DS - HW7 - Shortest Path

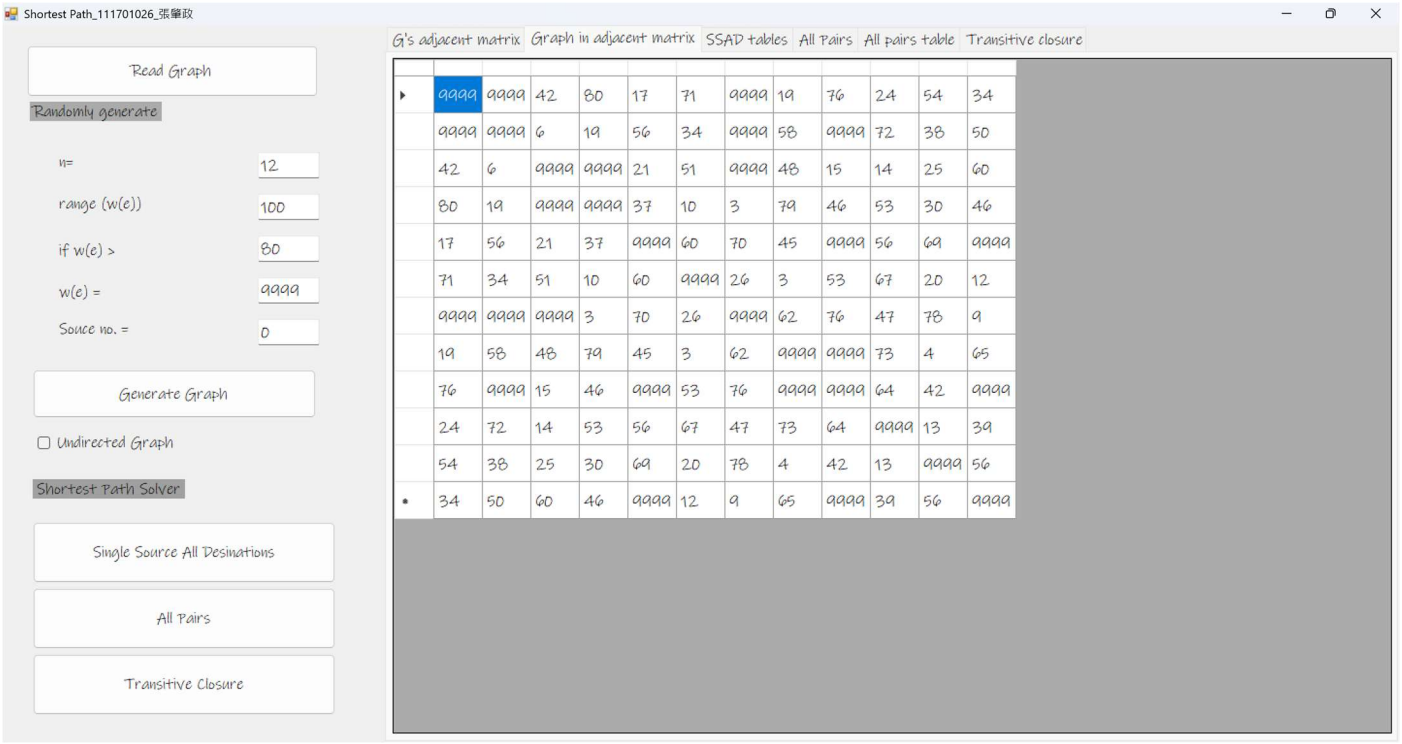
111701026-張肇政

- Requirements:
  - ➢ Basic
  1. Generate a graph G=(V, E) in random, the weights and density of the edges in G can be assigned by user.
  - ➢ For Problem 1 and 2 :
  2. Find shortest distance from single source to every vertices (single source all destinations)
  3. Find shortest distance between and two points
  4. User can trace the process of solving this problem.
  - ➢ For Problem 3:
  2. Find transitive closure of the given graph.
  - ➢ Advanced

    For Problem 1: Report the shortest paths from the source to all destinations (SSAD)

