ECE 6133
Efficient Algorithm for Channel Routing – Yoshimura and Kuh

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ROUTING

- Problem is to route a specified netlist between two rows of terminals across a two layer channel.
- Nets are routed with horizontal segments on one layer and vertical segments on the other. Connections between the two layers are made through holes.
- Channel Routing is important because it is efficient and simple, it guarantees 100% completion for monocyclic constraints.
- The routing problem is expressed by a netlist as shown below.

0	1	4	5	1	6	7	0	4	9	10	10
2	3	5	3	5	2	6	8	9	8	7	9

IMPLEMENTATION

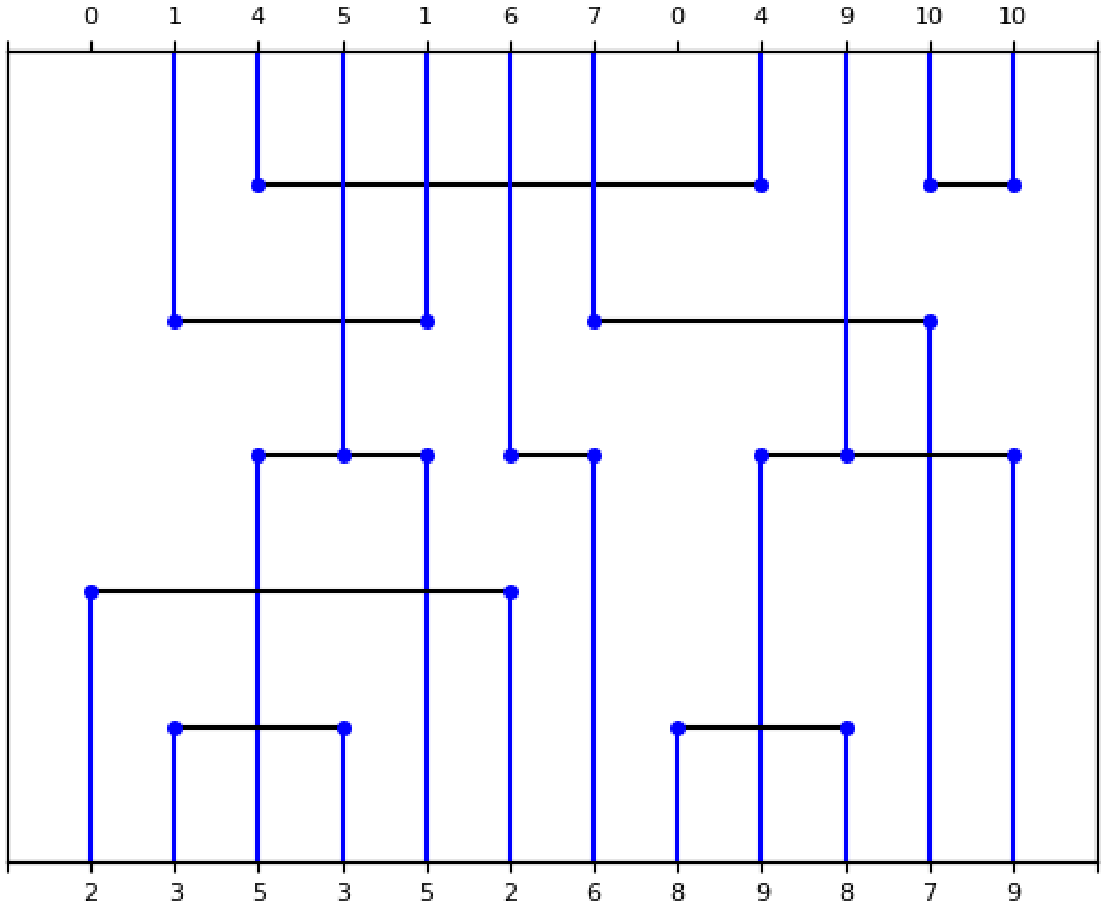
- If no cycles are present in the VCG , route the given problem without inserting any doglegs.
- If cyclic conflicts are present in the VCG, obtain all the nodes involved in the conflict and dogleg them at terminal positions.
- If cyclic conflicts still persist, sort the nodes involved in the conflict in terms of their horizontal span. Then take the first node in this list and check viability of doglegging at first terminal + 1 position.
- If not viable, check viability of doglegging that node at terminal + 2 position and so on. After each dogleg insertion in this manner, recheck for cyclic conflicts and update the zones accordingly. Continue in this manner until no conflicts exist. This provides the VCG for merging algorithm.

