Lab Project 2 Mastermind AI

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Pseudocode:

```
FUNCTION AI(rr: CHAR, rw: CHAR) -> STRING
    DEFINE lambda functions for different steps in the AI guessing process
    DEFINE static variables to keep track of historical values of guesses
and results
    STORE the results from the last guess in grr and grw
    IF first step is not completed
        CALL firstStep function
              SET each position of sGuess to the current guess number
               IF rr is greater than 0 and guess is not 0
                   SAVE the correct previous digits in digits
               ENDIF
               IF rr is 0 and guess is not 0 and less than 10
                   SAVE the incorrect digits for guessing in wGuess
               ENDIF
               IF all four digits have been found or if guess is 9
                   COMPLETE this step

    ELSE IF second step is not completed
        CALL secondStep function
              SET sGuess to wGuess
              IF rr is 1 and the counter for this step is not 0
              SAVE the first digit in its correct position in wGuess
              COMPLETE this step
              IF this step is not completed
               FILL each position of sGuess with the first digit until
       this step is completed


    ELSE IF third step is not completed
        CALL thirdStep function
              SET sGuess to wGuess
              IF rr is 2 and the counter for this step is not 0
              SAVE the second digit in its correct position in wGuess
              COMPLETE this step
              ENDIF
```

```
            IF this step is not completed
            FILL each position of sGuess with the second digit until
      this step is completed

    ELSE IF fourth step is not completed
        CALL fourthStep function
            SET sGuess to wGuess
            IF rr is 3 and the counter for this step is not 0
            SAVE the third digit in its correct position in wGuess
            COMPLETE this step
            IF this step is not completed
            FILL each position of sGuess with the third digit until
      this step is completed


    ELSE
        CALL fifthStep function

            INCREMENT the counter for this step until it reaches a
position that has not been filled by previous steps
            SAVE the fourth digit in its correct position in wGuess
            SET sGuess to wGuess


    PRINT the results if guess is not 0
    SAVE the result in aGuess array
    INCREMENT guess counter
    RETURN sGuess as the result of the function
END FUNCTION
```

Goal:

Generate a code that uses the sequence 0000, 1111, 2222, 3333 etc. Inputs are the 2 clues, the output is the next guess.

Create your AI function whose output is the next guess to break the code. When you have all 4 digits, use them to find the right positions. You should be able to break the code faster than a Binary Search.

What we know:

This is a C++ program that plays the game Mastermind. The program generates a random 4-digit code, and the AI tries to guess the code. The AI makes a guess, and the program evaluates the guess by returning the number of digits that are correct and in the correct position (variable ‘rr’) and the number of digits that are correct but in the wrong position (variable ‘rw’). The AI uses this information to make its next guess. The game continues until the AI correctly guesses the code.

Variables and Functions:

1. `firstDigit()`: This function finds the correct digits of the secret number by filling each position of the guess with the current guess number. It also saves the correct previous digits and incorrect digits for guessing.
2. `secondDigit()`: This function finds the position of the first digit by filling each position of the guess with the first digit until the step is completed.
3. `thirdDigit()`: This function finds the position of the second digit by filling each position of the guess with the second digit until the step is completed.
4. `fourthDigit()`: This function finds the position of the third digit by filling each position of the guess with the third digit until the step is completed.
5. `fifthDigit()`: This function gives the final guess by filling the remaining position with the fourth digit.