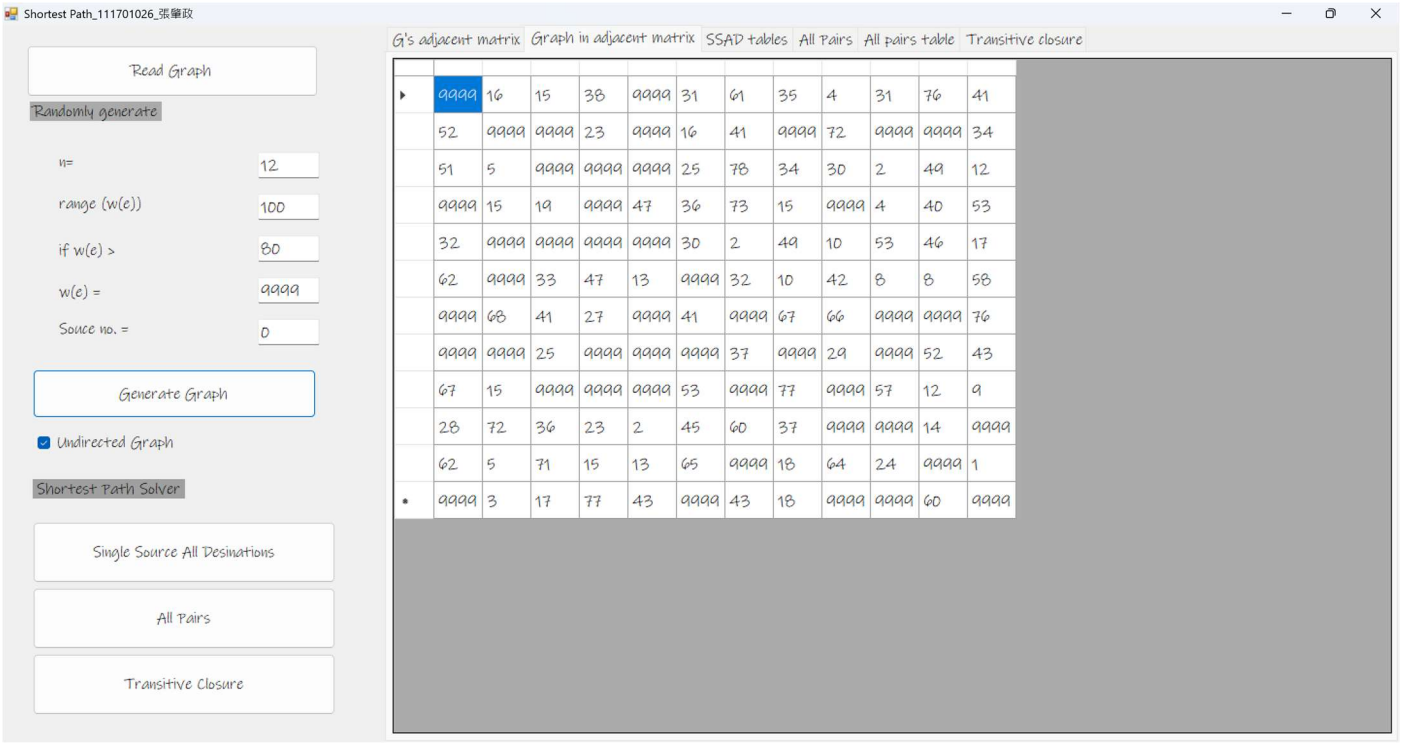
    For Problem 2: Report the shortest paths for all pairs
- 執行結果

1. 輸入必要條件後，執行 Generate graph
   - ➢ Directed grpah(其他功能展示都是以此圖做為初始)



