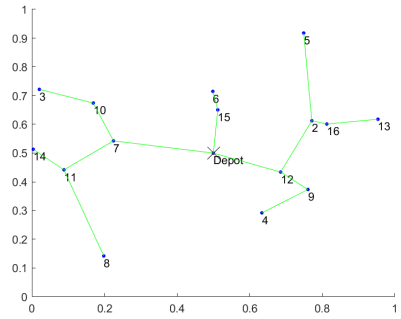

Fig. 1. MST of a graph with 16 nodes

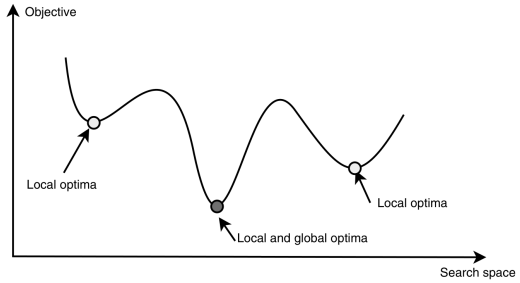

Fig. 2. Graphical Representation of local and global optima

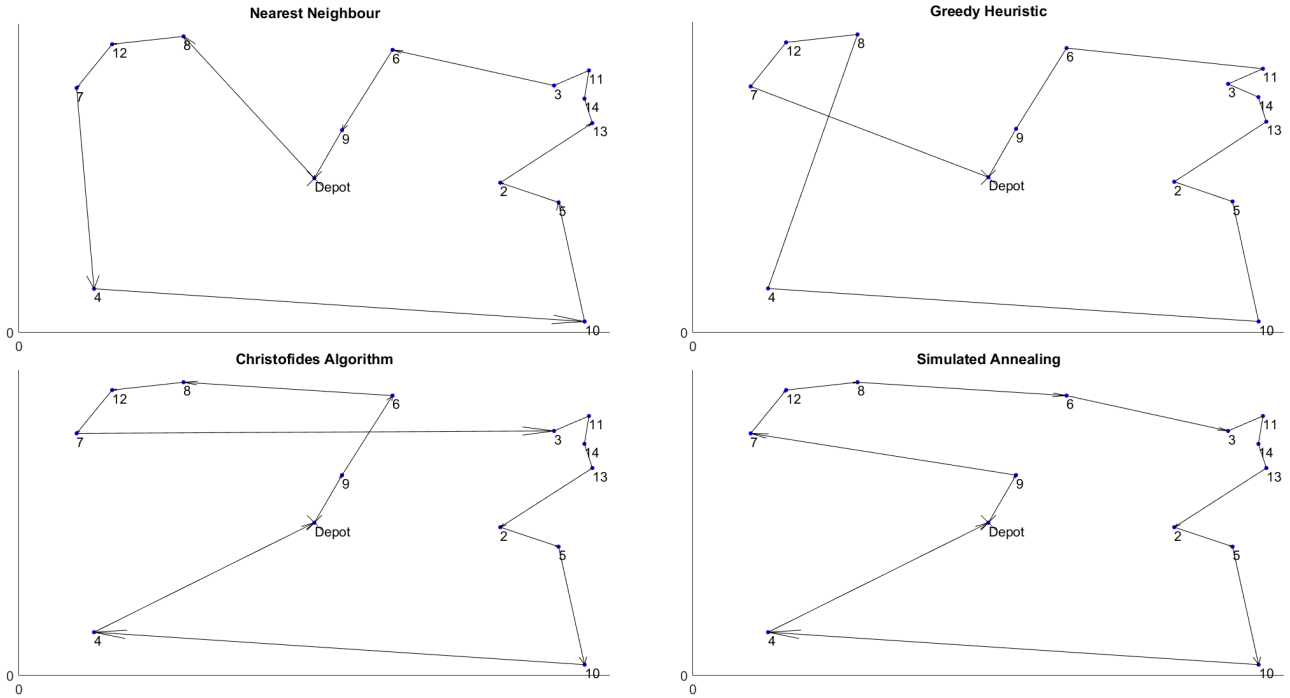

Fig. 3. Path Outputs of the TSP algorithms at 13 nodes

Specification\Aircraft	DJI Inspire 2	DJI Matrice 210	DJI Matrice 600
Weight	3.290kg	4.53kg	9.6kg
Max Takeoff Weight	4.000kg	6.14kg	15.1kg
Max Ascent Speed	5 m/s	4 m/s	5 m/s
Max Descent Speed	4 m/s	3 m/s	3 m/s
Max Speed	94 kph	82.8 kph	65 kph
Max Wind Speed Resistance	10 m/s	10 m/s	8 m/s
Battery			
Battery Model	TB50	TB55	TB47S/TB48S
Capacity	4280 mAh	4920 mAh	7800 mAh
Battery Energy	2×97.58 Wh	2×174.6 Wh	6×129.96 Wh

Relevant Specifications of the DJI UAVs [11]-[13]

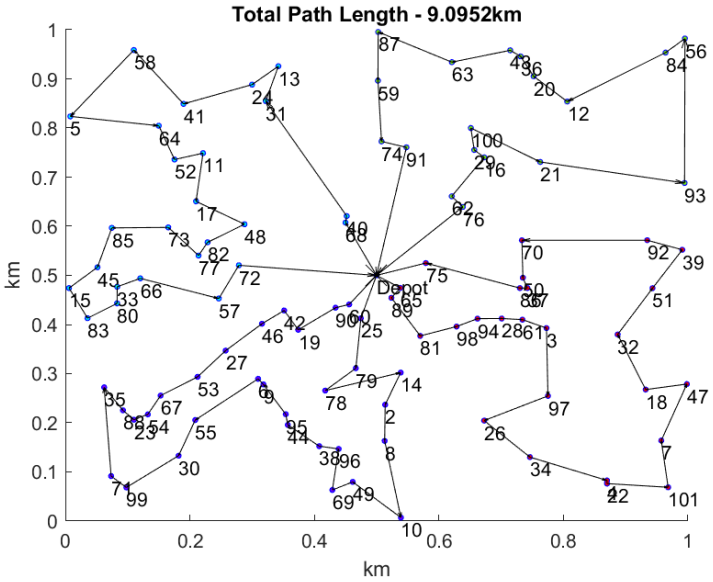

Fig. 4. Splitting 100 nodes into four clusters using k-means and plotting the path direction of each cluster using SA

