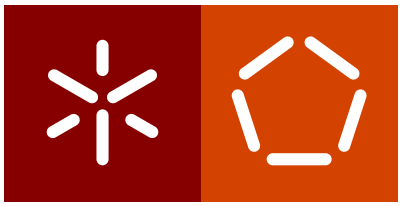

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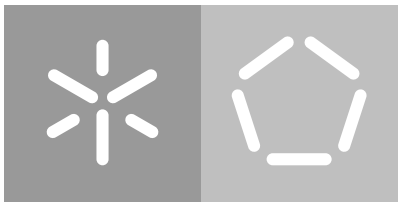

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Analysis and Visualisation of Dynamic Social Networks

Master dissertation
Master Degree in Computer Science

Dissertation supervised by
Pedro Rangel Henriques
Alda Lopes Ganarski

September 2016

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Write acknowledgements here

ABSTRACT

Write abstract here (en) or import corresponding file

RESUMO

Escrever aqui resumo (pt) ou importar respectivo ficheiro

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ACRONYMS

O

OSN Online Social Network.

S

SN Social Network.

SNA Social Network Analysis.

1

INTRODUCTION

1.1 CONTEXT AND PROBLEM

Social Networks (SNs), *Social Network Analysis (SNA)*, *Online Social Networks (OSNs)*, Unstructured Data Analysis

1.2 MOTIVATION

1.3 GOALS

2

SOCIAL NETWORKS IN SOCIOLOGY

Nowadays is hard to find something that is not organized as a network, if one tries to understand something about the world around us, then definitely one needs to know something about networks.

Curiously if you look up the term *"social network"* in the Cambridge Dictionary, we may face the following:

> *"a website or computer program that allows people to communicate and share information on the Internet using a computer or mobile phone"*

But, even if today we automatically think in SNs as websites (or web applications), deep down we know when talking about SNs, we refer to a much more broader term, that said, we may consider a SN as the following:

> *"A social structure made of nodes that are generally individuals or organizations. A social network represents relationships and flows between people, groups, organizations, animals, computers or other information/knowledge processing entities. The term itself was coined in 1954 by J. A. Barnes."*

One may say that networks work like pipes, and trough them things flow, from individual to individual inside the network. It's trough networks that big institutions can organize themselves, and actually add value to society despite the large number of individuals.

2.1 ORIGINS OF SOCIAL NETWORKS

> *"The network concept is one of the defining paradigms of the modern era."* [REF_BOOK]

Before talking of network from the sociology perspective, one needs to review the network concept, which is broadly used across multiple fields of study, this include, physics, biology, linguistic, anthropology, mathematics, computer science and more recently computer networks.

But why is the network approach so adopted in such diversification fields? The answer is, because networks allows us to capture the interactions of any individual unit within the larger field of activity to which the unit belongs [REF_BOOK].

2.1.1 *Sociology Perspective*

> *"(...) many people attribute the first use of the term "social network" to Barnes (1954). The notion of a network of relations linking social entities, or of webs or ties among social units emanating through society, has found wide expression throughout the social sciences. (...)"*

The *"social network"* concept has been around for many years now, maybe not in the exact format that nowadays, we are familiarized with (*"web way"*, in a manner of speaking), but in a more abstract sense, applied in real life within real connections. In *"Social Network Analysis - Methods and Applications Stanley Wasserman and Katherine Faust"*, the authors refer that this term has first came into discussion in 1954, introduced by Barnes, J.A.

> *"Social relations in Bremnes, Norway, fall into three categories: relatively stable formal organizations serving many different purposes, unstable associations engaged in fishing, and interpersonal links that combine to form a social network and on which perceptions of class are based. In fishing situations, orders are given and obeyed; in the other social settings, consensus decisions are reached obliquely and tentatively."*

In the above citation, John Arundel Barnes, does a very well succeed reflection about the relationships of the people from Bremnes (Norway). The author points out that relations can form organizations for serving a specific purpose, and today we clearly see that the chosen path of SNs and also Online Social Networks (OSNs), was narrow down social networks to very specific purposes, such as professional networks. So one may say that John Arundel Barnes not only coined the term *"social network"*, but also was one of the first who described **interest-based social networks**.

2.2 RELEVANT SN RELATED TERMS

In this section talk about some inherent concepts of social networks, only if they are found relevant. (Review this theories. Why are they important in sociology? What is their placement (fitting) in the thesis?)

- Homophily and Heterophily
- Structuralism
- Structural functionalism
- Conflict theories
- Social constructionism

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ONLINE SOCIAL NETWORKS

Present table and comment. A, B and C are studied more deeply in the following sections.

3.1 PORTUGUESE AND ONLINE SOCIAL NETWORKS

Mentioning relevant facts from marktest study "Os Portugueses e as Redes Sociais 2016"

3.2 SN A

3.2.1 *Domain Modeling*

3.2.2 *API*

3.3 SN B

3.4 SN C

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4.1 NETWORK ANALYSIS

4.1.1 *Scientific Background*

Graphs

Statistics

...

4.1.2 *Power Law*

4.1.3 *Centrality Measures*

4.1.4 *Link Analysis*

4.1.5 *...*

4.2 SIX DEGREES OF SEPARATION

Small World Problem, Stanley Milgram's Experiment

4.3 NETWORK VISUALISATION

It's a science by itself.

4.4 REAL WORLD APPLICATIONS

What SNAs are used for.

5

STATE OF THE ART

State of the art review; related work

5.1 BASICS/BACKGROUND/RELATED WORK

Example of a citation where the author should be cited directly on the text like, the work of Goossens et al. (1997), on producing LaTeXfiles with BibTeX references.
Another way of citing whithout a direct mention to the author can used like the work done on C language (Kernighan and Ritchie, 1988).

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THE PROBLEM AND ITS CHALLENGES??

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PROPOSED SOLUTION

7.1 SOLUTION REQUIREMENTS

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7.4.3 *Technology C*

7.4.4 *Technology Comparison*

7.4.5 *Decision*

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8.1.1 *Data Sources*

8.2 DATA MINING

8.3 BACK END

8.4 FRONT END

8.5 OUTCOMES

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Application of main result (examples and case studies)

9.1 RESULTS

9.2 DISCUSSION

9.3 SUMMARY

10

CONCLUSION

Conclusions and future work.

10.1 CONCLUSIONS

10.2 PROSPECT FOR FUTURE WORK

BIBLIOGRAPHY

Michel Goossens, Sebastian Rahtz, and Frank Mittelbach. *The LaTeX Graphics Companion*. Addison-Wesley, 1997. ISBN 0-201-85469-4.

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