MAIN MERGING ALGORITHM

- L = { }.
- For Z = Zs to Zt do:
- L = L + {nets that terminate at zone z}.
- R = {nets that begin at zone z+1 }.
- Merge L and R so as to minimize the increase in the longest path in VCG.
- L = L - { merged nets in previous step }
- Pairing is done heuristically by knowing the longest source to node and longest node to sink paths for every node.
- By maximizing f(m) and minimizing g(n,m) the pair to be merged is obtained

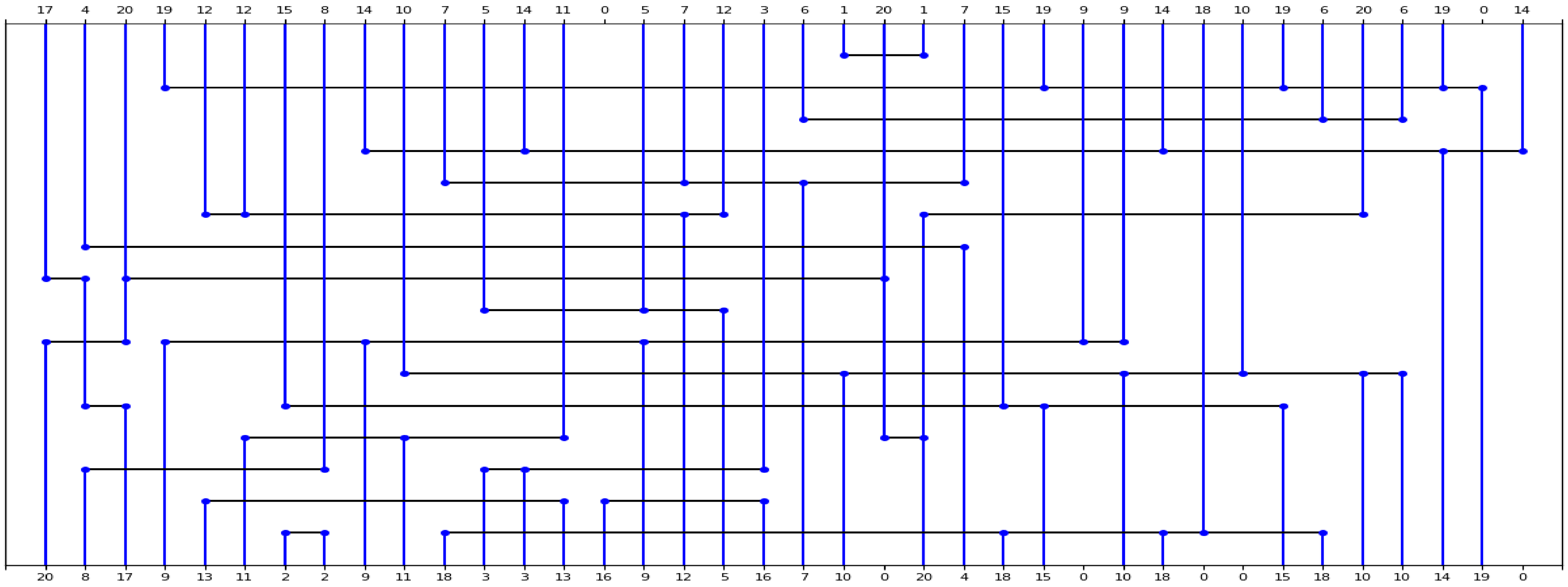
RESULTS (1)

