only used for the display of the interface and to coordinate the drawing of the checkerboard. First define a paint brush object, then two int integer variables to store color, the representative pieces of black and white color is set to pass values, white is 0, 1 in black, for gobang chess pointSize to define an integer variables and the size of the set value of 16, then define a storage and assigned to different color Bitmap array pointArray, stored behind the two colors for preparing pieces fill color. Define a method onSizeChanged beginning to initialize

the board, the number of horizontal lines and vertical lines define two global maxX and maxY integer variables to store the longitude and the lower right corner, fine-tuning xOffset and yOffset coordinates value, make the whole board box in the middle and checkerboard initialization has been basically completed, and then define a createboard method calls to get in front of the number of coordinates and transverse and longitudinal board, the board has a white background drawColor definition, Then load the prepared checkerboard picture file go, and begin drawing the checkerboard and blending it with the background to show the overall checkerboard effect. Both player1 and player2 in the Chessboard class store all the pieces that have been played on their side, so every time either side plays, the refreshCanvas() function redraws the board and all the pieces that have been played on both sides and displays them on the screen.

### 5.2 Victory and defeat judgment of backgammon

Whether to choose what kind of game modes, all need to play the outcome of judgment, the outcome of the gobang judgement is on the board of horizontal, vertical, diagonal and the diagonal to the four directions, judge whether there is a line in any direction with the same color 5 pieces, if there is a victory, if not in the other party to play chess. Judge the winner: Here to win games of lateral determine whether, for example, when doing lateral judgment y coordinate and height should be the same, judgment is with the same piece position on the horizontal direction, the first gets the current by the position of the pieces, and judgment with which is connected to the color of the pieces are the same, to define a Boolean method of Boolean hasWin, Boolean variables only two values, when the return value is false number is 0, when the return value is true serial number is 1, and then define an int type integer variable count initialization value is 1, To save how many of the same color pieces, pieces of judgment through the while loop, first gets the current pieces under the coordinates, starting on the left side of the judgement, namely the current abscissa piece coordinates in turn from minus 1, and count the number of less than 5 conforms to determine conditions, eligible after the count from 1, if the total of the same color of the pieces variable count is greater than or equal to 5 win return true, then the current pieces under the coordinates of the right side of the judgement, namely the current abscissa piece coordinates in turn from + 1, In addition, if the number of count is less than 5, the criteria are met, and if the number of count meets the criteria, the count will be increased by 1. If the count of chessmen variable with the same color is greater than or equal to 5, it will return true. Otherwise, the chessmen will continue to play chess to decide.

## **6. Implementation and testing of the system**

### **6.1 Demonstration of human-computer chess**

In Eclipse, right-click on the project to the software operation mode to choose Android Application, choose to create good Android1 simulator in advance, after the simulator run completely program began to run automatically, first entry is a welcome screen, you can use the mouse to click on the virtual keyboard on the right side of the menu button, the menu will appear at the bottom of the screen the main page, you can to choose the game mode and function. Now you can choose the game mode. When you start the game, you play chess with the human machine. By default, the player chooses sunspot and the sunspot plays chess first.

### **6.2 Demonstration of everyone playing chess**

After clicking the menu button, the screen will appear below the main menu interface, at this time if you choose a double game, is two people on the same device to play chess, the game interface and man-machine game model of the interface, and there is no default rules of the game, the player can define your own rules of the game, just obey the rules of the gobang the outcome of the judgment, the left is pop-up prompts sunspot win and can through the menu to start the game, on the right is the pop-up prompts an albino win and can through the menu to start the game interface.

### **6.3 Game test**

When the program is written, the final debugging of the game is started to ensure the normal operation of the software after the user installs it on the mobile phone. Connect the phone to the computer, then open the Eclipse software to load the project into the phone and test the physical phone. Run gobang game on the phone each module, test the game function implementation process whether there are errors, etc. After the test of the game, the Android renju game can achieve the expected functional requirements, and there are no errors or incompatibilities in the running process.

## **7. Summary**

Renju game is a classic small game, it has the characteristics of simple and easy to learn, and loved by people, and has profound skills. After a period of time for Android knowledge study, make me to the basic knowledge of Android and Android had the further understanding of the game, has experienced many difficulties, a full Android gobang game was basically completed, a little happy proud, at the same time also feel your many insufficiencies, gobang game involves many algorithms, a lot of problems in the design process, through all kinds of information on the net, seek the help of teachers and students, problems also gradually resolved, but gobang game design at

the same time also has many shortcomings, For example, in the process of playing chess, there is no countdown display of playing chess time, which makes me understand that I still have a lot to learn. In the process of designing, I realized that I should actively solve problems to avoid accumulation, learn to analyze and think about how to solve problems, and solve problems is to learn a lot of knowledge in the process of continuous learning. This graduation project is a synthesis of the knowledge learned in the university and a test of my practical ability. I believe it will benefit me a lot in my future study and work.

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