2021级计科中外C++期末考试报告

222021321102077　　赵淳屹

2021级计科中外C++期末考试报告
程序总结
任务回应
程序中用到的类及其关系
主要算法流程
运行效果

程序总结

本程序主要了调用STL中的***<vector>***，***<queue>***以及C++11中的***<random>***等库，充分运用了多态，继承，封装，函数重载，独立编译等C++知识，以及少量的概率统计知识。最后的程序以30分钟为一个大周期，模拟核酸检测站排队做核酸这一情景，程序每分钟会打印出不同检测点的排队人员的信息，并且站点的个数会就排队人员的数量进行动态调整。最终用户只需要通过提示界面输入非0的任意数就可以反复模拟30分钟周期的做核酸情况。

任务回应

本次考试的1,2,3大题的需求本程序均已实现。
在程序中的体现和大致思路如下：

1. 对于第1大题

   主要通过 `CCollectionStationOperation.h` 头文件中定义的 `GeneratePeople( )` 函数实现 。其中的信息生成和数值范围控制借助***<random>***库结合一些概率统计知识实现。生成的警察和普通人对象均存储在他们基类的指针vector中，便于我们后续访问以及实现多态操作。

2. 对于第2、3大题

   我们的基本思路是以1分钟为基本单位，我们将两种不同类型的检测点的指针都存储在相应的vector中，每分钟我们调用 `GeneratePeople( )` 函数随机生成10~50个来排队做核酸的人，把他们的指针存在一个vector中，我们通过遍历这个vector从而对每个人完成分配检测站的工。在遍历中我们也根据普通站点排队人数对普通站点的个数进行实时调整，一分钟结束我们输出每个检测点的排队人员信息，并且更新做完核酸后的每个检测点实例的queue属性。循环30次，便模拟了题目要求的30分钟的时间段。