DR1.TXT



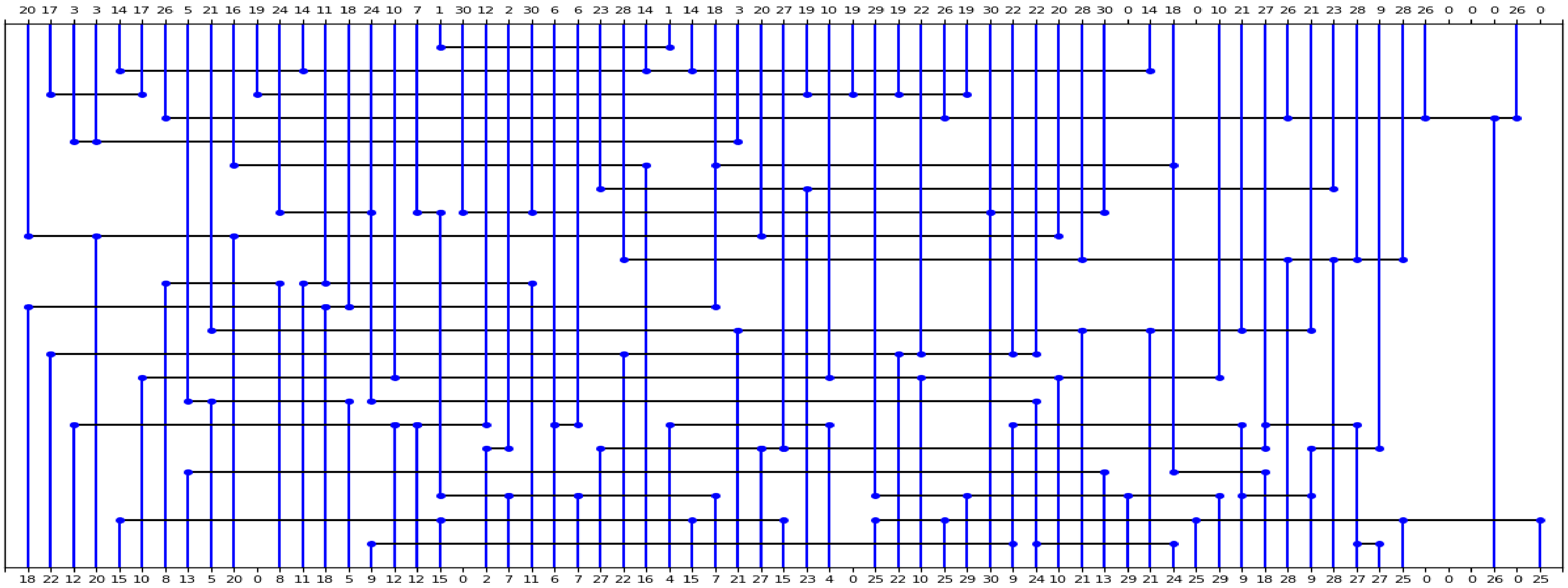
RESULTS (2)

