Description

1. C++ Estimate people who are unable or enable to return home after disasters

In big city such as Shinjuku, there are a lot of people who might not return home that cause secondary disaster or delay of rescue. This is code that is possible to estimate people who are unable or enable to return home after disasters by using **Mobile spatial statistics data.** This data is specific population statistics that include location data via mesh and hometown data where people is from. This code will calculate distance between location and hometown by joining 2 other file that have each latitude and longitude and then output file that has estimation of people who are unable or enable to return home provided by mesh code of location or city code of each hometown.

【Input data】

- **Mobile spatial statistics file**

1 Date(20170400)
2 Weekdays or Holidays
3 Time (24-hour unit)
4 Location (mesh code(12 x 12 250 mesh units))
5 Hometown (city code)
6 Total population

- **Mesh file** //of location of mobile spatial statistics data

1 Mesh ID (12 x 12 250 mesh units)
2 Latitude of the center point in mesh
3 Longitude of the center point in mesh(Calculated from GIS)

- **City file** //of hometown of mobile spatial statistics data

1 City code
2 Latitude of the center point in city
3 Longitude of the center point in city

【Main flow】

1. Import Mobile spatial statistics file.txt ,Mesh file.txt,City file.txt and stored in the eash data storage.

2. Join the city and mesh code of mobile spatial statistics data and them of mesh data and city data that include latitude/longitude of each city and mesh.

3. Calculate the distance between two points based on latitude and longitude of the mesh and city.

4. Estimate whether people enable or unable to return home from the calculated distance
   [Definition]
   More than 20km : Everyone unable to return home
   10km-20km : 50% people unable to return home / 50% people enable to return home
   Less than 10km : Everyone enable to return home.

5. Distribute estimated people via each mesh or city and output file with the estimation.

(Code)

```
int main (int argc, char *argv[])
{
string a;
int filetype,time;
cout << "What time data you want？:";
cin >> time; //Input time when you want to get data

Returnp file(time,argv[3]); //Input Mobile spatial statistics file
file.mesyufile(argv[1]); //Input mesh file
file.livefile(argv[2]); //Input city file
file.calculate_distance(); //Calculate distance mesh and city
file.calculate_return(); //Calculate the people who are unable or enable to return home after disasters

cout <<"calculate people via mesh or city？ 1:mesh,2:city:"<<endl;
cin >> filetype; //calculate people via mesh or city??

cout <<"what is file name？(should add .txt ):"<<endl;
cin >>a; //what file name??

file.output(filetype,a); //output file
return 0;
}
```

【Function code】

File name : Estimate.cpp

Class Returnp //for Estimate people who are unable or enable to return home after disasters

1 Data storage

Struct MOBILE

Mobile data : ①Mobile spatial statistics file

Data[6] //Mobile spatial statistics data

Distance //Distance from Location mesh to Hometown code

mesyus_n lives_n //The link mesh ID of mesh data and city code of city data

Struct AREA

Mesyu .data : //②Mesh file

Live.data : //③City file

Data[3] //②Mesh data or //③City data

return_p,nreturn_p //people who are unable or enable to return home after disasters

2 Function

- Returnp (int time,char *ac);

1. Import, read and put the Mobile spatial statistics file in mobile.data[] of this Returnp class.

※select time of this data

- void mesyufile (char *ac);

1. Import, read and put the mesh file in mesyu.data of this Returnp class.

- void livefile (char *ac);

1. Import, read and put the city file in live.data of this Returnp class.

- void calculate_distance();

1. Matching mesh code of mobile.data and the longitude/latitude data of mesyu.data.
2. Matching city code of mobile.data and the longitude/latitude data of live.data.
3. double distance (double lat1, double lng1, double lat2, double lng2);

① import longitude/latitude data of 2 point(mesh and city).

② Transform the 2data to radian and calculate the distance.

- void calculate_return();

1. Initialization of return_p and nreturn_p in both mesh and live

2. Calculate the people who are unable or enable to return home after disasters in the 3case.

【The 3 case】

1. 20000 <= Distance between mesh and residential area
   →100% of people are unable to return home
   →0% of people are enable to return home
2. 10000<= Distance between mesh and residential area <=20000
   →50% of people are unable to return home
   →50% of people are enable to return home
3. Distance between mesh and residential area <=10000
   →0% of people are unable to return home
   →100% of people are enable to return home

- void output(int which,string output_file);
  1. output data file either people who are unable or enable to return home via mesh or city code.