I. Numerical Results

A. Time Complexity Comparison

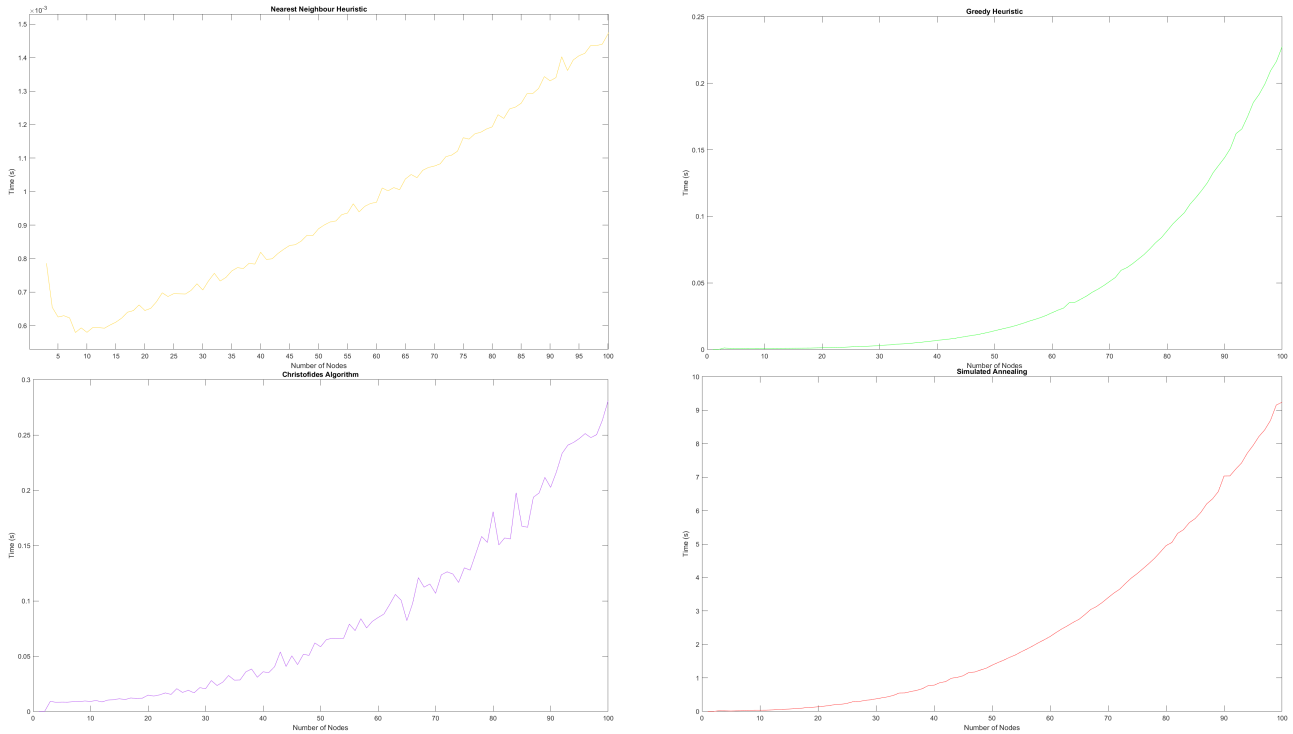

Fig. 5. Time taken to perform the algorithm at each number of nodes

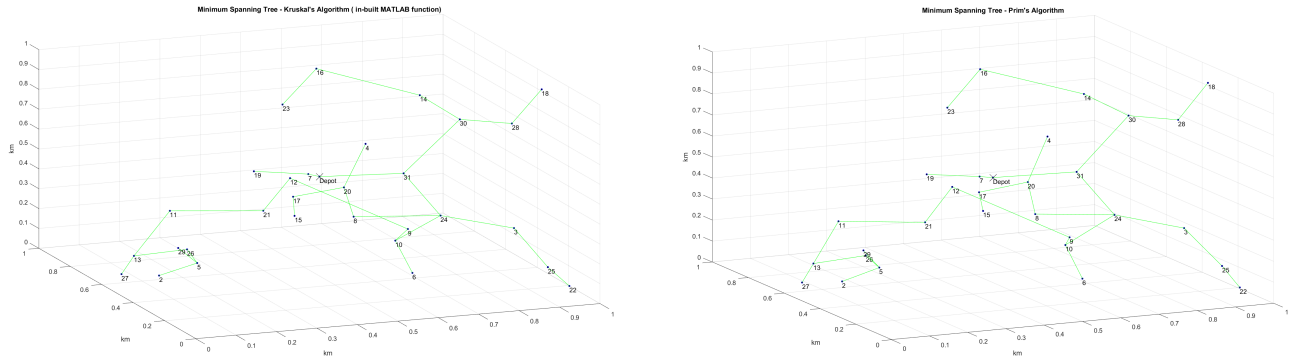

Fig. 6. MST comparison of Prim's and Kruskal's algorithm

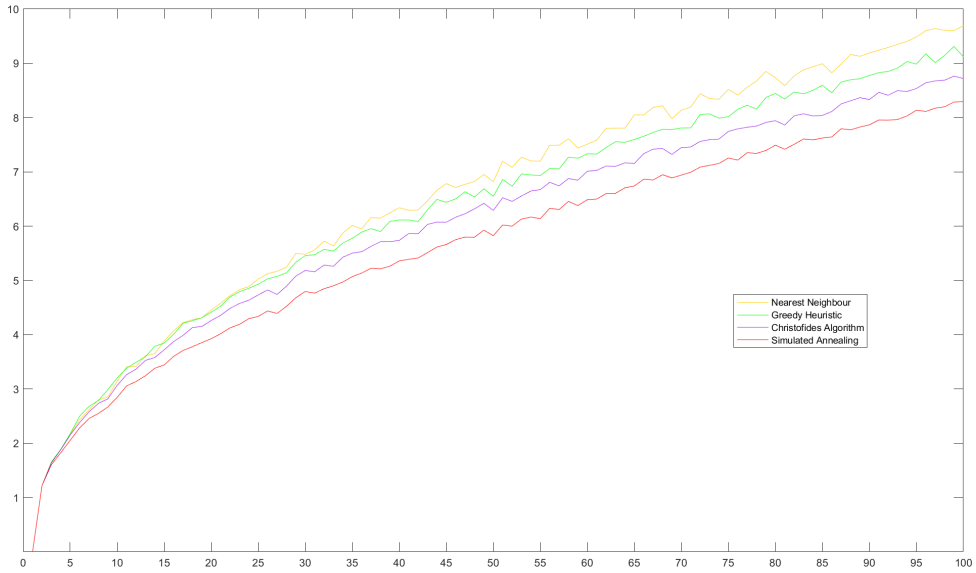

Fig. 7. Cost Comparison of TSP Algorithms - Monte Carlo Method (50 Trials)

Algorithm\Nodes	25	50	75	100	125	150
Nearest Neighbour	5.0397	6.872	8.556	9.763	10.685	11.835
Greedy	4.965	6.627	8.112	9.146	10.142	11.207
Christofides	4.772	6.319	7.770	8.766	9.699	10.641
Simulated Annealing	4.365	5.852	7.276	8.305	9.2141	10.1324

TABLE I

COST OF PATH IN KM OF TSP ALGORITHMS FOR A VARIOUS NUMBER OF NODES (50 TRIALS)