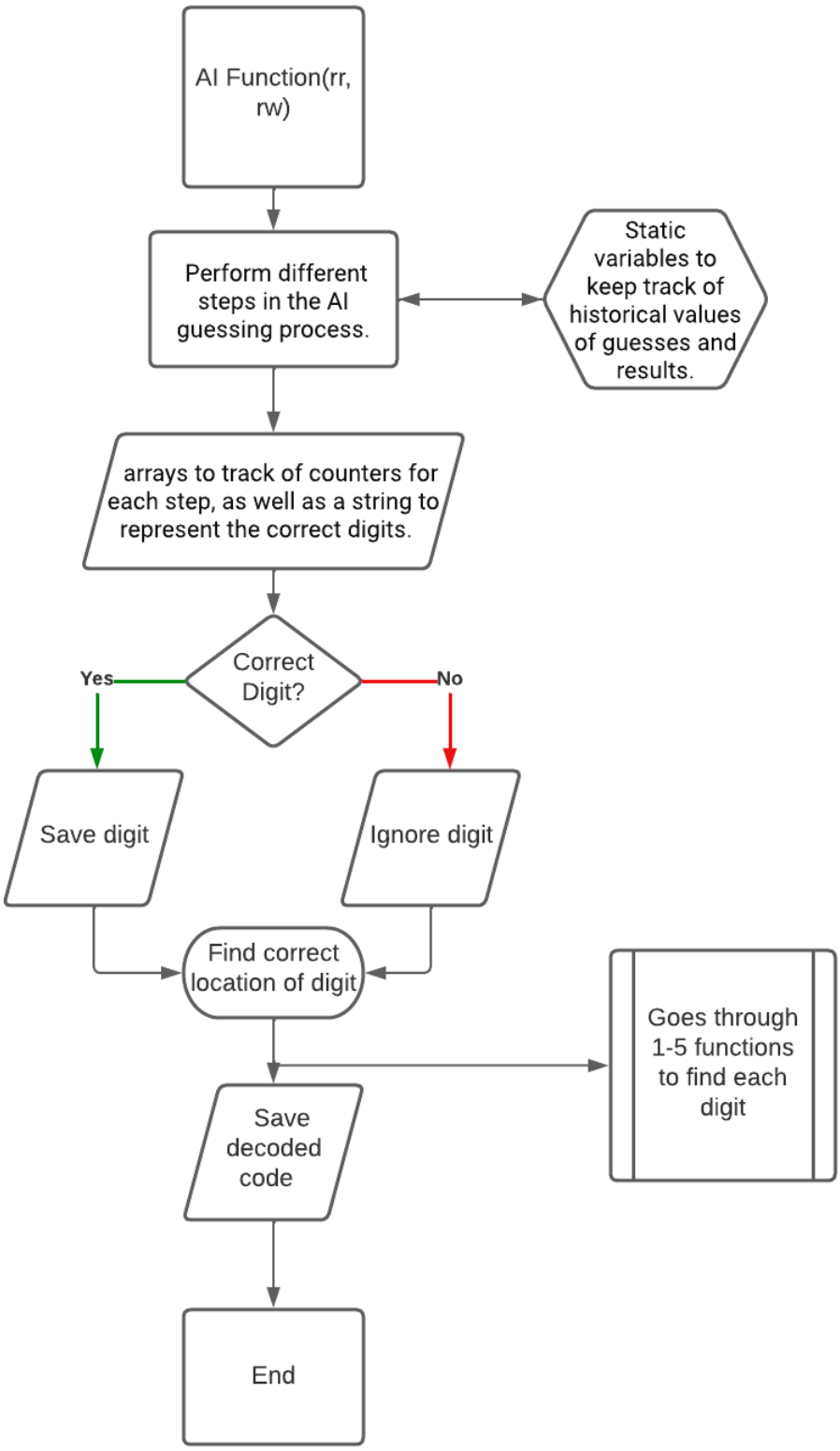
The function also defines several static variables to keep track of historical values of guesses and results. These variables include:

- `aGuess`: an array of strings to save the guesses
- `grr`: an array of chars to save right guesses in right spots
- `grw`: an array of chars to save right guesses in wrong spots
- `guess`: an integer counter to keep track of the number of guesses
- `sGuess`: a string to represent the current guess
- `wGuess`: a string to save wrong guesses for testing

The function also defines several variables for use in the AI guessing process. These include:

- `counters`: an array of integers to keep track of counters for each step
- `digits`: a string to represent the correct digits
- `steps`: an array of booleans to keep track of whether each step has been completed

The AI guessing process involves checking whether each step has been completed and calling the corresponding lambda function if it has not. Once all steps have been completed, the final guess is returned as a string.


AI Function(rr, rw)
Perform different steps in the AI guessing process.
Static variables to keep track of historical values of guesses and results.
arrays to track of counters for each step, as well as a string to represent the correct digits.
Correct Digit?
Yes
No
Save digit
Ignore digit
Find correct location of digit
Goes through 1-5 functions to find each digit
Save decoded code
End