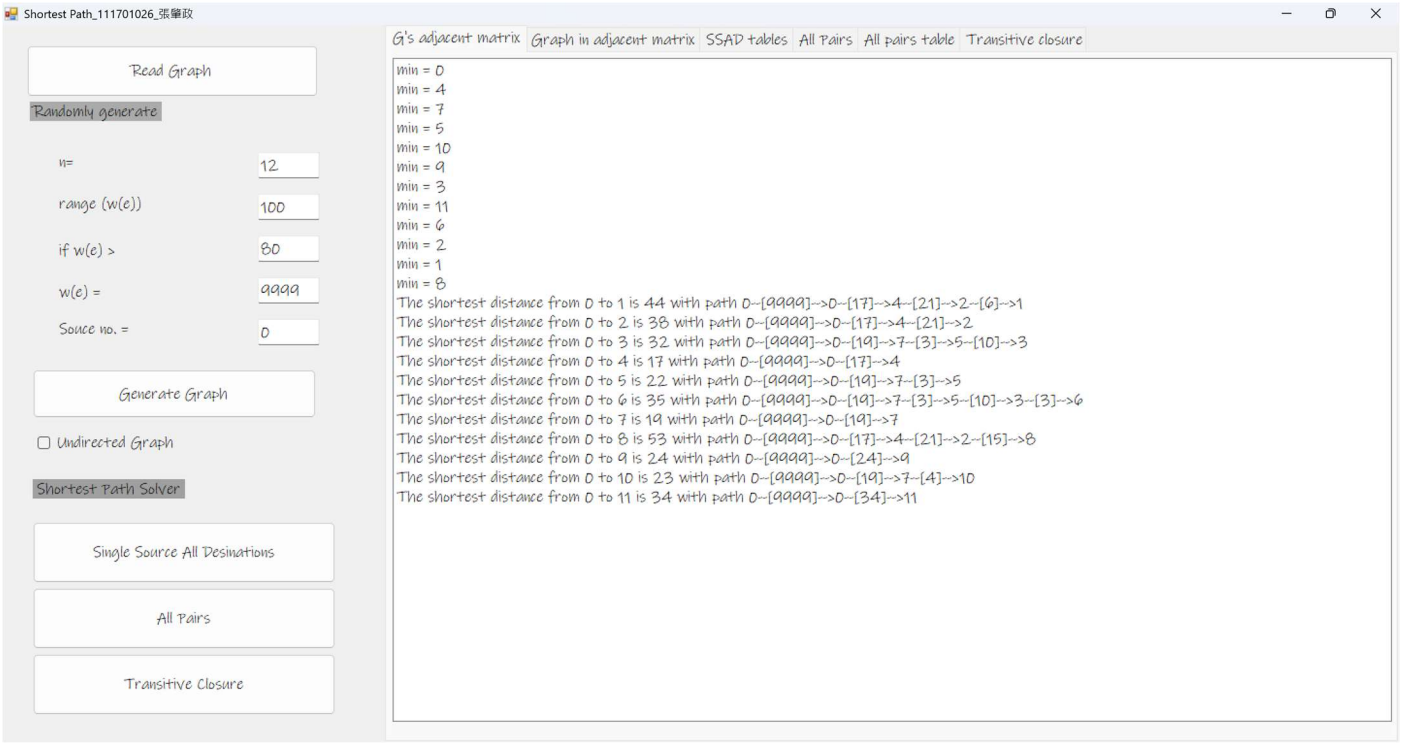
▸	9999	9999	42	80	17	71	9999	19	76	24	54	34
	9999	9999	6	19	56	34	9999	58	9999	72	38	50
	42	6	9999	9999	21	51	9999	48	15	14	25	60
	80	19	9999	9999	37	10	3	79	46	53	30	46
	17	56	21	37	9999	60	70	45	9999	56	69	9999
	71	34	51	10	60	9999	26	3	53	67	20	12
	9999	9999	9999	3	70	26	9999	62	76	47	78	9
	19	58	48	79	45	3	62	9999	9999	73	4	65
	76	9999	15	46	9999	53	76	9999	9999	64	42	9999
	24	72	14	53	56	67	47	73	64	9999	13	39
	54	38	25	30	69	20	78	4	42	13	9999	56
*	34	50	60	46	9999	12	9	65	9999	39	56	9999