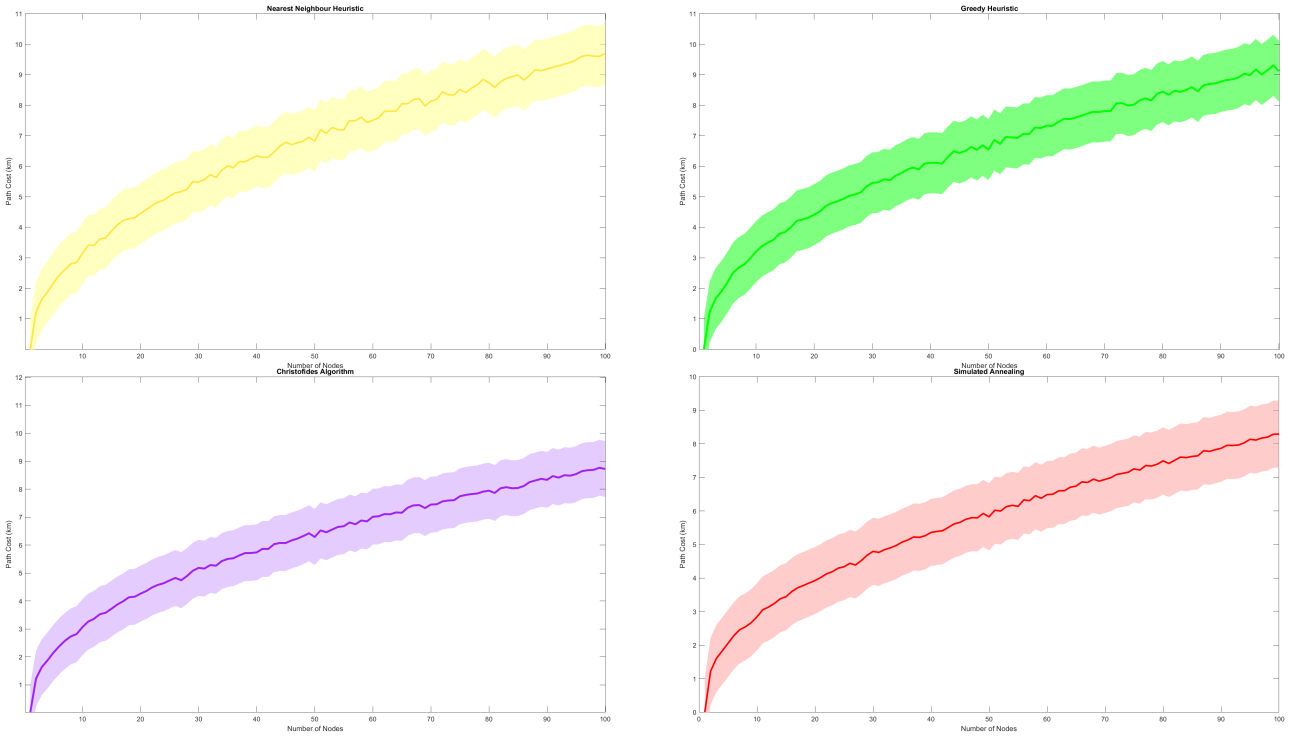

Fig. 8. Standard Deviation as a shaded region of the TSP Heuristics (50 trials)

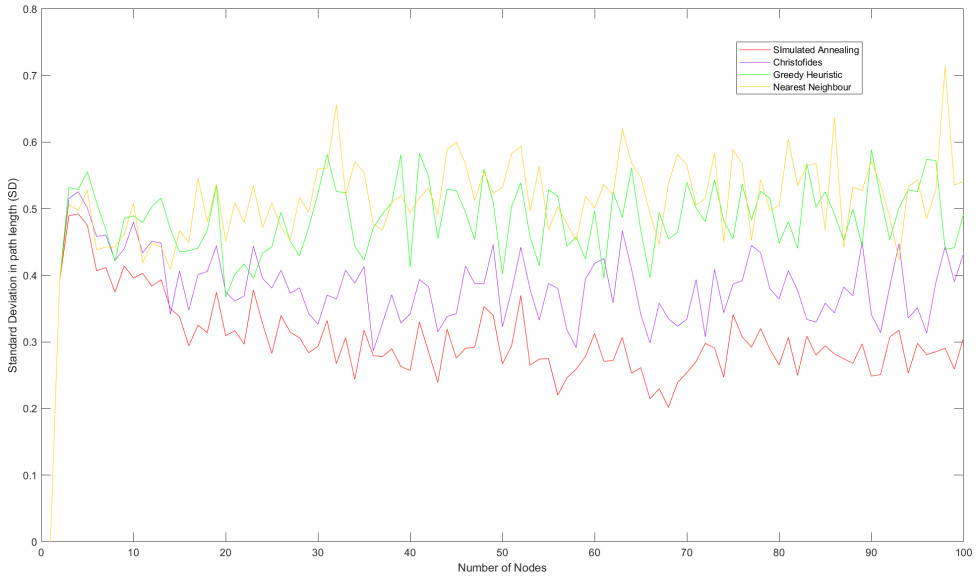

