Le Pham Minh Duc

Un-polarizing news in social media platform

Master’s thesis of mathematical information technology

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Author:Le Pham Minh Duc (Lê Phạm Minh Đức)

Contact information: [miduleph@student.jyu.fi](mailto:miduleph@student.jyu.fi), minhduc1993@yahoo.com

Supervisors: Oleksiy Khriyenko (oleksiy.o.khriyenko@jyu.fi)

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Jyväskylä, September 4, 2018

Le Pham Minh Duc (Lê Phạm Minh Đức)

Glossary

NLP Natural language processing

DCOM Distributed Component Object Model  
More explanation…

C++ Shouldn’t need any explanation…

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# INTRODUCTION

## Problems overview

Ideological polarization has been a problem in our society for quite a long time. (that reference from 1986). With the rise of social media (citation here or not), it’s estimated that 66% of US citizen use social media as one source of news (citation from that web page), the amplification of ideological polarization has been increasing much faster than previously due to social endorsement, and other social media techniques that is used to keeps its user engaged (Sporh. 2017). This creates the echo-chamber effects that, by the design of social networks that only show what the users want to see, make the user even furthermore polarized into his own belief and makes him see the world wrongly, which may turn the user into some extremists that might be harmful for the society.

Scholars have been researching about this problem and solutions are proposed (many citations needed) but these solutions are either too impractical (e.g: needing the giant media companies to change their entire business models) or just way out of reach of the scholar scope (e.g: needing of the government’s intervention on the issue or people to stop using the services).

## Proposed solution and research questions

The main goal of this thesis is to find the way to break the people’s echo chamber that is mostly caused by the effect of social medias only show the user what he/she wants to see. To combat this, we need to show the user the news from the other side of view. If he/she reads about the opening of a new coal mines help creating a few hundreds of new jobs for the area, he should also know that the new coal mines will cause a great damage to the environment and might cause some local wild-life to disappear.

On top of that, the service must be accessible and easy to use, as the reason of many people using social media as their main source of news as it’s so convenience to have one place to go to and can see both your friend’s status as well as news.

With that goal in mind, the main research question of the thesis is:

* **How to find articles with alternative (different) points of view to a given article?**

We will only attempt to find the news that is relevant to the article but also provide oversight from different point of view that the first article misses. We will not check if the news is credible (but we will try to only provide news from credible sources) or if it is true, we simply provide the user different articles from many points of views so that he/she can choose to interpret it whatever he/she wants to.

Afterwards, with the first question answered, we will address two additional support questions on deploying the news un-polarizing service for the mass to use:

* **What is the most convenience way to deliver the service for the user?**

If the service is too complicated to use, or requires too many unnecessary steps, the user will rarely use the service at all, which will defeat the whole purpose of the system.

* **How to engineer the service so that it is autonomous, up-to-date and scalable?**

As a news service, it must always catch up with the latest news to be relevant to use.

## Research method

Abc, test text. Please fill in later.

## Thesis structure

This thesis will be divided into four main parts, including this introduction. The second chapter, named “Un-polarizing algorithm” will attempt to answer the main research question on how to find articles with alternative points of view to a given article.

As this chapter attempts to answer the main thesis question, including the theoretical approach as well as solution implementation from the ground, it thus can be furthermore divided into 4 smaller sub-chapters in which, the first sub-chapter starts with the fundamental technologies used for the works, the author original hypothesis and the reasons for choosing the services used in the thesis implementation part. The second sub-chapter focus on processing and storing the articles/news/documents retrieved from the internet using the technologies presented previously. With the articles processed and stored, the third sub-chapter provides the un-polarizing algorithm that answer the main thesis questions. Finally, the second chapter ends with evaluation of the un-polarizing algorithm as well as comparison to other existing solution.

The third chapter tackles the two subsequence researches question of providing the un-polarizing algorithm in the most convenience way for the general mass to use and how to develop the algorithm to be a cloud service that can support a large amount data if needed.

Finally, conclusions for the thesis as well as possible future work and extension are given in the last chapter.

# UN-POLARIZING ALGORITHM

## Natural language processing

### Original hypothesis

Our original hypothesis is that: given two articles talking about one similar topic (*for example: The US’s involvement in Iraq*), if one article has a positive views on the situation (*ie: Saddam Hussein is a terrible man and the people living under his reign are suffering badly*) and the other has a negative views regarding the same situation (*ie: it furthermore destabilizes the region and the main intention of the war was because of oil*). With articles telling about the same story but with different sentiment value, it could be interesting for the reader to see from different kind of attitudes about the same topic, thus, bring him to different point of views about a problem.

This hypothesis, however, after some implementation and evaluation, was proven to be not good enough (**more in-depth in chapter 2.3.2 Sentiment analysis**). The final solution of this thesis utilizes more complexed calculations and processing techniques that was not originally planned from the start. However, the initial hypothesis did create a solid technology base to work on: Named entity recognizer (*to understand the article topic*) and sentiment analysis (*to understand the positivity/negativity of the article*).

### Natural language processing and evaluation of available NLP services

For our un-polarizing algorithm to work, we need to have the machine automatically understand the news and articles written in human language. Fortunately, understanding natural language is an interesting topic that has been thoroughly research by scholars for over 70 years, since the 1950s (<https://en.wikipedia.org/wiki/Natural_language_processing>) with a lot of readily available tools to use.

Natural language processing (NLP) is an area of computer science and artificial intelligence concerned with the interactions between computers and human (natural) languages, in particular how to program computers to process and analyze large amounts of natural language data. (Source from wiki- more information needed).

### Stanford CoreNLP

## Article processing

### Data gathering technique

Local

database

Web

content

processor

Article

annotator

Requested URL

News gatherer

News

suggestions

module

Suggested

articles

Figure 1. Service architecture

### Web content parser

### Article annotation

## Un-polarizing algorithm

### Sentiment analysis

### Named entity recognizer

### Article similarity calculation

|  |  |  |  |
| --- | --- | --- | --- |
| Word | Year | Magnitude | Example |
| example | [1700,2000] | [1,10] | example |
| example | [1950,2000] | [1,106] | example |
| example | [1995,2000] | [10–6,106] | example 1, example 2 |

Table 1. Example of the table

### Un-polarizing algorithm

## Solution evaluation and related works

# SERVICE DEPLOYMENT

## Backend service deployment

## User interface and user experience design

Local

database

Web

content

processor

Article

annotator

Requested URL

News gatherer

News

suggestions

module

Suggested

articles

Figure 2. Test figure

# CONCLUSION

Hope you enjoyed the text...

In the bibliography the recommendable style is Chicago. You can also use other styles: the main thing is that the styles of the bibliography and referring technique are **consistent** in the whole thesis.

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Appendices

1. Title of the first appendix
2. Title of the second appendix