Design transportation route scheme based on artificial intelligence algorithm and computer simulation

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Abstract. This article adopts Computer simulation and graph theoretic algorithm to choose the most reasonable place to convey drugs. And this article use mathematical modeling and computer programming to solve the problem of transport drugs.

1. Symbols and definitions

ST the shortest distance

GUINEA	1	NZEREKORE	LEBERIA	15	MONTSERRAD	
	2	LOLA				
	3	MACENTA		16	GRANG COPE MOUNT	
	4	KISSIDOUGO	SIERRA LEONE	17	KENEMA	27
				18	BO	KAMBIA
	5	FARANAH		19	MOYAMBA	
	6	SIGUIRI		20	KONO	
	7	TOUGUE		21	KOINADUGU	
	8	MALI				
	9	BOFFA		22	BOMBALI	
	10	DUBREKA		23	TONKOLILI	
	11	KINDIA		24	FREETOWN	
	12	COYAH				
	13	CONAKRY		25	WESTERN RURAL	
	14	FORECA		26	PORTLOK	

2. The foundation of model and computer simulation and calculate

I have got the data of two cities in the three countries. However, the transport of the drugs is too complex to find the optimal scheme, so I find the best transport by mathematical modeling and computer simulation.

As the picture shows, considering the problem of national border, the three countries are respected into four parts Guinea is divided into two parts i.e. 1and 2, Liberia is 4 and Sierra Lenoe is 3. The round in the picture are signed 1to 27.To find the optimal scheme, we take the part 1 as an example . regarding Part 1 as a matrix $A=(a_{ij})$. a_{ij} means the distance between province i and j.

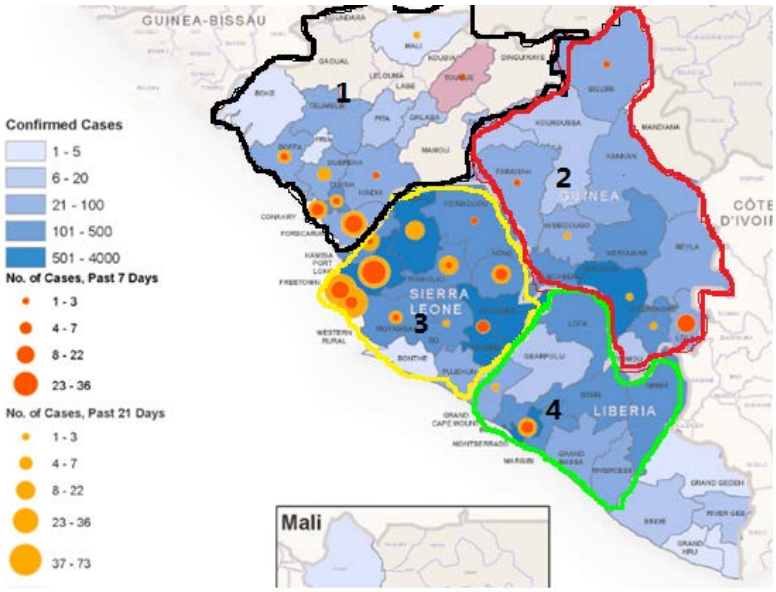

Figure 1

3. Part 1

Table 1

	7	8	9	10	11	12	13	14	ST
7	0	0.7666	2.569	2.4184	1.7587	2.3838	2.7357	2.4192	15.0514
8	0.7666	0	2.5609	2.6023	2.0767	2.6187	2.9241	2.7613	16.3106
9	2.569	2.5609	0	0.6421	1.1659	0.8141	0.7447	1.2072	9.7039
10	2.4184	2.6023	0.6421	0	0.725	0.1731	0.3231	0.5651	7.4491
11	1.7587	2.0767	1.1659	0.725	0	0.6439	1.0132	0.6852	8.0686
12	2.3838	2.6187	0.8141	0.1731	0.6439	0	0.3719	0.3939	7.3994
13	2.7357	2.9241	0.7447	0.3231	1.0132	0.3719	0	0.6266	8.7393
14	2.4192	2.7613	1.2072	0.5651	0.6852	0.3939	0.6266	0	8.6585

