Summary: The complexity class CLS was proposed by C. Daskalakis and C. Papadimitriou [in: Proceedings of the 22nd annual ACM-SIAM symposium on discrete algorithms, SODA’11. Philadelphia, PA: Society for Industrial and Applied Mathematics (SIAM); New York, NY: Association for Computing Machinery (ACM). 790–804 (2011; Zbl 1373.68263)] to understand the complexity of important NP search problems that admit both path following and potential optimizing algorithms. Here we identify a subclass of CLS – called UniqueEOPL – that applies a more specific combinatorial principle that guarantees unique solutions. We show that UniqueEOPL contains several important problems such as the P-matrix Linear Complementarity Problem, finding fixed points of Contraction Maps, and solving Unique Sink Orientations (USOs). We identify a problem – closely related to solving contraction maps and USOs – that is complete for UniqueEOPL.

MSC:
68Q15 Complexity classes (hierarchies, relations among complexity classes, etc.)
68Q17 Computational difficulty of problems (lower bounds, completeness, difficulty of approximation, etc.)
68Q25 Analysis of algorithms and problem complexity

Keywords:
P-matrix linear complementarity problem; unique sink orientation; contraction map; TFNP; total search problems; continuous local search

Software:
BEDFix

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References: