Five Crowns Manual

Improvements made:

1. The user with the least points wins the game compared to greater points winning the game.

Bug Report:

1. If the computer wins right off the bat, it doesn't allow for the human to play it's turn. However, this doesn't happen if the human wins right off the bat, if the human wins right off the bat, it allows for the computer to have it's turn before proceeding. This bug will be fixed in the coming Python project.

Feature Report:

1. Missing features: None
2. Extra features: Allows for two help modes, regular and extended.
3. Player can enter their name so as to personalize the game.

Data structures/classes used:

1. **fivecrowns:**

This is the driver of the game. It calls upon the singleton instance of the round class and starts up a round and goes until the round count hits 11. After all rounds are done, it tallies the scores and prints out the winner.

2. **gameRound**

This is a singleton class which holds that one instance of round to be operated upon throughout the game. It resets itself at the end of each round and starts itself up with updated information.

3. **newCardCollection**

This is where all the strategizing takes place. The newCardCollection class will hold a collection as a vector of cards and then operate on it to provide many functionalities such as checking whether the user can go out or not, how many runs the user has currently, how many books the user has, how many jokers or wildcards it used and so on. It uses a matrix representation of the hand to do all this. The newCardCollection has three passes that it can make through the matrix tackling various cases such as deciding which book or which run to prioritize (if one card belongs to one or more books or runs) and where to use the jokers or wildcards best.

4. **Brain**

The brain class makes decisions on behalf of the computer and also helps the user out if they ask for it. It makes decision with the help of the newCardCollection to choose which card to pick, which to drop and so on.

5. **Card**

This is the card class that represents the card through strings. One for suit, one for rank.

6. **Deck**

This is the deck class that holds the deck as a vector of cards.

7. **Player**

This class holds all the information and functionalities belonging to a player in the game. Two classes inherit from it and it also allows for function overriding in child classes.

8. **Human**

Human inherits from player class. A humans turn is different from a computer so function overriding aka polymorphism is used here.

9. **Computer**

Computer inherits from player class. A computer turn is different from a computer so function overriding aka polymorphism is used here.

10. **Serialization**

This class helps to serialize the game. Saving and loading is done with the help of this class.

Log

September 8, 2019 -

- Thought about the basic class design and worked on the implementation.
- Wrote out the simple class structure for card and deck in code

September 9, 2019
- Worked on deck initialization.
- Deck creation complete

September 10, 2019
- Changed to using vectors instead of arrays for the deck
- Added a joker child class that inherits from card class
- Removed the joker child class that inherits from card class, only created complications

September 11, 2019
- Switched to using pointer manipulation for efficiency rather than doing copies of objects everywhere
- Creation of round class, ability to deal cards to players

September 12, 2019
- The round is instantiated, coin tossed, cards distributed to draw pile, discard pile, to player hands.
- Players can now take turns
- No longer using pointer manipulation, the overhead considered measly

