**Longest Consecutive Sequence**

* **Question Description:**

Given an unsorted array of integers, find the length of the longest consecutive elements sequence.

* **Required Complexity:**

O(n)

* **Input**:

[100, 4, 200, 1, 3, 2]

* **Explanation:**

The longest consecutive elements sequence is [1, 2, 3, 4]. The longest consecutive sequence length is 4.

* **Analyze:**

1. Select the max value from input array.

max\_value = 200

1. Create a hash table with the size of max value in the input array. The hash table is used to store whether the value appears in the input array.

(Zero indicates that the value doesn’t appear in the input array meanwhile one indicates that the value appears in the input array.)

[0, 1, 2, 3, 4, 5, 6, …, 100, ......, 200]

[0, 1, 1, 1, 1, 0, 0, …, 1, ........, 1]

which stands for:

hash\_table [0] = 0, hash\_table [1] = 1, hash\_table [2] = 1, hash\_table [3] = 1, hash\_table [4] = 1, hash\_table [5] = 0, hash\_table [6] = 0, ......,

hash\_table [100] = 1, hash\_table [101] = 0, ......, hash\_table [200] = 1

1. Create a statistical table which is used to sum up the total 1 in hash table before the current value sequentially. Go through the whole hash table:

If meets 0, initializes sum = 0;

Else meets 1, add one on the current sum value;

Assign the sum value to the corresponding value on the Statistical Table.

[0, 1, 2, 3, 4, 5, 6, …, 100, ......, 200]

[0, 1, 1, 1, 1, 0, 0, …, 1, ........, 1]

which stands for:

hash\_table [0] = 0, hash\_table [1] = 1, hash\_table [2] = 1, hash\_table [3] = 1, hash\_table [4] = 1, hash\_table [5] = 0, hash\_table [6] = 0, ......,

hash\_table [100] = 1, hash\_table [101] = 0, ......, hash\_table [200] = 1

Initialize sum = 0

* + First Round:

hash\_table [0] = 0 and sum = 0.

Assign statistical\_table [0] = sum = 0.

* + Second Round:

hash\_table [1] = 1 and sum = 0.

sum ++ -> sum = 1

Assign statistical\_table [1] = sum = 1.

* + Third Round:

hash\_table [2] = 1 and sum = 1.

sum ++ -> sum = 2

Assign statistical\_table [2] = sum = 2.

* + Forth Round:

hash\_table [3] = 1 and sum = 2.

sum ++ -> sum = 3

Assign statistical\_table [3] = sum = 3.

* + Fifth Round:

hash\_table [4] = 1 and sum = 3.

sum ++ -> sum = 4

Assign statistical\_table [4] = sum = 4.

* + Sixth Round:

hash\_table [5] = 0 and sum = 4.

sum = 0

Assign statistical\_table [5] = sum = 0.

...

* + 200th Round:

hash\_table [200] = 1 and sum = 0.

sum ++ -> sum = 1

Assign statistical\_table [200] = sum = 1.

1. Go through statistical table and get the max value as the longest consecutive sequence length.

In the above example, the max value equals to 4.

* **Special Circumstances:**

Input array is empty, then the longest consecutive sequence length = 0.

* **Space Complexity**

O(n)

* **Speed Complexity**

O(n)