UNIVERSITY OF SOUTHAMPTON

FACULTY OF PHYSICAL AND APPLIED SCIENCES

Electronics and Computer Science

Using Linked Data in Purposive Social Networks

by

Priyanka Singh

Thesis for the degree of Doctor of Philosophy

February 2015

UNIVERSITY OF SOUTHAMPTON

ABSTRACT

FACULTY OF PHYSICAL AND APPLIED SCIENCES Electronics and Computer Science

Doctor of Philosophy

USING LINKED DATA IN PURPOSIVE SOCIAL NETWORKS

by Priyanka Singh

This work is all about ...

Contents

D	eclar	ation of Authorship xi	ii
A	cknov	vledgements	v
N	omer	clature xv	ii
1	Intr	oduction	1
	1.1	Overview	1
	1.2	Research Challenge	1
	1.3	Research Contribution	1
	1.4	Structure of the thesis	1
2	Bac	kground	3
	2.1	Emergence of Social Web	5
		2.1.1 Web 2.0 and Social Networks	5
		2.1.2 Content-specific Social Networking Services	5
	2.2	Collective Intelligence and Crowdsourcing	5
		2.2.1 Crowdsourcing Services	5
		2.2.1.1 Wiki	5
		2.2.1.2 Forums and Messaging Boards	5
		2.2.1.3 Q&A Services	5
		2.2.2 Human Computation	5
		2.2.3 User Recommendation System	5
	2.3	Semantic Web and Linked Data	5
		2.3.1 Social Semantic Technology	5
		2.3.1.1 FOAF	5
		2.3.1.2 SIOC	5
		2.3.1.3 OPO	5
		2.3.2 Linked Data Technology	5
		2.3.2.1 Linking the Datasets	5
		2.3.3 Open Linked Data and Graph	5
	2.4	Semantic Search	5
		v o	5
		2.4.2 Concept Mapping	5
		2.4.3 SPARQL Queries	5
3	Pur	posive Social Network	7
	3.1	What is Purposive Social Network	9

vi CONTENTS

		3.1.1	Information Paged Community	9
		3.1.1		9 9
		3.1.3		9 9
		3.1.4		9 9
	3.2			9 9
	3.2	3.2.1		9 9
		3.2.1 $3.2.2$	•	9 9
		3.2.3		9 9
		3.2.4	*	9
		3.2.5	•	9
	9.9	3.2.6	9	9
	3.3		1	9
		3.3.1	<u> </u>	9
		3.3.2	v o	9
		3.3.3	9	9
		3.3.4		9
		3.3.5	•	9
	3.4		•	9
		3.4.1	0	9
		3.4.2		9
		3.4.3	•	9
		3.4.4		9
	3.5		*	9
		3.5.1		9
		3.5.2		9
		3.5.3	*	9
		3.5.4		9
		3.5.5	• 0	9
		3.5.6	Social Network Analysis	9
4	Svs	tem De	esign and Methodology 1	1
•	4.1		Mining	Τ
	1.1	4.1.1	StackOverflow Data Mining	
		4.1.2	Reddit Data Mining	
	4.2		Structuring	
	1.2	4.2.1	Data Cleaning	
		4.2.2	Converting into N-Triples	
		4.2.3	Linking the Data	
	4.3		ord Disambiguation	
	1.0	4.3.1	OpenCalais Service	
		4.3.2	DBpedia Spotlight Service	
	4.4		• •	
	4.4	4.4.1	pt Mapping	
		4.4.1 $4.4.2$	Document Term Matrix	
	4.5			
	4.0	4.5.1	and Query	
		4.5.2	Searching Answers of Unanswered Questions	4

CONTENTS vii

		4.5.3	Expert Finder				 	 	 	 		 12
5	Pur	posive	Social Network	k Analy	ysis							13
	5.1	Netwo	rk Linkage and So	ocial Tie	es .		 	 	 	 		 13
	5.2	Role o	f Individual Actor	rs			 	 	 	 		 13
	5.3	Incent	ive Design				 	 	 	 		 13
	5.4	Qualit	y Control				 	 	 	 		 13
	5.5	Linked	l Data Graph				 	 	 	 		 13
	5.6	Discou	rse Analysis				 	 	 	 		 13
6	Eva	luatior	1									15
	6.1	Experi	ment Design				 	 	 	 		 15
		6.1.1	Calculating Sam	ple Size			 	 	 	 		 15
		6.1.2	Selecting Question	ons			 	 	 	 		 15
	6.2	Data (Collection				 	 	 	 		 15
		6.2.1	Questionnaire D	esign .			 	 	 	 		 15
		6.2.2	Dataset Frequen	cy Distr	ribut	ion	 	 	 	 		 15
	6.3	Result	s				 	 	 	 		 15
		6.3.1	Keywords T-Tes	t			 	 	 	 		 15
		6.3.2	Q&A Correlation	n Test .			 	 	 	 		 15
		6.3.3	Summary				 	 	 	 	 •	 15
7	Con	clusio	ns									17
	7.1	Summ	ary of Results .				 	 	 	 		 17
	7.2	Limita	tion of System.				 	 	 	 		 17
	7.3	Future	Work				 	 	 	 		 17
Δ	Stut	ff										19