Fig. 9. Standard Deviation (SD) in Path length across all nodes (50 Samples)

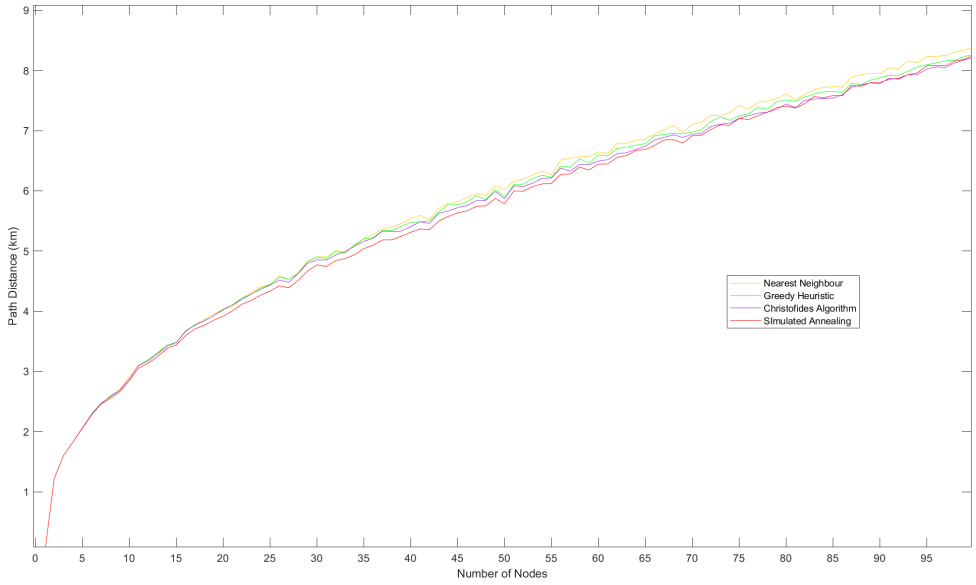

Fig. 10. Cost Comparison of TSP Algorithms (2-Opt Optimal)- Monte Carlo Method (50 Trials)