   - ➢ Undirected graph

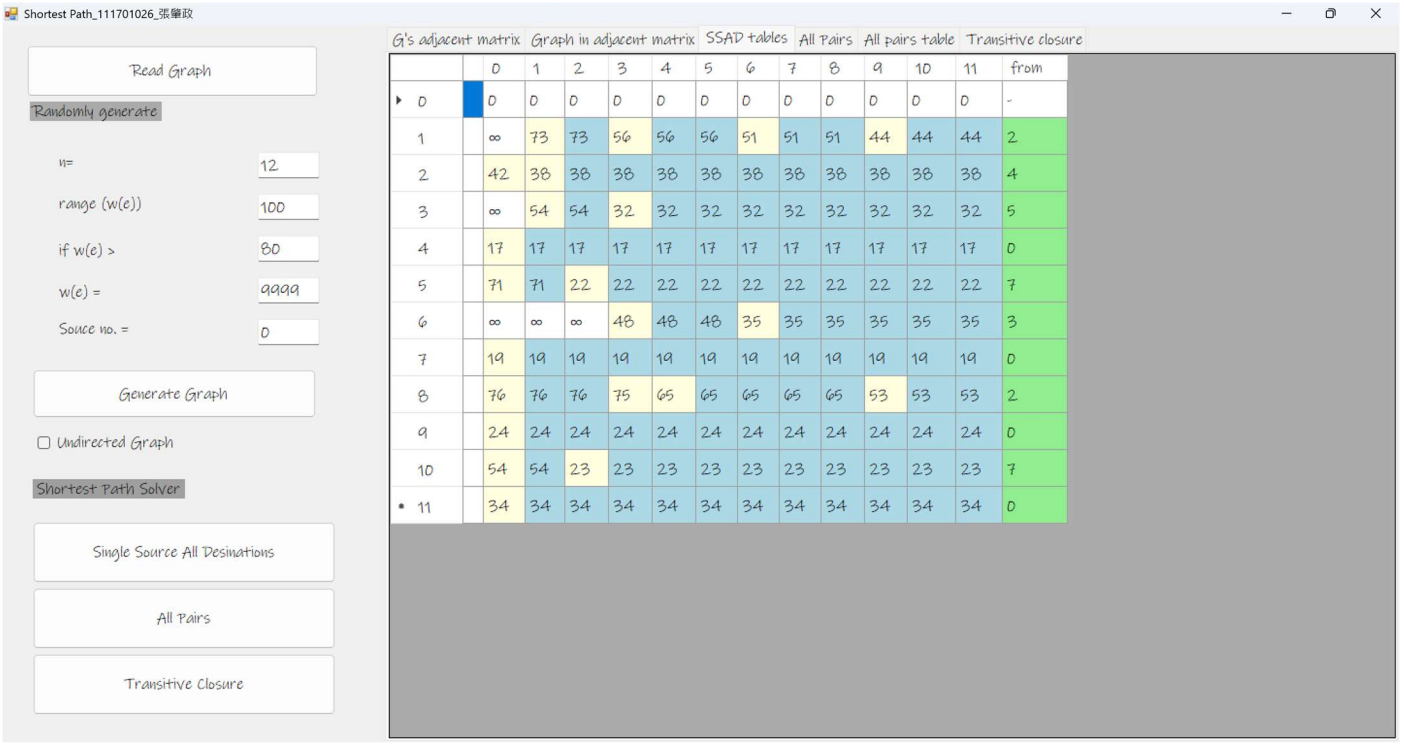


2. Single source all destination (SSAD)

- Min 顯示 Dijkstra 的過程中，輸出目前距離最小的節點編號



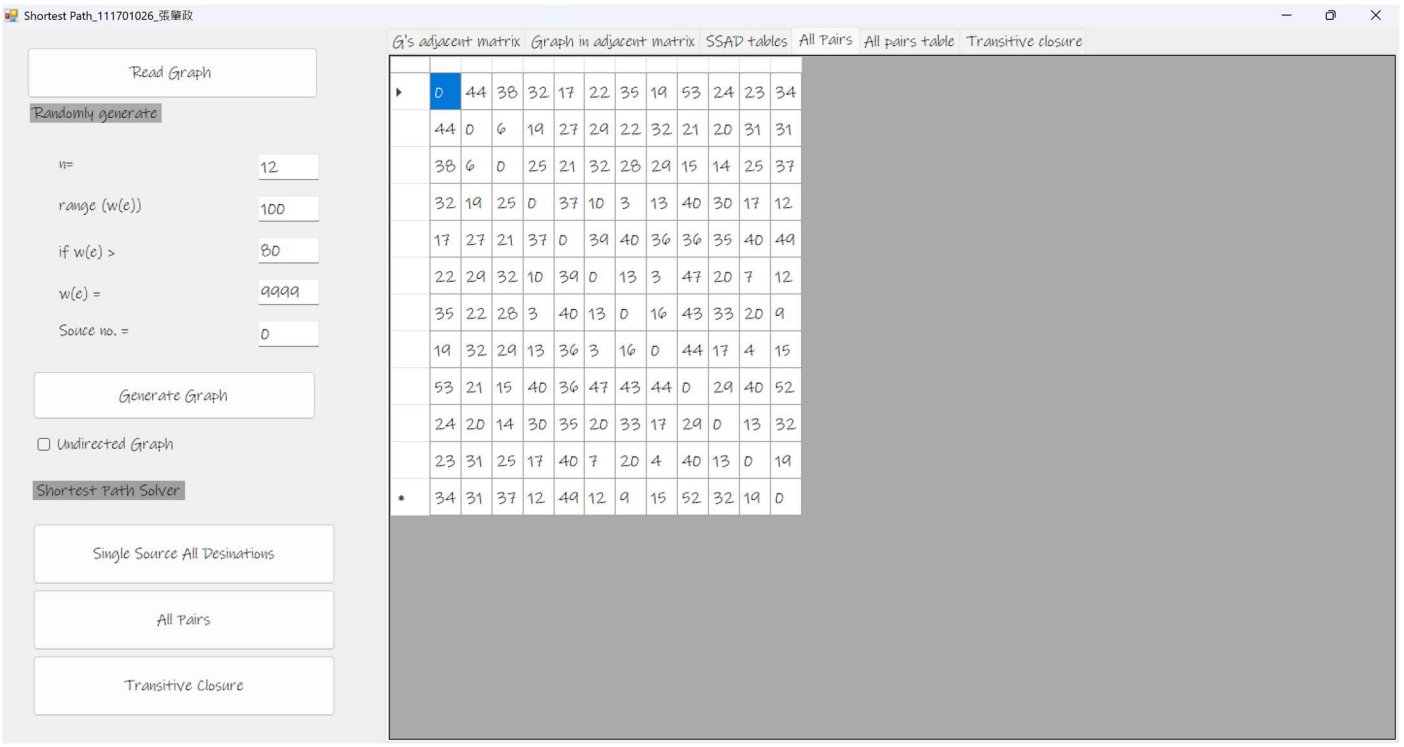
- SSAD table 每一欄會顯示更新狀況，淺黃色代表數值更新(距離變短)，藍色為沒有更新，每一列的數值只會一直減少或不再減少(更新距離)，最右邊的欄顯示是從哪個節點前來。



	0	1	2	3	4	5	6	7	8	9	10	11	from
0	0	0	0	0	0	0	0	0	0	0	0	0	-
1	∞	73	73	56	56	56	51	51	51	44	44	44	2
2	42	38	38	38	38	38	38	38	38	38	38	38	4
3	∞	54	54	32	32	32	32	32	32	32	32	32	5
4	17	17	17	17	17	17	17	17	17	17	17	17	0
5	71	71	22	22	22	22	22	22	22	22	22	22	7
6	∞	∞	∞	48	48	48	35	35	35	35	35	35	3
7	19	19	19	19	19	19	19	19	19	19	19	19	0
8	76	76	76	75	65	65	65	65	65	53	53	53	2
9	24	24	24	24	24	24	24	24	24	24	24	24	0
10	54	54	23	23	23	23	23	23	23	23	23	23	7
11	34	34	34	34	34	34	34	34	34	34	34	34	0

