《程序设计课程设计》题目要求

本次课程设计要求同学们使用 C++编程语言，以面向对象编程方式，开发一个狐狸与猎狗棋、五子棋或黑白棋游戏。这三个游戏的规则见本文档附件。

任务安排

开发分为两个阶段进行迭代，对每个阶段的要求如下：

1. 第一阶段：为期 2 周

   a) 实现功能：

      1）能够提供图形化界面供棋手下棋，推荐但不限定使用 FLTK；

      2）能够实现人-人在同一台机器上下棋，即不需要实现网络对战，也不需要实现人-机对战；

      3）能够判断棋手所下的每一手棋是否合法；

      4）能够准确地判断棋局的输赢，并能够终止棋手在有输赢结果的棋局上继续下棋。

   b) 提交制品：

      1）源代码：中间必须编写有助于程序理解的注释；

      2）设计文档：描述设计思路和方案，根据给定的模板写。

2. 第二阶段：为期 2 周

   a) 实现功能：

      1）能够实现人-机对战，但是不要求机器一定要每局都赢；

      2）能够对棋谱进行记录，并能够在棋盘上显示棋谱；

      3）能够按照棋谱的记录，按照行棋顺序复盘，复盘时应该注意每步棋之间的时间间隔。

   b) 提交制品：

      1）源代码：中间必须编写有助于程序理解的注释；

      2）设计文档：描述设计思路和方案，根据给定的模板写；

      3）总结文档：对课程设计全过程的总结。

扩展功能

同学们还可以在上述基础上有选择地设计并实现扩展功能，包括：

1. 指定扩展功能：

    a) 换肤：更换棋盘背景和棋子形状、颜色、图案等；

    b) 回合限时：对每步棋限定时间，超时惩罚，例如判输、随机走棋，或者是空过等；

    c) 棋手等级管理：记录每位棋手的输赢局数，并自定义等级评定等；

    d) 机器角色扮演：可以让机器棋手进行角色扮演，在人类棋手思考过程中出现对话，例如"快点呀！""没招了吧！"等。可以参考三国五子棋中的类似功能。

2. 其他自定义定扩展功能：这部分功能完全由个人发挥，没有限制。

考核目标和方式

本课程的目标是培养学生面向对象程序设计能力和问题解决能力，因此将从程序设计的角度而非人工智能的角度评分。最终成绩由平时成绩和答辩成绩组合而成。各部分所占比例如下：

1. 平时成绩：50%

    a) 第一阶段提交制品：15%

        1）程序设计质量：10%，考核依据为源代码和设计文档

        2）程序编写质量：5%，考核依据为源代码

    b) 第二阶段提交制品：25%

        1）程序设计质量：15%，考核依据为源代码和设计文档

        2）程序编写质量：10%，考核依据为源代码

    c) 学生参与课程的程度：10%

2. 答辩成绩：50%

    a) 程序演示：30%

        1）实现第一阶段与第二阶段的所有功能：20%

        2）实现扩展功能：10%

    b) 答辩：20%

        1）宣讲：10%

        2）回答问题：10%

    c) 答辩形式：每位同学先进行自述，并演示程序，然后回答答辩委员组的提问。其中，自述和演示程序的时间为 10 分钟，回答问题 10 分钟，共 20 分钟。

d) 答辩委员组：即课程指导小组成员，各成员的打分需进行加权平均，其中指导教师占 60%，每个学生指导助教占 20%，其他所有助教占 20%

附件：三个棋类游戏的规则

A．狐狸与猎狗棋(Fox and Hounds)

以下内容来自维基百科 **http://en.wikipedia.org/wiki/Fox_and_hounds**
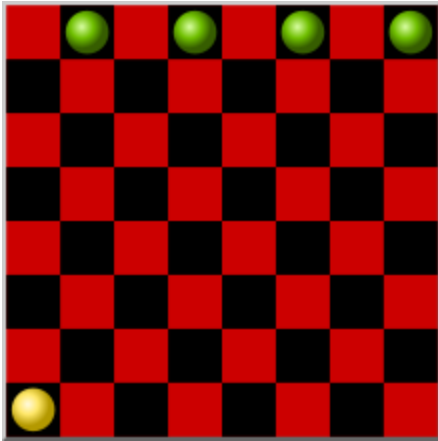
This version (also called "Wolf and Sheep," "Hounds and Hare," or "Devil and Tailors") is played on an 8×8 chess/checkerboard., and only the dark squares are used. The four hounds are initially placed on the dark squares at one edge of the board; the fox is placed on any dark square on the opposite edge. The objective of the fox is to cross from one side of the board to the other, arriving at any one of the hounds' original squares; the hounds' objective is to prevent it from doing so.