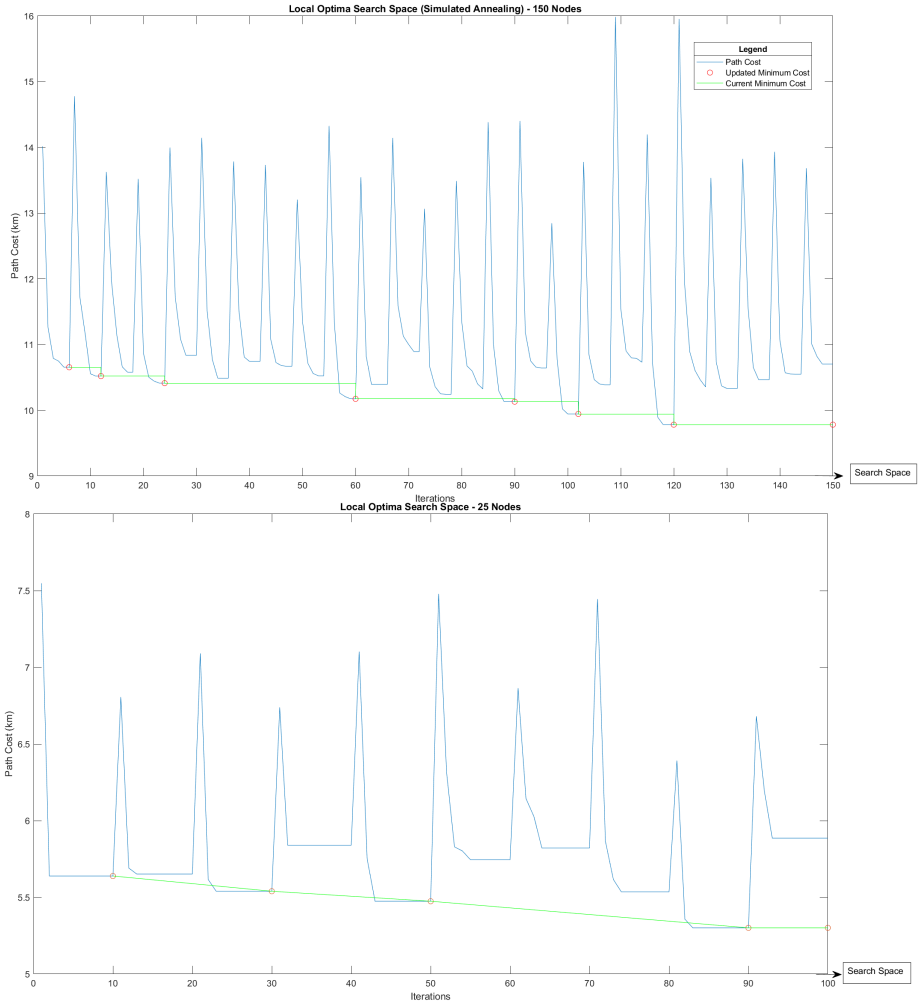

Fig. 11. Visual representation of the Simulated Annealing algorithm showcasing the working of the SA algorithm