DR2.TXT



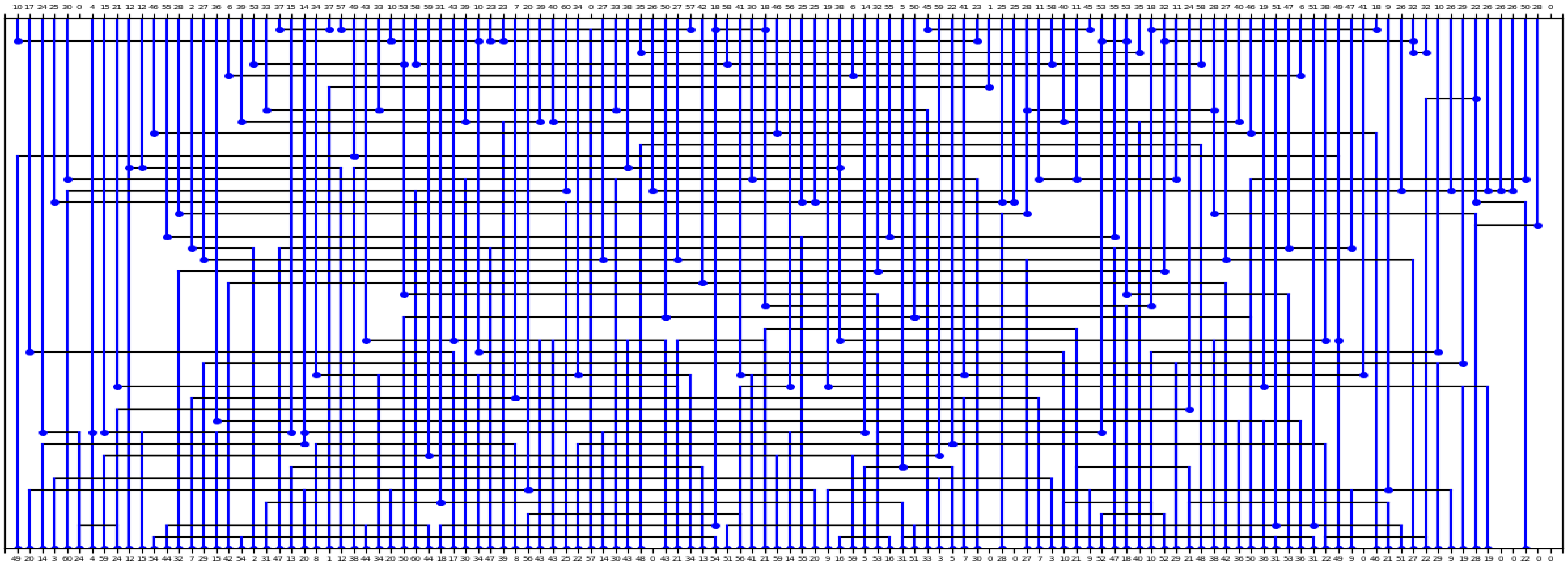
RESULTS (3)

DR3.TXT



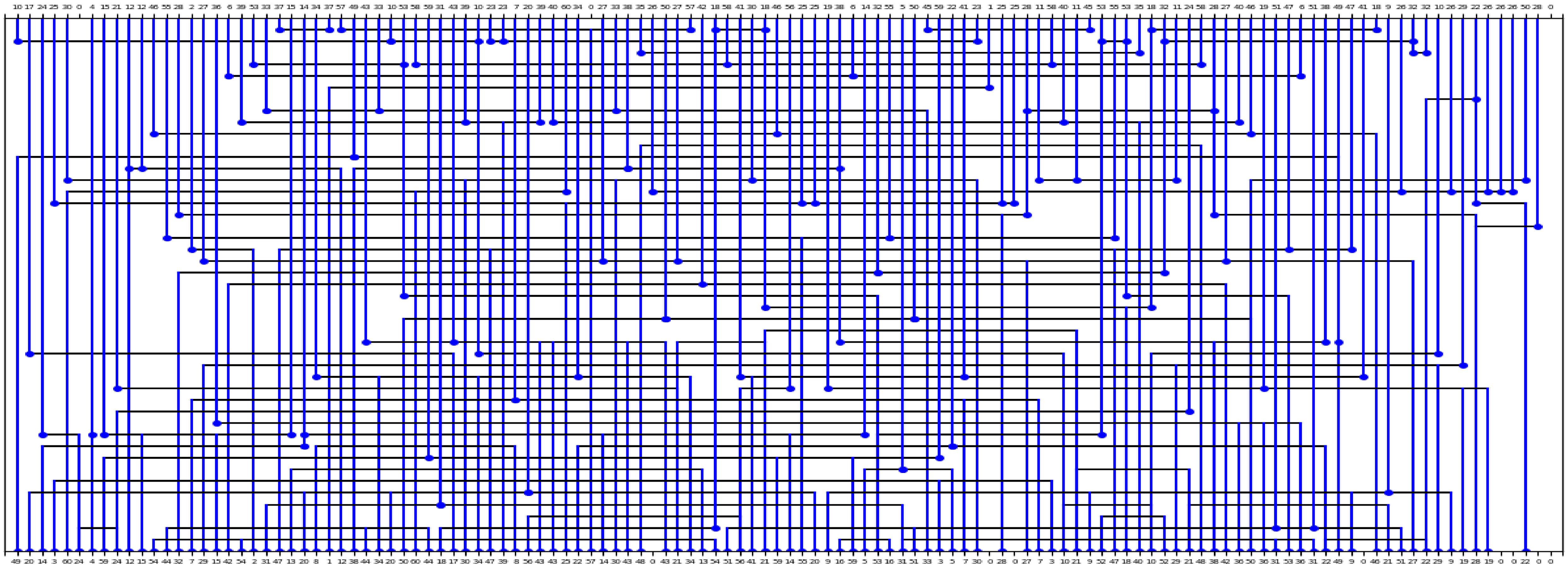
RESULTS (4)