The hounds move diagonally forward one square. The fox moves diagonally forward or backward one square. There is, however, no jumping, promotion, or removal of pieces. The play alternates with the fox moving first. The player controlling the hounds moves only one of them per turn.

The fox is trapped when a hound occupies all four of its potential move squares. Alternatively, two hounds may trap the fox against an edge of the board (other than their original home-row). There is even one corner (see diagram) where a single hound may do the trapping. It may be noted that should a hound reach the fox's original home row, it will no longer have any potential moves.

Perfect play will result in a "hounds" victory, even if the fox is allowed to choose any starting square and to pass his turn once during the game.

B. 五子棋(Gomoku)

以下内容来自维基百科 http://en.wikipedia.org/wiki/Gobang

from: http://www.gnustep.it/nicola/Applications/Gomoku/
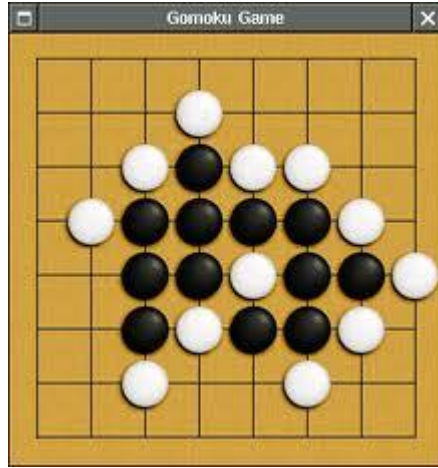
Gomoku is an abstract strategy board game. Also called Gobang or Five in a Row, it is traditionally played with Go pieces (black and white stones) on a go board (19x19 intersections); however, because once placed, pieces are not moved or removed from the board, gomoku may also be played as a paper and pencil game. This game is known in several countries under different names.

Black plays first, and players alternate in placing a stone of their color on an empty intersection. The winner is the first player to get an unbroken row of five stones horizontally, vertically, or diagonally.

The name "Gomoku" is from the Japanese language, in which it is referred to as gomokunarabe (五目並べ). Go means five, moku is a counter word for pieces and narabe means line-up. The game is also popular in Korea, where it is called omok (오목(五目)) which has the same structure and origin as the Japanese name. It is said to have originated in China with the name Wu Zi Qi (五子棋). In the nineteenth century, the game was introduced to Britain where it was known as Go Bang, said to be a corruption of Japanese goban, said to be adopted from Chinese k'i pan (qíbàn) 'chess-board

C. 黑白棋(Reversi/Othello)

以下内容来自维基百科 http://en.wikipedia.org/wiki/Reversi

Where light may play
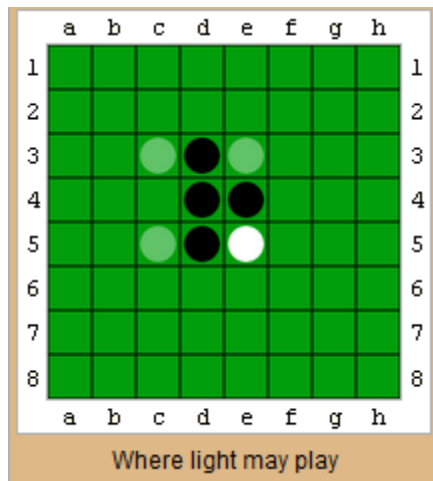
Reversi (marketed by Pressman under the trade name Othello) is a strategy board game for two players, played on an 8x8 board (similar to chess and checkers, with the theoretically meaningless difference that the board in reversi is usually monochrome aside from lines separating the individual squares).

There are 64 identical pieces called 'disks' (often spelled 'discs'), which are light on one side and dark on the other—physically with an actual set, or conceptually via computer—to correspond with the opponents in a game. In most cases a game consists of placing all of these up to a full board, but exceptions occur if neither player has a legal move.

Though the original rules of reversi were such that each player was limited to using no more than half of the disks (those in possession at the start), this rule has long been out of common practice; and, if using a physical board and pieces, the player whose turn it is simply retrieves a disk that is in possession of the opponent as needed. This means that there is now only one way a player will pass (always involuntarily) rather than place a disk, while formerly there were two.

Each player's objective is generally to have as many disks one's own color at the end as possible and for one's opponent to have as few—or, technically in consideration of the occasional game in which not all disks are placed, that the difference between the two should be as large as possible if the winner and as small as possible if the loser. However, simply winning is the basic goal, and maximizing the 'disk differential' is regarded as ancillary. (It may have more or less weight depending upon such things as tournament tiebreaks.)