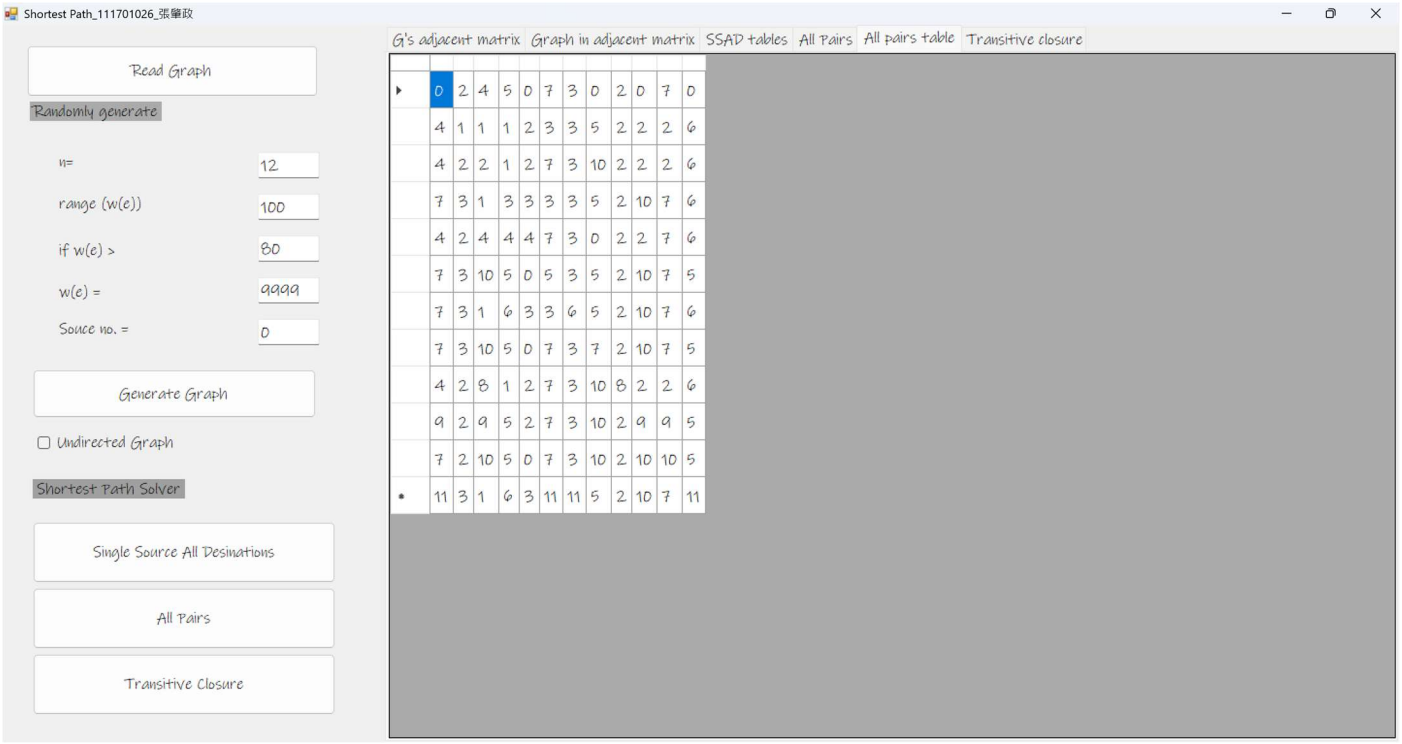
3. All pairs

➢ All pairs 顯示各個點與其他點的最短距離關係



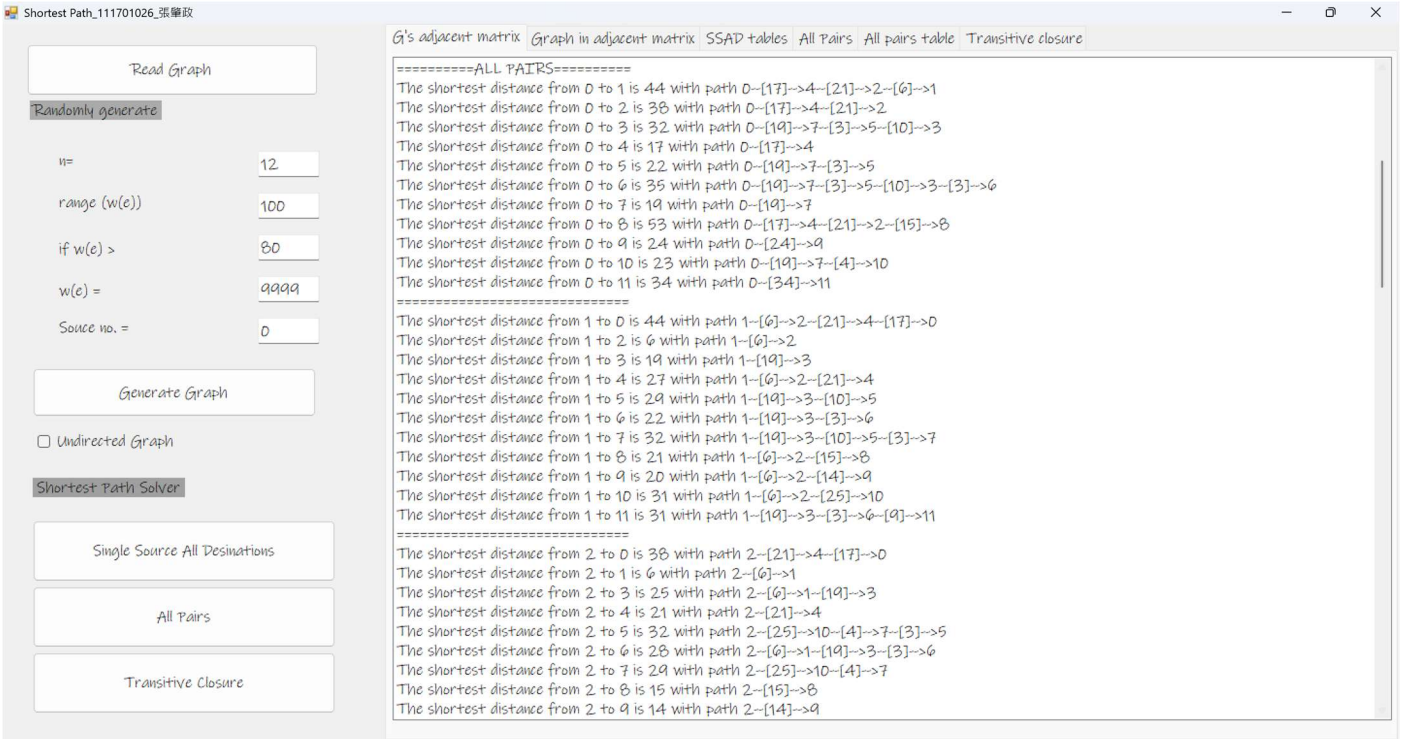
0	44	38	32	17	22	35	19	53	24	23	34
44	0	6	19	27	29	22	32	21	20	31	31
38	6	0	25	21	32	28	29	15	14	25	37
32	19	25	0	37	10	3	13	40	30	17	12
17	27	21	37	0	39	40	36	36	35	40	49
22	29	32	10	39	0	13	3	47	20	7	12
35	22	28	3	40	13	0	16	43	33	20	9
19	32	29	13	36	3	16	0	44	17	4	15
53	21	15	40	36	47	43	44	0	29	40	52
24	20	14	30	35	20	33	17	29	0	13	32
23	31	25	17	40	7	20	4	40	13	0	19
34	31	37	12	49	12	9	15	52	32	19	0

