

Contents

Introduction	1
Outline and Main Contributions	4
1 An introduction to G-CORE	5
1.1 G-CORE Overview	5
1.2 Data Model	7
1.2.1 Path Property graphs	7
1.3 Basic notions of G-CORE	8
2 Related Work	13
2.1 Recursion in Relational Database Query Languages	13
2.1.1 Datalog	13
2.1.2 Recursion in SQL	15
2.2 Recursion in Graph Query Languages	15
2.2.1 SPARQL	16
2.2.2 Cypher	16
2.2.3 PGQL	17
2.2.4 G-CORE	17
3 General Recursion	18
3.1 The need for a general recursive operator	19
3.2 A proposal to generalize the expression of recursive queries	22
3.3 Syntax of general recursive queries in G-CORE	25
3.3.1 Nested Recursion	26
3.4 Semantics of general recursive queries in G-CORE	27
3.5 An Example: Nodes at k distance from the root	29
3.6 Data Complexity	31
3.6.1 Note: On Linear Recursion.	31
4 Graphs algorithms with recursive G-CORE	33
4.1 Topological Sorting	33
4.2 Minimum Spanning Tree	37
4.3 Eulerian Circuit	40
4.4 Maximum Matching	48
4.5 Connected Components	53
4.6 Planarity Testing	55

5	Issues for the Implementation of recursion in G-CORE	57
5.1	Current Implementation of G-CORE	57
5.2	Adding recursion to G-CORE	58
5.3	Problems with G-CORE operators	58
6	Conclusion and Future Work	60
	Bibliography	62