DR4.TXT



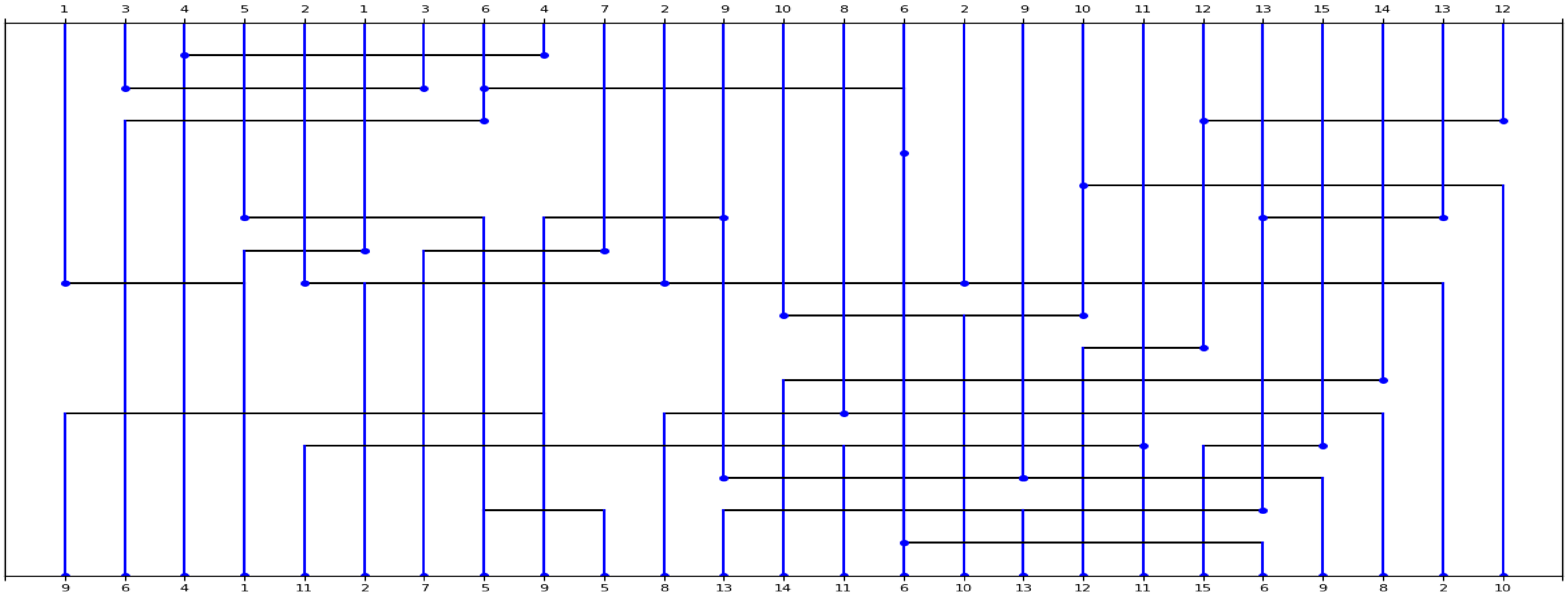
RESULTS (5)