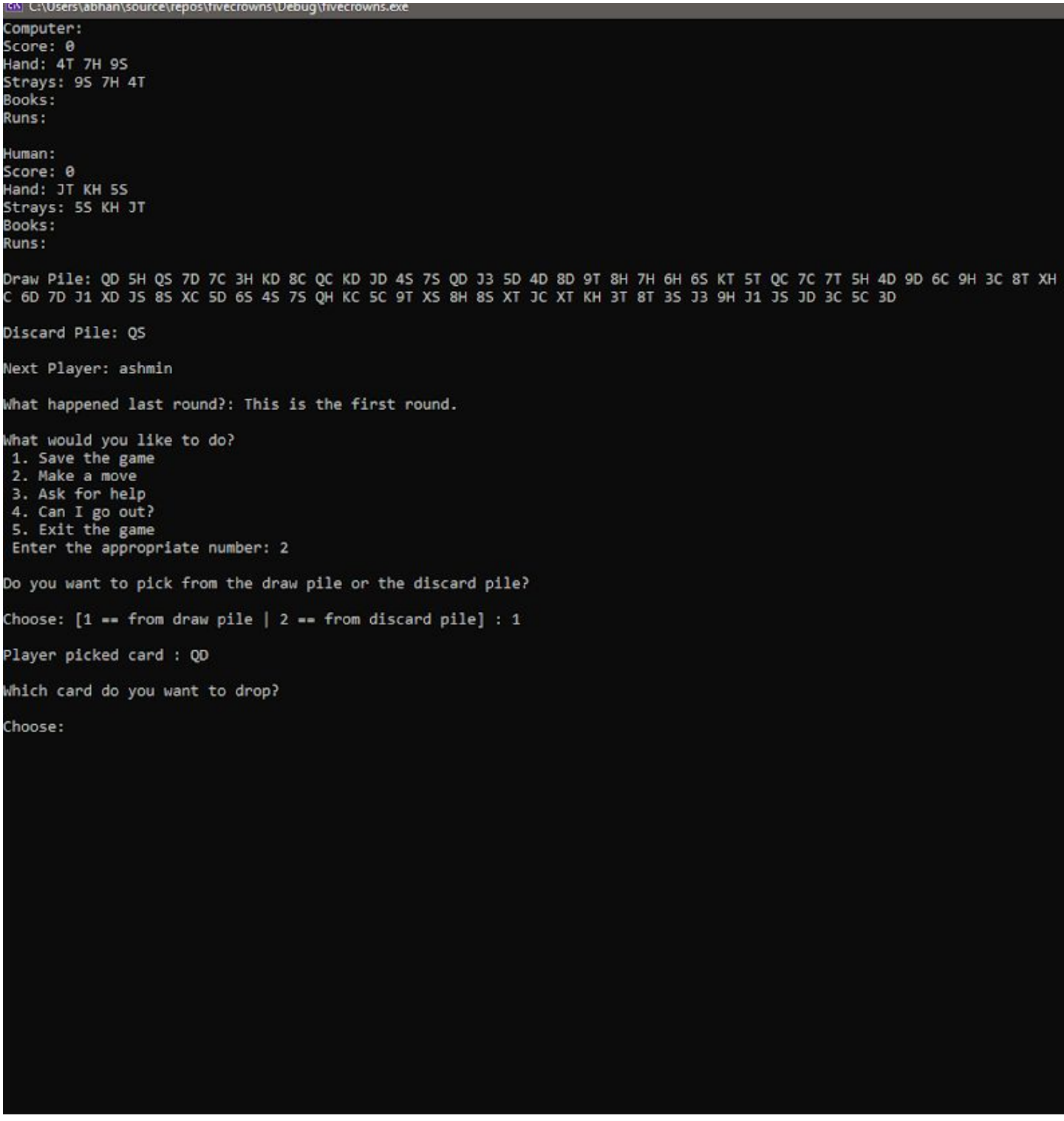
September 16, 2019
- Stuck on a read access violation bug for the past couple of days
- Solved the read access violation
- ERROR LOG: The human and computer instances went out of scope when the function in which it was created went out of scope, so I was trying to read out of nothing. Instantiating human and computer, two player objects, as data members solved the problem

September 17, 2019
- Player can pick and drop card, so can the computer.
- The computer picks and drops cards randomly at this point.
- Boiler code to check whether it was a book or not, getting into the problem for real

September 25, 2019

- Have been working on a card collection class since the first milestone. Trying to tell if a user can go out. How many cards are there in a book? How many runs?
- Approached the problem using a sorting way, in which I create a multimap first with the rank as keys and then the suit as keys. This way, found out how many books or runs there are in the class but since once card may only be used for a book or a run, ran into a couple of tricky edge cases with collisons. Trying to solve that and trying to think of a better approach to the problem.

SCREENSHOTS


C:\Users\abhan\source\repos\fivecrowns\Debug\fivecrowns.exe
Computer:
Score: 0
Hand: 4T 7H 9S
Strays: 9S 7H 4T
Books:
Runs:
Human:
Score: 0
Hand: JT KH 5S
Strays: 5S KH JT
Books:
Runs:
Draw Pile: QD 5H QS 7D 7C 3H KD 8C QC KD JD 4S 7S QD J3 5D 4D 8D 9T 8H 7H 6H 6S KT 5T QC 7C 7T 5H 4D 9D 6C 9H 3C 8T XH
C 6D 7D J1 XD JS 8S XC 5D 6S 4S 7S QH KC 5C 9T XS 8H 8S XT JC XT KH 3T 8T 3S J3 9H J1 JS JD 3C 5C 3D
Discard Pile: QS
Next Player: ashmin
What happened last round?: This is the first round.
What would you like to do?
1. Save the game
2. Make a move
3. Ask for help
4. Can I go out?
5. Exit the game
Enter the appropriate number: 2
Do you want to pick from the draw pile or the discard pile?
Choose: [1 == from draw pile | 2 == from discard pile] : 1
Player picked card : QD
Which card do you want to drop?
Choose:

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What happened last round?: This is the first round.