程序中用到的类及其关系

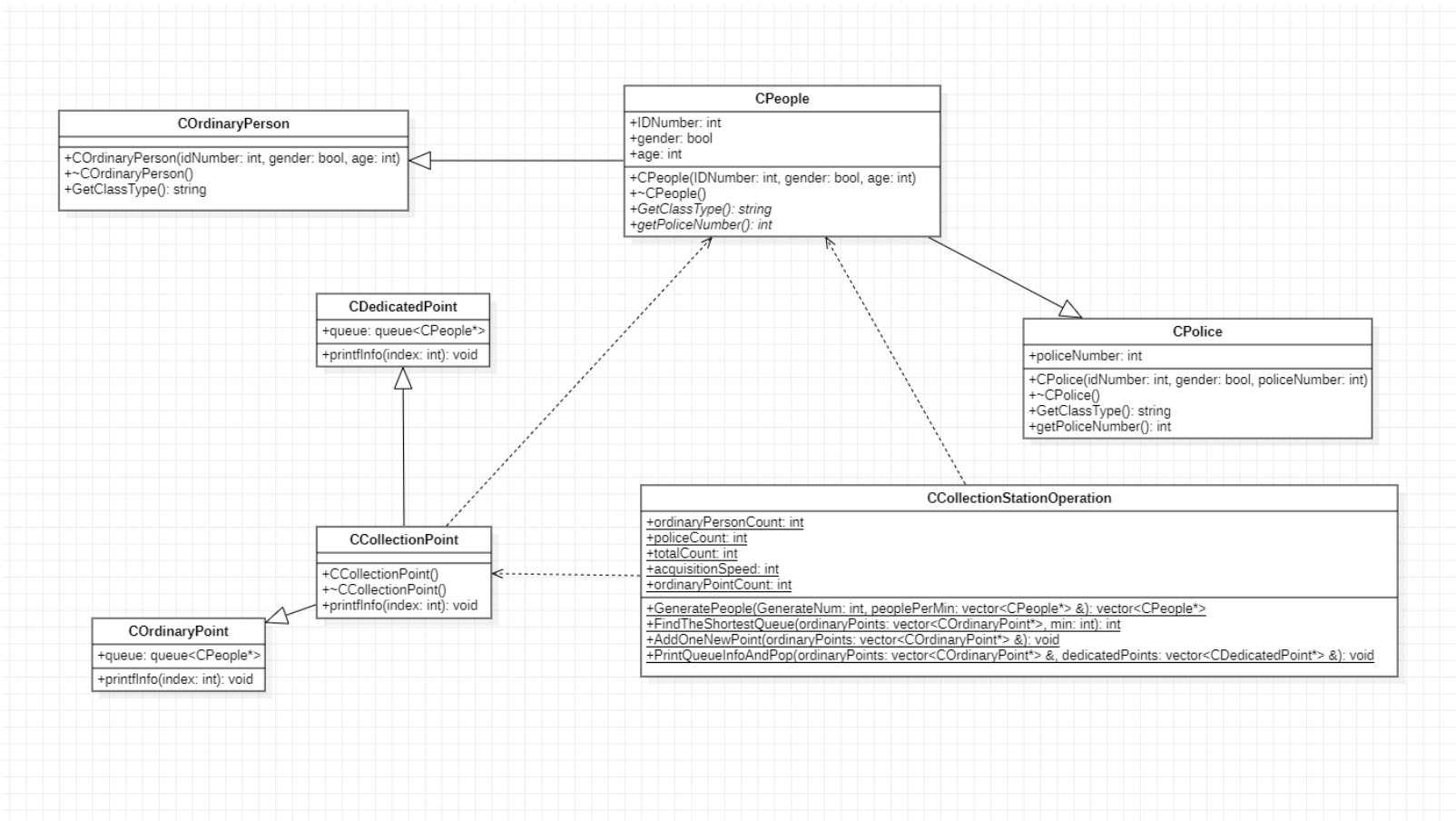

Fig1.程序中用到的类及其关系

主要算法流程

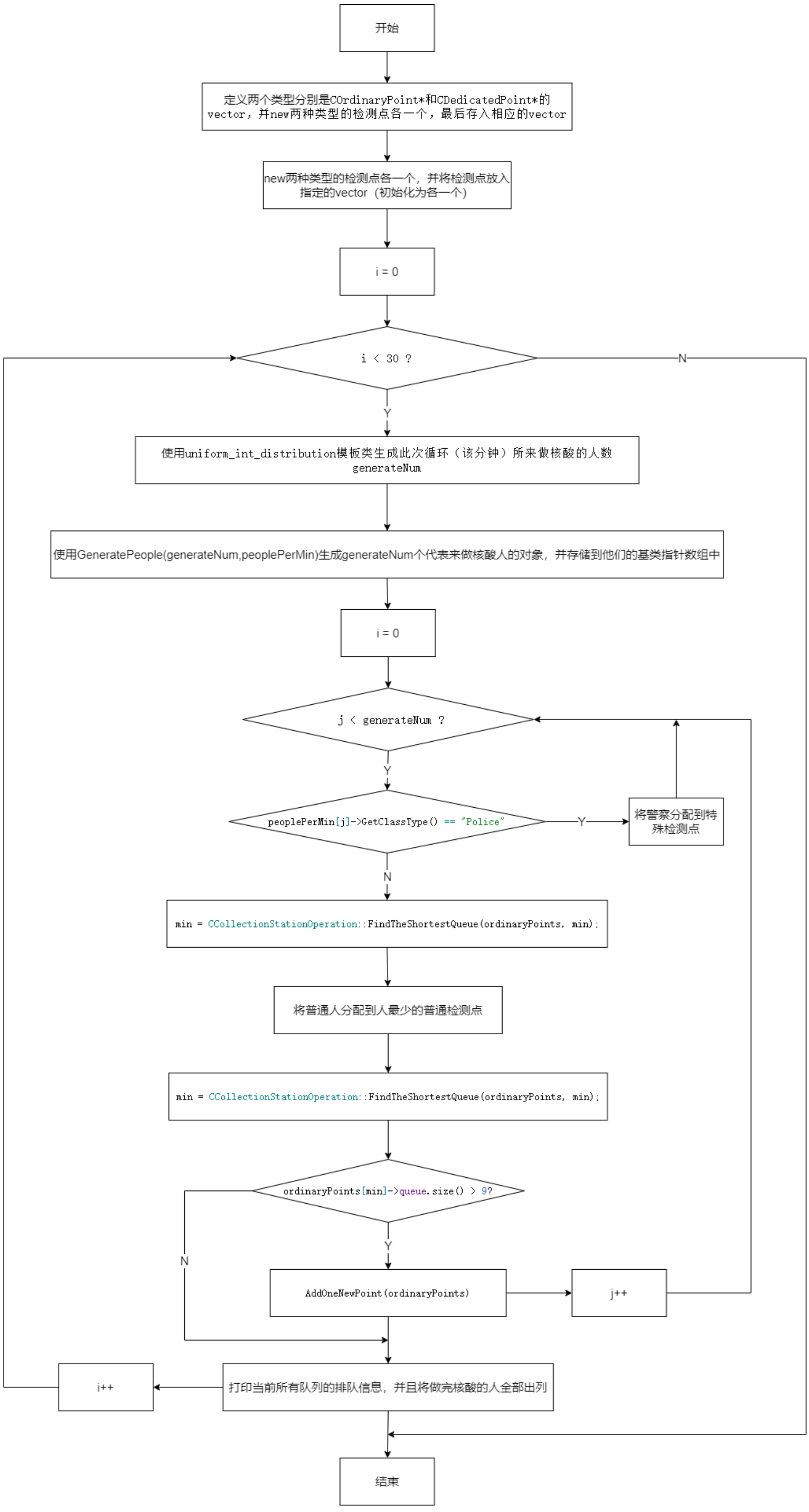

Fig2.程序主体函数流程图

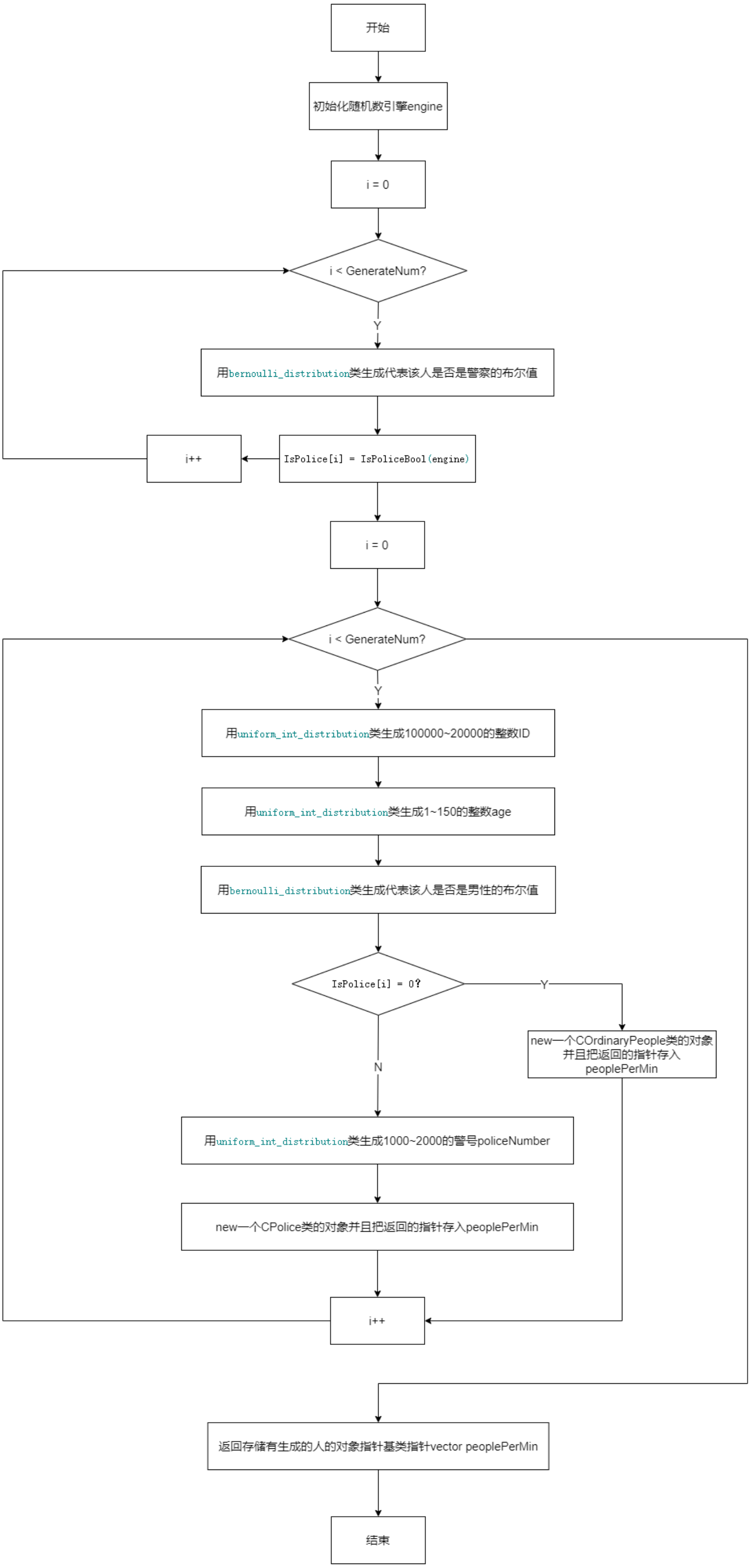

Fig3.GeneratePeople(int GenerateNum, std::vector<CPeople*> &peoplePerMin)函数流程图

运行效果

1.首先运行程序，程序会提示让我们输入进行交互

```
D:\codes\CLion\FinalExam\cmake-build-debug\FinalExam.exe
\***This is a program which simulates the queues of a collection station conducts nucleic acid collection for 30 minutes***/
        \***Please enter any number (except 0) to conduct one stimulation and enter 0 to end the program***/
```

2.输入任意非0数，程序开始模拟(30分钟周期)

```
D:\codes\CLion\FinalExam\cmake-build-debug\FinalExam.exe
\***This is a program which simulates the queues of a collection station conducts nucleic acid collection for 30 minutes***/
        \***Please enter any number (except 0) to conduct one stimulation and enter 0 to end the program***/
1

**********Start of the NO.1 stimulation**********


==========This is the NO.1 minutes of the total 30 minutes==========

~~~~~~~~~Now there are 1 ordinary points and 1 dedicated point in total~~~~~~~~~

This is ordinary point 1.
There are 6 ordinary people queuing.
-------------------------------------