DR5.TXT



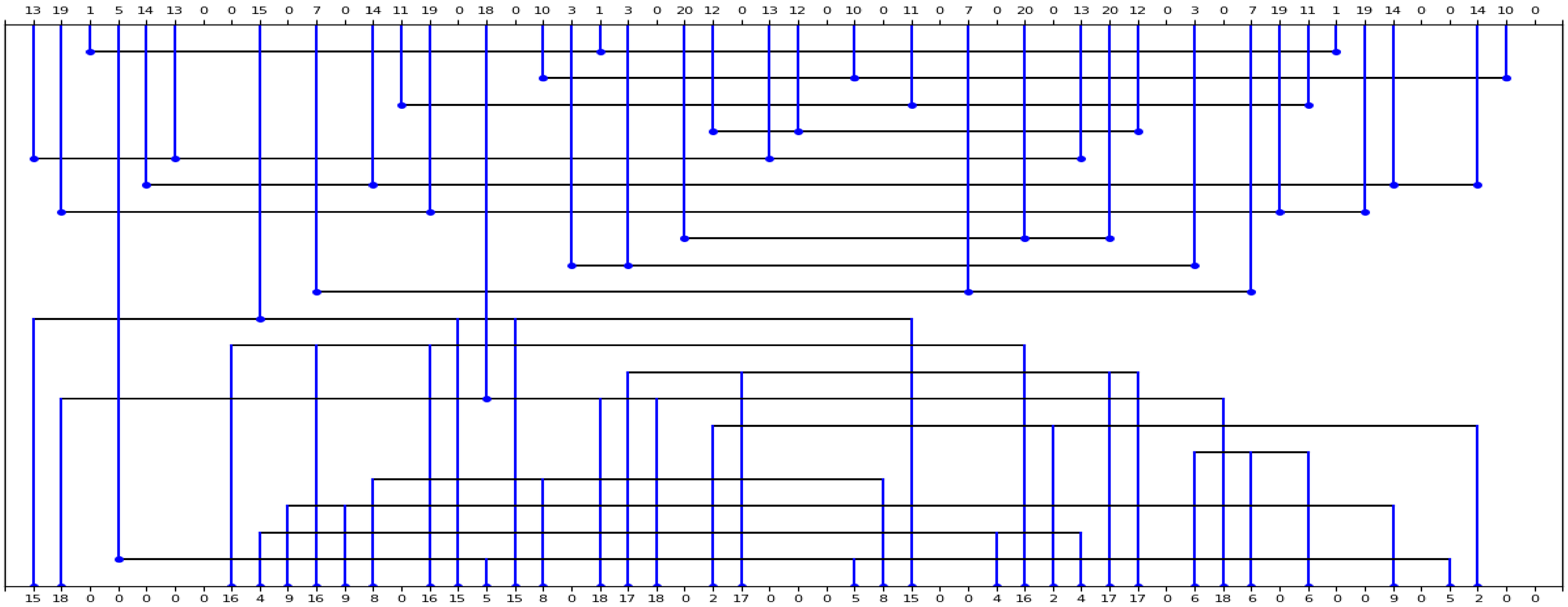
RESULTS (6)