What would you like to do?
 1. Save the game
 2. Make a move
 3. Ask for help
 4. Can I go out?
 5. Exit the game
 Enter the appropriate number: 2

Do you want to pick from the draw pile or the discard pile?

Choose: [1 == from draw pile | 2 == from discard pile] : 1

Player picked card : QD

Which card do you want to drop?

Choose: 5S

Player dropped card : 5S

Here's what happened during this move:
The hand: JT KH QD
Remaining cards: QD KH JT
Runs made:
Books made:


Round: 1

Computer:
Score: 0
Hand: 4T 7H 9S
Strays: 9S 7H 4T
Books:
Runs:

Human:
Score: 0
Hand: JT KH QD
Strays: QD KH JT
Books:
Runs:
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Draw Pile: QS 7D 7C 3H KD 8C QC KD JD 4S 7S QD J3 5D 4D 8D 9T 8H 7H 6H 6S KT 5T QC 7C 7T 5H 4
D J1 XD JS 8S XC 5D 6S 4S 7S QH KC 5C 9T XS 8H 8S XT JC XT KH 3T 8T 3S J3 9H J1 JS JD 3C 5C 3

Discard Pile: 4T 5S QS

Next Player: ashmin

What happened last round?: This is the first round.

What would you like to do?
 1. Save the game
 2. Make a move
 3. Ask for help
 4. Can I go out?
 5. Exit the game
 Enter the appropriate number: 3
  Help modes: (1). Regular : Will not look at the draw pile card. (2). Extended: Will look at
  REGULAR or EXTENDED? [1 or 2]: 2


Extended strategy:
Picking from the discard pile makes not positive difference, so I picked QS from the draw pil