Their information is as follows:
   ID      sex   age
 152694  female   63
 170121  female   40
 104746    male   95
 175643    male   38
 198258  female   98
 176652    male   42

This is dedicated police 1.
There are 4 polices queuing.
-------------------------------------
Their information is as follows:
   ID      sex   age   police number
 141750  female  140      1847
 107268  female   41      1436
 135927    male  135      1910
 106056  female   78      1319

============This is the end of NO.1 minutes of the total 30 minutes=============
```

3. 继续输入任意非0数，程序会反复运行进行模拟

```
This is ordinary point 6.
There are 4 ordinary people queuing.
-------------------------------------
Their information is as follows:
   ID      sex   age
 117300  female  119
 136913    male   39
 148302  female   75
 159846    male  127

This is dedicated police 1.
There are 5 polices queuing.
-------------------------------------
Their information is as follows:
   ID      sex   age   police number
 109043  female  114      1575
 185241    male   45      1389
 165387    male  109      1454
 181163    male   55      1262
 147906    male  139      1168

============This is the end of NO.30 minutes of the total 30 minutes=============



**************************End of the NO.5 simulation**************************



\***This is a program which simulates the queues of a collection station conducts nucleic acid collection for 30 minutes***/
        \***Please enter any number (except 0) to conduct one stimulation and enter 0 to end the program***/
3
```

4. 输入0结束程序，并提示用户一共进行了多少次模拟

```
This is dedicated police 1.
There are 5 polices queuing.
-------------------------------------
Their information is as follows:
   ID      sex   age   police number
 151285    male   13      1090
 124041  female  130      1383
 125430    male  132      1553
 100206  female   54      1656
 152803    male   10      1711

============This is the end of NO.30 minutes of the total 30 minutes=============




**************************End of the NO.6 simulation**************************




\***This is a program which simulates the queues of a collection station conducts nucleic acid collection for 30 minutes***/
        \***Please enter any number (except 0) to conduct one stimulation and enter 0 to end the program***/
0


-----------------------------------------------------
Goodbye! You have conducted 6 simulation(s) in total!

进程已结束,退出代码0
```