DR6.TXT



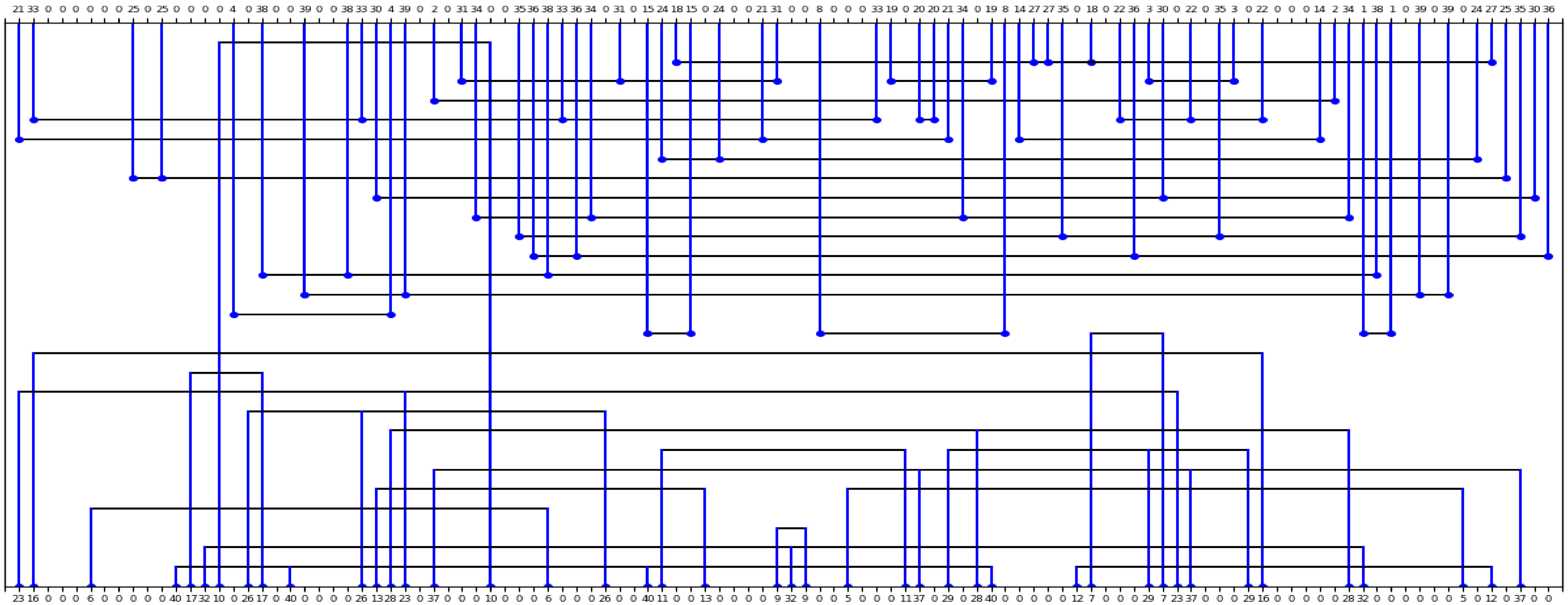
RESULTS (7)

DR7.TXT



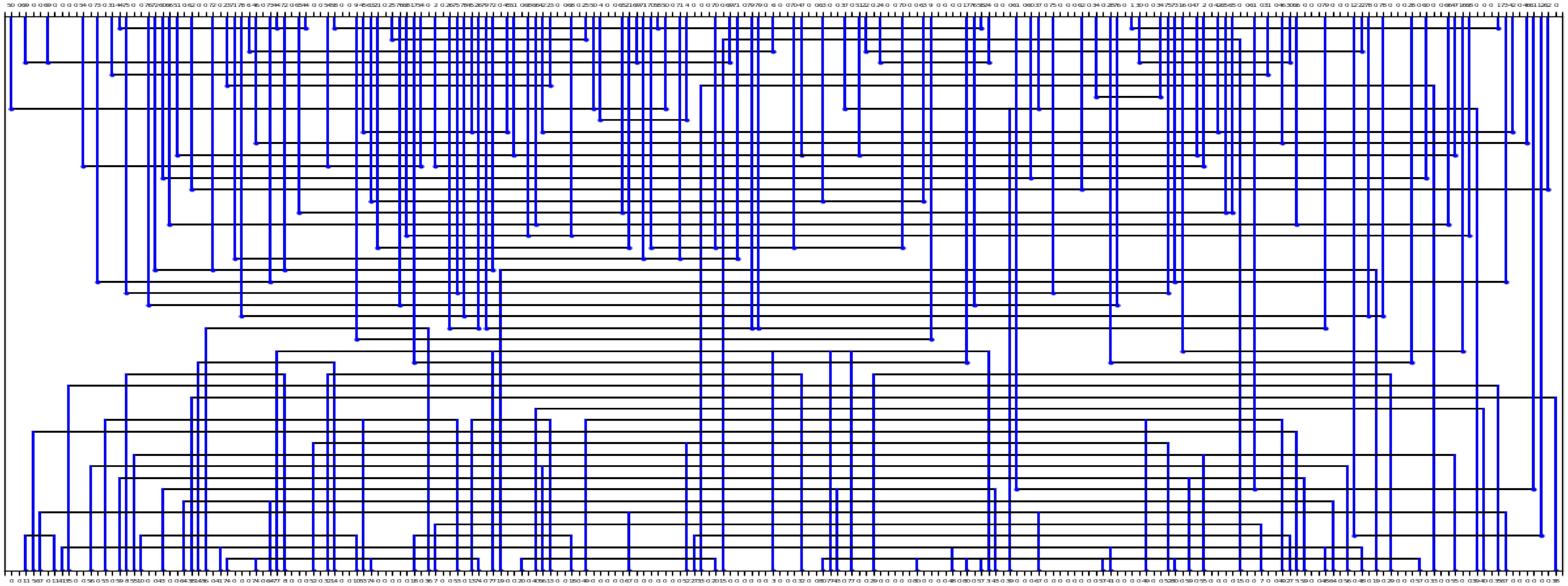
RESULTS (8)