List of Figures

List of Tables

Declaration of Authorship

- I, Priyanka Singh, declare that the thesis entitled *Using Linked Data in Purposive Social Networks* and the work presented in the thesis are both my own, and have been generated by me as the result of my own original research. I confirm that:
 - this work was done wholly or mainly while in candidature for a research degree at this University;
 - where any part of this thesis has previously been submitted for a degree or any other qualification at this University or any other institution, this has been clearly stated;
 - where I have consulted the published work of others, this is always clearly attributed;
 - where I have quoted from the work of others, the source is always given. With the exception of such quotations, this thesis is entirely my own work;
 - I have acknowledged all main sources of help;
 - where the thesis is based on work done by myself jointly with others, I have made clear exactly what was done by others and what I have contributed myself;
 - parts of this work have been published as: (?), (?) and (?)

Signed:	 	 	 	
0				
Date:	 	 	 	

Acknowledgements

Thanks to no one.

Nomenclature

w The weight vector

Introduction

- 1.1 Overview
- 1.2 Research Challenge
- 1.3 Research Contribution
- 1.4 Structure of the thesis

Background

2.1 Emergence of Social Web

- 2.1.1 Web 2.0 and Social Networks
- 2.1.2 Content-specific Social Networking Services
- 2.2 Collective Intelligence and Crowdsourcing
- 2.2.1 Crowdsourcing Services
- 2.2.1.1 Wiki
- 2.2.1.2 Forums and Messaging Boards
- 2.2.1.3 Q&A Services
- 2.2.2 Human Computation
- 2.2.3 User Recommendation System
- 2.3 Semantic Web and Linked Data
- 2.3.1 Social Semantic Technology
- 2.3.1.1 FOAF
- 2.3.1.2 SIOC
- 2.3.1.3 OPO
- 2.3.2 Linked Data Technology
- 2.3.2.1 Linking the Datasets
- 2.3.3 Open Linked Data and Graph
- 2.4 Semantic Search
- 2.4.1 Keyword Disambiguation
- 2.4.2 Concept Mapping
- 2.4.3 SPARQL Queries

Purposive Social Network

3.1 What is Purposive Social Network

- 3.1.1 Information Based Community
- 3.1.2 Interest Based Community
- 3.1.3 Expert Based Community
- 3.1.4 Location Based Community
- 3.2 Characteristics of Purposive Social Network
- 3.2.1 Community Size
- 3.2.2 Focused Interest
- 3.2.3 Direct Communication
- 3.2.4 Active Participation
- 3.2.5 Short Lifespan
- 3.2.6 Strong Incentive
- 3.3 Benefits of Purposive Social Network
- 3.3.1 Information Exchange and Self-interest
- 3.3.2 Symbiotic Relation and Social Exchange
- 3.3.3 Social Recognition and Personal Satisfaction
- 3.3.4 Recommendation System
- 3.3.5 Expert Finder
- 3.4 Crowdsourcing in Purposive Social Network
- 3.4.1 Recruiting and Retaining Users
- 3.4.2 Incentive Model
- 3.4.3 Quality Control
- 3.4.4 Search and Discovery of Quality Content

System Design and Methodology

- 4.1 Data Mining
- 4.1.1 StackOverflow Data Mining
- 4.1.2 Reddit Data Mining
- 4.2 Data Structuring
- 4.2.1 Data Cleaning
- 4.2.2 Converting into N-Triples
- 4.2.3 Linking the Data
- 4.3 Keyword Disambiguation
- 4.3.1 OpenCalais Service
- 4.3.2 DBpedia Spotlight Service
- 4.4 Concept Mapping
- 4.4.1 Keyword Matrix
- 4.4.2 Document Term Matrix
- 4.5 Search and Query
- 4.5.1 Database Design
- 4.5.2 Searching Answers of Unanswered Questions
- 4.5.3 Expert Finder

Purposive Social Network Analysis

- 5.1 Network Linkage and Social Ties
- 5.2 Role of Individual Actors
- 5.3 Incentive Design
- 5.4 Quality Control
- 5.5 Linked Data Graph
- 5.6 Discourse Analysis

Evaluation

- 6.1 Experiment Design
- 6.1.1 Calculating Sample Size
- 6.1.2 Selecting Questions
- 6.2 Data Collection
- 6.2.1 Questionnaire Design
- 6.2.2 Dataset Frequency Distribution
- 6.3 Results
- 6.3.1 Keywords T-Test
- 6.3.2 Q&A Correlation Test
- 6.3.3 Summary

Conclusions

It works.

- 7.1 Summary of Results
- 7.2 Limitation of System
- 7.3 Future Work

Appendix A

Stuff

The following gets in the way of the text....