What would you like to do?
 1. Save the game
 2. Make a move
 3. Ask for help
 4. Can I go out?
 5. Exit the game
 Enter the appropriate number:
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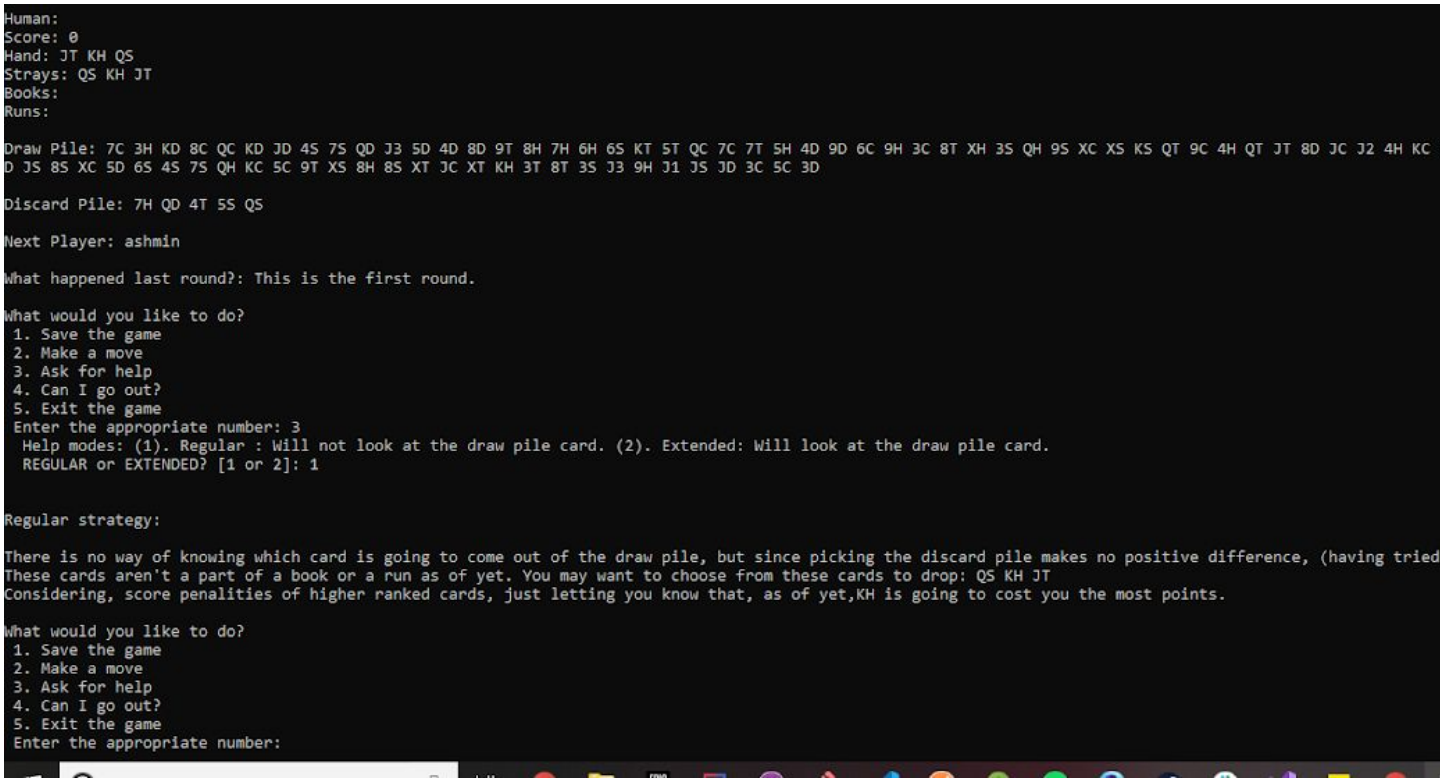
Human:
Score: 0
Hand: JT KH QS
Strays: QS KH JT
Books:
Runs:
Draw Pile: 7C 3H KD 8C QC KD JD 4S 7S QD J3 5D 4D 8D 9T 8H 7H 6H 6S KT 5T QC 7C 7T 5H 4D 9D 6C 9H 3C 8T XH 3S QH 9S XC XS KS QT 9C 4H QT JT 8D JC J2 4H KC
D JS 8S XC 5D 6S 4S 7S QH KC 5C 9T XS 8H 8S XT JC XT KH 3T 8T 3S J3 9H J1 JS JD 3C 5C 3D
Discard Pile: 7H QD 4T 5S QS
Next Player: ashmin
What happened last round?: This is the first round.
What would you like to do?
1. Save the game
2. Make a move
3. Ask for help
4. Can I go out?
5. Exit the game
Enter the appropriate number: 3
Help modes: (1). Regular : Will not look at the draw pile card. (2). Extended: Will look at the draw pile card.
REGULAR or EXTENDED? [1 or 2]: 1
Regular strategy:
There is no way of knowing which card is going to come out of the draw pile, but since picking the discard pile makes no positive difference, (having tried
These cards aren't a part of a book or a run as of yet. You may want to choose from these cards to drop: QS KH JT
Considering, score penalities of higher ranked cards, just letting you know that, as of yet,KH is going to cost you the most points.
What would you like to do?
1. Save the game
2. Make a move
3. Ask for help
4. Can I go out?
5. Exit the game
Enter the appropriate number:

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Draw Pile: 7C 4C XC 6T 7S JH 9S 7T 5H KT 4T JC 7H KS 7H 8T 3T 5S KC QD 5C XS 7T KH JT QC 4C J3 9H 8S J2 XT JC 3H 7D 7S 3C QS 8C 3S 9S 9D J
D XS KT 8H 9C QH 9T 9D 3S 5D 4H 6S 9T JH 4S 5T JT 6D 4H 4S 8H 5H QD KD 4D 6D JD KD QS 8S 6C JS 5T 7D

Discard Pile: 9H

Next Player: Computer

What happened last round?: This is the first round.

Round: 1

Computer:
Score: 0
Hand: J1 3D 3C
Strays: QS KS
Books:
Runs: 5S 4S 3S 8S 7S 6S JS XS 9S

Human:
Score: 0
Hand: KC JD 6H
Strays: KC JD 6H
Books:
Runs:

Draw Pile: 7C 4C XC 6T 7S JH 9S 7T 5H KT 4T JC 7H KS 7H 8T 3T 5S KC QD 5C XS 7T KH JT QC 4C J3 9H 8S J2 XT JC 3H 7D 7S 3C QS 8C 3S 9S 9D J
D XS KT 8H 9C QH 9T 9D 3S 5D 4H 6S 9T JH 4S 5T JT 6D 4H 4S 8H 5H QD KD 4D 6D JD KD QS 8S 6C JS 5T 7D

Discard Pile: 9H

Next Player: Computer

What happened last round?: This is the first round.

What would you like the computer to do?
 1. Save the game
 2. Let the computer make a move
 3. Quit the game
 Enter the appropriate number:
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