CS 790K: Genetic Algorithms

Homework Assignment # 1

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1. **The Problem**
   Same as the last homework, except: the *vec*'s size (150), and that now we don't know what is the maximum value.

2. **Problem Solving** I have used two different methods for this problem

   - Exploration-and-exploitation
     Randomly distribute 70 to 75 one's in the *vec* and store the *vec* sequence with maximum returned value. The program ran about 7 full days and nights and I found several sequences with the value of 64.
   - GA method
     I wrote a GA C++ program for this problem. I ran this program with 3 different cases in the poplation size, number of generations, and mutation probability. The maximum value I got is 56. I need more time on the improvement of a GA implementation of a certain problem.

3. **Results**

   - Exploration-and-exploitation

```
value = 64 The sequence is:
011011001011001000101001111000100011010110001001001001111000111000
011110110101100101011101000110110101101111001101001101101000100100
01110000000111100001

value = 64 The sequence is:
1010101011011000110111001101110110111000110011100101100110110001010
0011011111010110000111000110001000100101000010100010000010010011010
1001101111011001001

value = 64 The sequence is:
1100010010110000110111000010001110110101110011100001100100110011000
1111001110011111111110000000100000100111010001111011110100001100100
010000111110010010

value = 64 The sequence is:
01100110101001010101001101100101101100101000000001001110100001111111
```

```
0111100101011110101011110101100110110001010100000001101111100111001
0000011001100101

value = 64 The sequence is:
1001110101101001010000111011101000110111001001010111000010010010101
1110001001100011010010101111110110101101010101010000011110011000110
1011000000001101
```

- GA method

```
Fitness changed at generation = 162       fitness =  56 the sequence is
1110010010010110001100100001101100010000011101000110111110100011011 0
0101011011000001010001101011101101101100101110111010000010100111011 1
00100110100010
```

4. **The Code**
   Attached are the C++ classes and several test drives. Those are very short and simple.

   - *guess.cpp*: a class for explore-and-exploit.
   - *mainFromTo.cpp*: test drive for explore-and-exploit.
   - *hw1.cpp*: test drive for GA method.
   - *hw1Class.cpp*: GA C++ calss.