

Program Design Group Assignment – Weighting 30%

This project is to create a blackjack game using scratch - and to implement a strategy for playing blackjack.

The game is between a 'virtual' dealer and one or more players. The game uses a between 1 and 4 decks of 52 cards.

Betting

The player starts with a total score of 1000. The player can bet any integer amount on a hand (each round) between 1 and their current total. If the player wins a hand their bet is added to their total, if they lose a hand their bet is subtracted from their total, if the hand is drawn then their total remains the same. The player can continue playing until their total is 0, but can choose to leave the game after any hand.

Dealing

Initially two cards will be dealt to both the dealer and the player. Only one of the dealers cards is revealed to the player. Once these cards are dealt the player has two choices, to stick or hit. The aim of the game is to get a score as close to 21 without going over 21 (the scoring is explained below).

If the player chooses to hit he will receive another card from the dealer. After receiving the card the player again has a choice to stick or hit - unless the new card brings the players total over 21 in which case the player loses the round (goes bust).

If the player chooses to stick that means they are finished receiving cards for this round and it is up to the dealer to try to beat his score.

Once the player has completed their hand the dealer then completes their own hand. The dealer must continue to hit until their hand has reached 17 or higher (a dealer total of 17 including an ace valued as 11, also known as a "soft 17", should count the ace as one and hit again).

Scoring

An ace can be worth 1 or 11 (11 while the total is under 21 and 1 if 11 takes the total over 21).

Number cards are scored by their number (2-10).

Picture cards are worth 10 each.

The best possible hand, a Blackjack, is an ace and a 10 or picture card (11+10=21). All other hands are judged by their score alone.

If the player holds a score of 22 or more, he is busted and thus he loses his bet immediately.

If the dealer busts, the player wins independently of their final score.

If neither the dealer or player are busted, then the winner is the one with the highest score.

If the scores are equal then the bet is returned to the player with no gain or loss. If the player wins, the amount they bet is returned to their total along with their winnings. If the player loses then their bet is taken from them and removed from their total.

Requirements:

Each group is required to implement a blackjack game with an automated dealer and an automated player. A testing mode must be present so that the strategy of the automated player can be tested over many hands (suppress any messages for this mode so it can be run quickly). The testing mode should include a loop to run many rounds of the game. The number of rounds and amount to bet per hand should be parameters in the testing mode.

This project will require implementation of many of the concepts learned during the course, research on blackjack strategy and the creation of a test to see how well your program performs. Please make sure everyone in the group understands the program. It is the responsibility of the group to work together – this requires cooperation and patience. Please be generous to your fellow members.

Group Participation and Management (Each student is marked individually) - Weighting: 10%

Each team will start a team-drive on Google Drive. This will be the team's collaborative space. The minimum requirement is weekly updates including a breakdown of tasks for each individual in the group, goals set for the next week and goals achieved. Attendance of each individual at group meetings (lab sessions) must also be noted – if it is not it will be assumed there was no meeting for that week and the group will be marked accordingly. Likewise, if tasks are not recorded students will be marked accordingly. You are encouraged to meet outside lab sessions also, please record these meetings too.

Students are also encouraged to share files and record communications on the team drive.

Your lab advisor and lecturer must both be invited to your team drive to monitor your progress.

Design – Flowchart and Documentation - Weighting: 10%

- Create a document describing how your program works. You should create flowcharts to illustrate the high-level operation of your program. You can use flowcharts or pseudocode to explain the lower level details. Use yEd Diagram Editor to draw your flowchart (if you use some other software please submit the flowchart as a pdf).
- Provide appropriate error checking and user interaction.

Programming in Scratch, Weighting: 10%

This assignment gives you an opportunity to practice computational thinking with a simple programming language and tool called Scratch.

Your Scratch Project

- You will create a project implementing the game described above.
- You will include a README file (PDF) that explains how to interact with your project, including how to run the test mode.
- Please list any sources of images, sounds used in your project. (That is to say that you can take images from the web to use with your sprites, but you must give credit.)

Assignment Submission:

This assignment has a due date of 26-11-2019. You need to submit all your assignment related files as a zip file via Brightspace.

The submission should include:

- Scratch.pdf (steps for solving the problem, problem description etc.)
- Flowchart.pdf (description of the flowchart and the steps to solve the problem)
- the ScratchGame
- the Flowchart (the source file)
- and any other files you want to be considered for marking.

Late Submissions will be penalised as described in Lecture 1 (on BrightSpace)