DR8.TXT



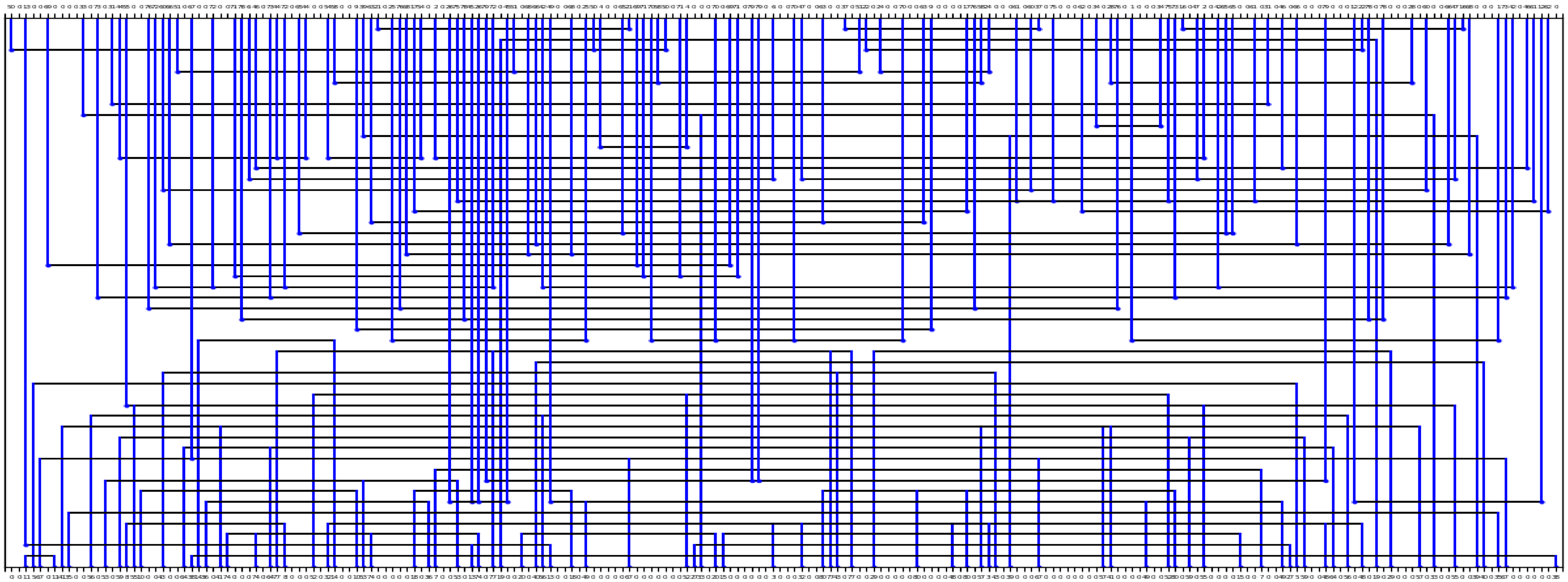
RESULTS (9)

DR9.TXT



RESULTS (10)

DR10.TXT



STATISTICS

CIRCUIT	DR1.TXT	DR2.TXT	DR3.TXT	DR4.TXT	DR5.TXT	DR6.TXT	DR7.TXT	DR8.TXT	DR9.TXT	DR10.TXT
NETS	10	20	30	60	60	15	20	40	80	80
MAXIMUM NET DENSITY	5	14	20	41	41	10	19	22	45	46
DOGLEGS	0	4	18	48	48	15	0	0	0	0
TRACKS	5	16	22	45	45	20	20	28	47	50
RUNTIME in seconds	0.01	0.04	0.12	16.76	16.78	0.17	0.01	0.02	0.06	0.07