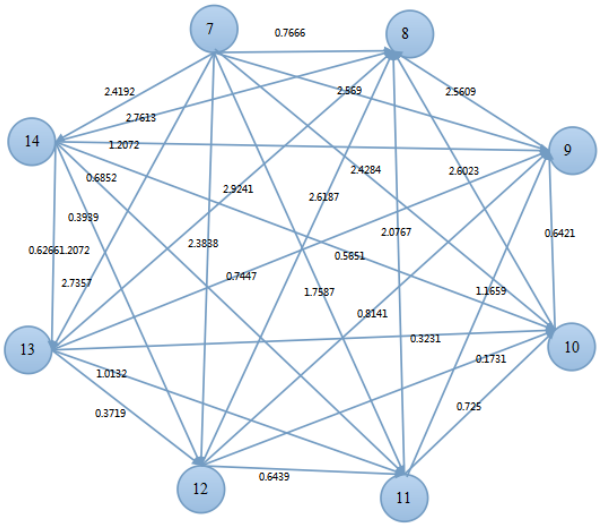

Figure 2

The distance of the 8 city points we abstract in the Part 1 are showed in Figure. After we calculate the shortest distance by Floyd, we can get a chart (Table), in which the summation of each row is the final result we need. Finally, we can get one of the best transport – COYAH! So, what is the concept

about the best dispatch station? Actually it's a transfer station. It must have the minimum distance with the other points in the same part. In assumptions, the velocity of transport is constant, so the minimum distance means the shortest time. When the disease gets worse, we can delivery our main source to the best dispatch station that we have selected firstly, then we deliver the drug to the other region in the same part and spend a shortest time!

4. Part 2 and Part 3

	1	2	3	4	5	6	ST
1	0	0.8422	1.0111	1.895	2.1976	3.6862	9.6321
2	0.8422	0	1.6773	2.4024	1.3554	3.4308	9.7081
3	1.0111	1.6773	0	0.8857	1.9267	2.9051	8.4059
4	1.895	2.4024	0.8857	0	1.047	2.4382	8.6683
5	2.1976	1.3554	1.9267	1.047	0	2.0754	8.6021
6	3.6862	3.4308	2.9051	4.3822	2.0754	0	14.5357

Part 2

	27	22	21	20	23	26	24	25	19	18	17	ST
27	0	0.7681	1.2165	2.0489	1.1358	0.4454	0.7095	0.8272	1.0887	1.6594	2.1388	12.04
22	0.7681	0	0.4484	1.3431	0.4484	1.052	1.3043	1.2733	1.1125	1.3457	1.6806	10.78
21	1.2165	0.4484	0	0.899	0.6947	1.5004	1.7527	1.7217	1.5609	1.6143	1.6784	13.09
20	2.0489	1.3431	0.899	0	0.9161	2.1652	2.3391	2.1733	1.6372	1.1607	0.9477	15.63
23	1.1358	0.4484	0.6947	0.9161	0	1.303	1.5147	1.4058	1.0358	1.0212	1.2676	10.74
26	0.4454	1.052	1.5004	2.1652	1.303	0	0.271	0.402	0.8461	1.5233	2.0544	11.56
24	0.7095	1.3043	1.7527	2.3391	1.5147	0.271	0	0.2675	0.8668	1.5764	2.1248	12.73
25	0.8272	1.2733	1.7217	2.1733	1.4058	0.402	0.2675	0	0.6221	1.3337	1.8861	11.91
19	1.0887	1.1125	1.5609	1.6372	1.0358	0.8461	0.8668	0.6221	0	0.7119	1.264	10.75
18	1.6594	1.3457	1.6143	1.1607	1.0212	1.5233	1.5764	1.3337	0.7119	0	0.5539	12.5
17	2.1388	1.6806	1.6784	0.9477	1.2676	2.0544	2.1248	1.8861	1.264	0.5539	0	15.6

Part 3

5. Conclusion

Finally I get four major transfer station,they are COYAH, MACENTA, TONKOLILI and GRANG COPE MOUNT.

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