➢ All pairs table 顯示各個點的連接情形



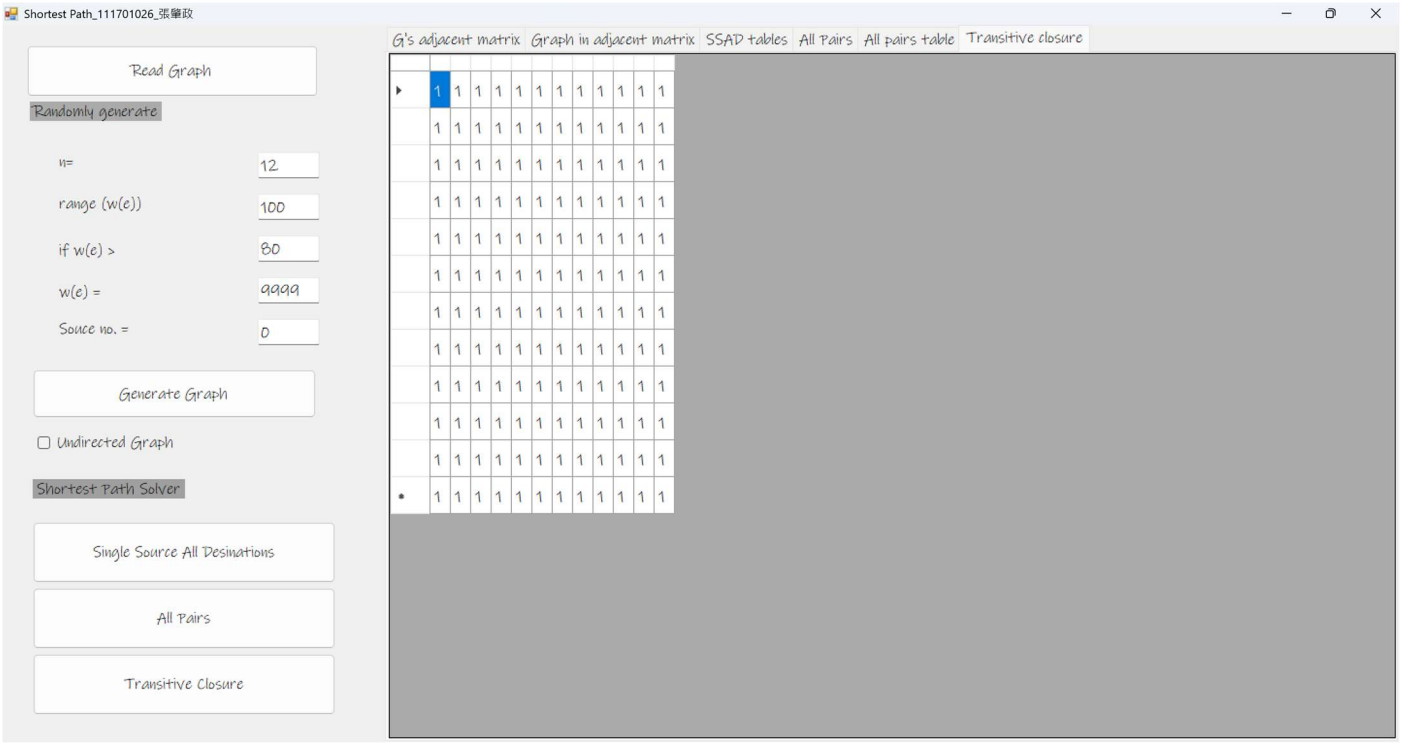
▸	0	2	4	5	0	7	3	0	2	0	7	0
	4	1	1	1	2	3	3	5	2	2	2	6
	4	2	2	1	2	7	3	10	2	2	2	6
	7	3	1	3	3	3	3	5	2	10	7	6
	4	2	4	4	4	7	3	0	2	2	7	6
	7	3	10	5	0	5	3	5	2	10	7	5
	7	3	1	6	3	3	6	5	2	10	7	6
	7	3	10	5	0	7	3	7	2	10	7	5
	4	2	8	1	2	7	3	10	8	2	2	6
	9	2	9	5	2	7	3	10	2	9	9	5
	7	2	10	5	0	7	3	10	2	10	10	5
*	11	3	1	6	3	11	11	5	2	10	7	11

➢ G's adjacent matrix 的 listBox 會接續顯示每個點到其他點的最短路徑



4. Transitive closure

表示各個節點是否有接通，有則顯示 1，無則顯示 0


Shortest Path_111701026_張肇政
Read Graph
Randomly generate
n=
12
range (w(e))
100
if w(e) >
80
w(e) =
9999
Souce no. =
0
Generate Graph
Undirected Graph
Shortest Path Solver
Single Source All Desinations
All Pairs
Transitive Closure
G's adjacent matrix
Graph in adjacent matrix
SSAD tables
All Pairs
All pairs table
Transitive closure