

1 PROBLEM AND STUDY ASSIGNMENT

The assignment of problems and studies to the categories as given in Figure 3 and 4 in the main article is outlined in Table 1-3.

Table 1. Treated standard CO problems and associated solution approaches

<u>Standard Problem</u>	<u>Solution Approach</u>	<u>Category</u>
Dense Subgraph Identification	Others: [17]	Standard Graph Optimization
Graph Colouring	QAOA/VQE: [86, 102] QA: [84, 95, 102] Others: [88]	Standard Graph Optimization
Graph Partitioning	QAOA/VQE: [87, 109] Others: [22, 106]	Standard Graph Optimization
Graph Similarity	QAOA: [46] Others: [17]	Standard Graph Optimization
k-Community Detection	QAOA/VQE: [67, 92] QA: [75, 85] Others: [54, 93, 106]	Standard Graph Optimization
Maximum Clique	QA: [77, 82] Others: [17]	Standard Graph Optimization
Max-Cut	QAOA/VQE: [4, 25, 61, 69, 115], [36, 41, 43, 45, 63, 74, 91, 108] [8, 15, 16, 58] [5, 33, 38, 55, 56, 94, 99, 104, 116] QA: [52] Others: [62, 70, 73, 113],	Standard Graph Optimization
Maximum Independent Set	QAOA/VQE: [8, 74, 89, 90] QA: [111]	Standard Graph Optimization
Minimum Multicut Problem	QA: [26]	Standard Graph Optimization
Travelling Salesman Problem	QAOA/VQE: [72, 74] QA: [9, 34, 80, 81]	Standard Graph Optimization
Vertex Cover	QAOA/VQE: [71, 72, 87]	Standard Graph Optimization
Job-Shop Scheduling	QA: [2, 117]	Standard Routing/Scheduling
Network-Flow Optimization (e.g. Routing)	QAOA/VQE: [114]	Standard Routing/Scheduling
Vehicle Routing Problem	QAOA/VQE: [11, 44] QA: [2, 34, 42, 53]	Standard Routing/Scheduling
Consensus Clustering	QA: [24]	Standard Packing/Covering/Partitioning
Knapsack Problem	QA: [34]	Standard Packing/Covering/Partitioning
Linear Assignment Problem	QAOA/VQE: [83]	Standard Packing/Covering/Partitioning

Table 1 continued from previous page

Standard Problem	Solution Approach	Category
Market Split Problem	QAOA/VQE: [8, 74]	Standard Packing/Covering/Partitioning
Minimum 2-Sum Problem	Others: [68]	Standard Packing/Covering/Partitioning
Number Partitioning	QAOA/VQE: [8, 58, 74]	Standard Packing/Covering/Partitioning
Quadratic Knapsack Problem	QA: [112]	Standard Packing/Covering/Partitioning
Set Packing	QAOA/VQE: [87]	Standard Packing/Covering/Partitioning
Tiling Puzzle Problem	QA: [32]	Standard Packing/Covering/Partitioning
Max-2-SAT	QAOA/VQE: [65, 108, 109]	Standard SAT
Max-3-SAT / 3-SAT	QAOA/VQE: [8, 74] QA: [19, 37, 60, 66]	Standard SAT
SAT Problems	QA: [7]	Standard SAT
Max-Sum Diversification	QA: [10]	Standard Diversification
Portfolio Optimization	QAOA/VQE: [8, 33, 58] QA: [40, 107] Others: [39]	Standard Diversification
Quadratic Assignment Problem	Others: [68]	None

Table 2. Treated real-world CO problems with given mappings to standard problems, and associated solution approaches

Real-World Problem/Domain	Standard Problem	Solution Approach	Category
Air Traffic Management	Conflict-Resolution Problem	QA: [98]	Real-World Graph Opt.
Flight scheduling	Graph Colouring	QAOA/VQE: [78]	Real-World Graph Opt.
Frequency allocation			
Register allocation			
Smart charging electric vehicles	Max-k-Cut Maximum Independent Set	QAOA/VQE: [27]	Real-World Graph Opt.
Cluster head selection	Maximum Weighted Independent Set	QAOA/VQE: [20, 21, 57]	Real-World Graph Opt.
Wireless scheduling			
Satellite scheduling			
Satellite sub-const. assig.	Weighted k-Clique Problem	QA: [9]	Real-World Graph Opt.
Social workers problem	Combination of Vehicle Routing Problem and Scheduling Problem	QAOA/VQE: [1] Others: [6]	Real-World Rout./Sched.
Military maintenance	Job-Shop Scheduling	QA: [9]	Real-World Rout./Sched.
Robot routing	Routing	QA: [23, 79]	Real-World Rout./Sched.
Binary paint shop problem	Scheduling	QAOA/VQE: [100]	Real-World Rout./Sched.
Flight-gate assignment problem	Scheduling	QAOA/VQE: [96]	Real-World Rout./Sched.
Multiple processor scheduling	Scheduling	QAOA/VQE: [87]	Real-World Rout./Sched.
Nurse scheduling	Scheduling	QA: [49]	Real-World Rout./Sched.

Table 2 continued from previous page

Real-World Problem/Domain	Standard Problem	Solution Approach	Category
Railway dispatching problem	Scheduling	QA: [31]	Real-World Rout./Sched.
Traffic flow optimization	Scheduling	QA: [47, 50, 110]	Real-World Rout./Sched.
Transaction scheduling	Scheduling	QA: [12, 13]	Real-World Rout./Sched.
Workflow scheduling	Scheduling	QA: [105]	Real-World Rout./Sched.
Tail assignment problem	Exact Cover Set Partitioning	Others: [101]	Real-World Pack./Cov./Part.
Facility location allocation	Quadratic Assignment Problem	QAOA/VQE: [83] QA: [3]	None
Garden optimization problem	Quadratic Assignment Problem	QA: [18]	None
Item listing optimization problem	Quadratic Assignment Problem	QA: [76]	None

Table 3. Treated real-world CO problems and associated solution approaches

Real-World Problem/Domain	Solution Approach	Category
Black-box optimization	QA: [59]	Real-World without Mapping
Dominant eigenpair	Others: [28]	Real-World without Mapping
Election poll forecasting	QA: [48]	Real-World without Mapping
Financial indexing	QAOA/VQE: [35]	Real-World without Mapping
Heat exchanger networks	QA: [3]	Real-World without Mapping
Image acquisition planning with satellites	QA: [97]	Real-World without Mapping
Logistics network design	QA: [29]	Real-World without Mapping
Manufacturing cell formation	QA: [2]	Real-World without Mapping
Model-predictive control	QA: [51]	Real-World without Mapping
Molecular conformation	QA: [2]	Real-World without Mapping
Online advertisement allocation	QA: [103]	Real-World without Mapping
Partially occluded object detection	QAOA/VQE: [64]	Real-World without Mapping
Prediction of financial crashes	QA: [30]	Real-World without Mapping
Transaction settlement	QAOA/VQE: [14]	Real-World without Mapping
Unit commitment	QA: [3]	Real-World without Mapping

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