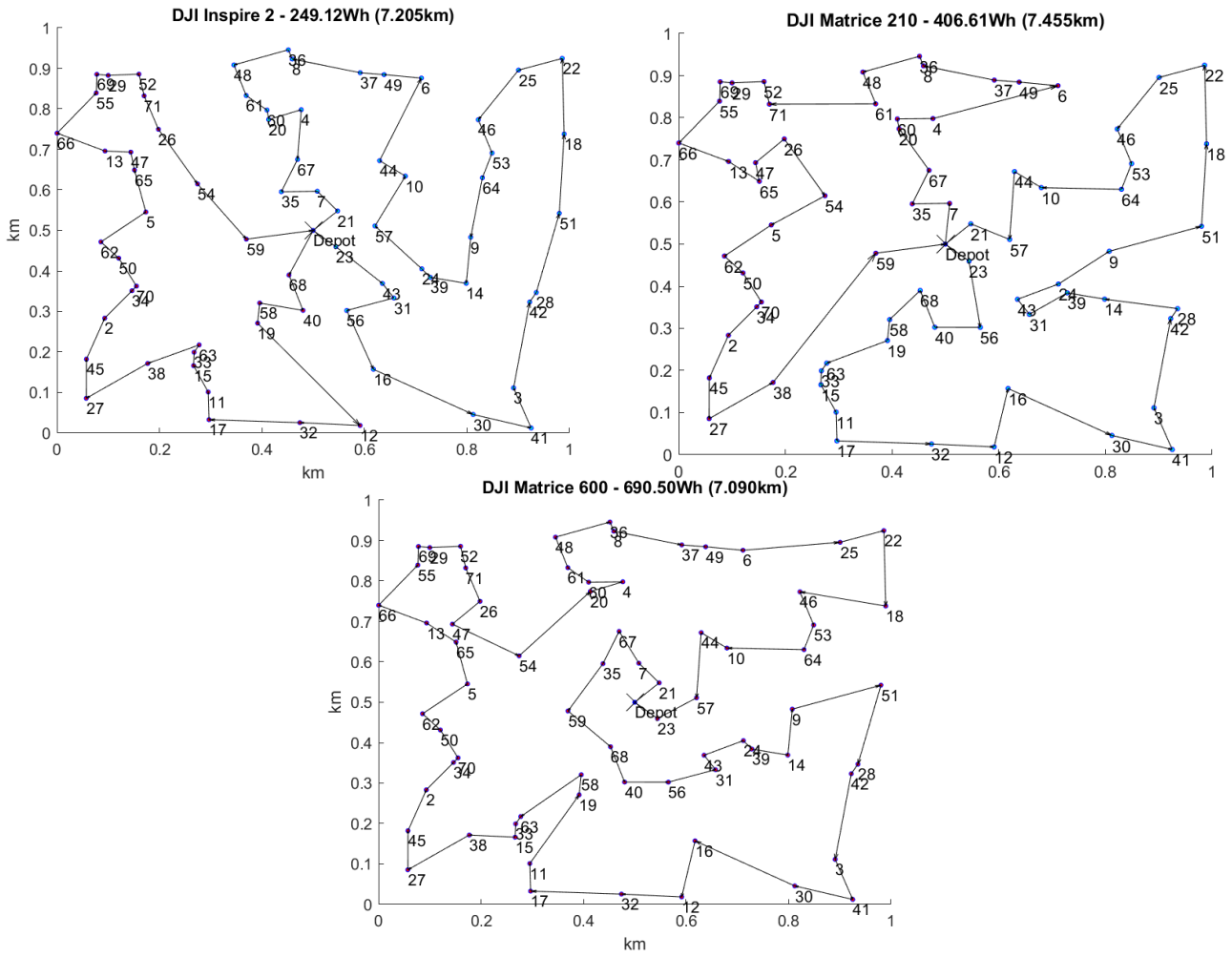

Fig. 12. Visual representation of valid tours of the three UAV models for 70 nodes

Nodes	10	20	30	40	50	60	70	80	90	100	110
DJI Inspire 2	125.04	125.13	152.11	168.89	213.77 (2)	232.09 (2)	224.59 (2)	264.76 (2)	271.78 (2)	291.67 (2)	309.68 (3)
DJI Matrice 210	197.26	197.41	239.96	261.91	310.88	371.40	341.07 (2)	419.17 (2)	437.08 (2)	454.19 (2)	481.74 (2)
DJI Matrice 600	352.25	352.51	428.51	462.11	568.43	582.52	598.73	745.64	777.07	817.17 (2)	864.75

TABLE II

ENERGY CONSUMED BY EACH DRONE FOR PATHS WITH A CERTAIN NUMBER OF NODES IN WH

1) Standard Deviation: