

# Table of contents

<b>1</b>	<b>Introduction</b>	<b>1</b>
1.1	Research Hypothesis . . . . .	3
1.2	Objectives . . . . .	3
1.2.1	General Objective . . . . .	3
1.2.2	Specific Objectives . . . . .	3
1.3	Contributions . . . . .	4
1.4	Thesis Structure . . . . .	4
1.5	Publications . . . . .	5
<b>2</b>	<b>Preliminaries</b>	<b>6</b>
2.1	Lattice Theory . . . . .	6
2.1.1	Sets . . . . .	6
2.1.2	Tuples . . . . .	7
2.1.3	Relations . . . . .	8
2.1.4	Partially Ordered Sets . . . . .	8
2.1.5	Lattices . . . . .	9
2.2	Formal Concept Analysis . . . . .	10
2.3	The Semantic Web . . . . .	12
2.3.1	RDF . . . . .	12
2.3.2	RDF Data Model . . . . .	13
2.3.3	RDF Vocabularies . . . . .	13
2.3.4	RDF Schema . . . . .	15
2.4	Characteristic Sets . . . . .	16
2.5	Wikidata . . . . .	17
2.6	Apache Hadoop . . . . .	19
2.6.1	Hadoop Distributed File System . . . . .	19
2.6.2	Hadoop MapReduce . . . . .	19
2.7	Linear Regression Models . . . . .	20
2.8	Summary . . . . .	21
<b>3</b>	<b>Related Work</b>	<b>22</b>
3.1	Computing Formal Concept Lattices . . . . .	22
3.2	Formal Concept Analysis on the Semantic Web . . . . .	23
3.3	Data-Driven RDF schema . . . . .	24
3.4	Modelling dynamics on the Semantic Web . . . . .	26
3.5	Summary . . . . .	26

<b>4</b>	<b>Proposed Graph Schema</b>	<b>27</b>
4.1	RDF Concept Lattice . . . . .	27
4.2	Characteristic Set Lattice . . . . .	30
4.3	Characteristic Set #-Lattice . . . . .	31
<b>5</b>	<b>Modelling Dynamics in RDF Graphs</b>	<b>33</b>
5.1	Characteristic Set Lattice Diff . . . . .	33
5.2	Adding a Diff to a Lattice . . . . .	35
<b>6</b>	<b>Extraction of Characteristic Sets</b>	<b>38</b>
6.1	Architecture . . . . .	38
6.2	Data . . . . .	38
6.3	MapReduce Jobs . . . . .	39
6.4	Optimization and Performance Analysis . . . . .	40
6.4.1	Number of Reducers . . . . .	40
6.4.2	OIDs representation . . . . .	41
6.4.3	Compression . . . . .	42
6.4.4	Combiners . . . . .	43
6.4.5	Summary . . . . .	43
6.5	Characteristic Set Statistics . . . . .	44
<b>7</b>	<b>Characteristic Set Lattice Computation</b>	<b>46</b>
<b>8</b>	<b>High Level Dynamics Evaluation</b>	<b>49</b>
8.1	Flat Prediction . . . . .	50
8.2	Transitive Prediction . . . . .	50
<b>9</b>	<b>Conclusions</b>	<b>52</b>
	<b>Bibliography</b>	<b>53</b>