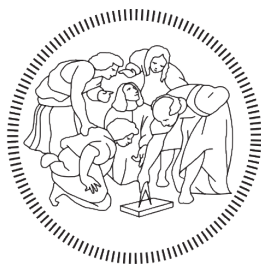


POLITECNICO DI MILANO
Scuola di Ingegneria Industriale e dell'Informazione
Corso di Laurea Magistrale in Ingegneria Informatica
Dipartimento di Elettronica, Informazione e Bioingegneria



POLITECNICO
MILANO 1863

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Academic Year 2015–2016

Some nice inspirational and aspirational quote. Some nice inspirational and aspirational quote.

Someone

Summary

Hello, here is some text without a meaning. This text should show what a printed text will look like at this place. If you read this text, you will get no information. Really? Is there no information? Is there a difference between this text and some nonsense like “Huardest gefburn”? Kjift – not at all! A blind text like this gives you information about the selected font, how the letters are written and an impression of the look. This text should contain all letters of the alphabet and it should be written in of the original language. There is no need for special content, but the length of words should match the language.

Abstract

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Chapter 1

Introduction

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1.1 Structure

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- In the chapter 2 blahblah
- In the chapter 3 Hello, here is some text without a meaning. This text should show what a printed text will look like at this place. If you read this text, you will get no information. Really? Is there no information? Is there a difference between this text and some nonsense like “Huardest gefburn”? Kjift – not at all! A blind text like this gives you information about the selected font, how the letters are written and an impression of the look. This text should contain all letters of the alphabet and it should be written in of the original language. There is no need for special content, but the length of words should match the language.

Chapter 2

State of the art

This chapter describes state of the art of sentiment analysis in social media. Chapter consists of three sections, each of them trying to bring closer the need of sentiment analysis in current market:

1. Need for sentiment analysis
2. Application of sentiment analysis in various companies and non-profit organizations
3. Most used tools for sentiment analysis

2.1 Need for sentiment analysis

With growth of people's interaction and company's advertisements through social media, we have come to the point of realizing that people sharing opinions could help us "predict" stock market and as well follow current trends by guiding the market according to the customers input. Customers nowadays have endless ways to interact with brands which could help increasing brand's awareness but if not properly analyzed could also lead to obtaining not quite accurate view of customer's satisfaction. The idea of analyzing customer opinion has driven companies to search for an automated way of understanding what message are customers sharing online. The main network of spreading opinions is social media. Almost every tweet, comment, re-share or review gives an information that could guide a company towards better planning , optimizing production and better stock managing. Reason for finding an automated way of analyzing customer's opinion comes from a problem of big data being generated each day which makes impractical of doing human analysis of each user input. Leaving the big data problem aside, brings us to another issue; being able to beat natural language processing challenge. Reason for making the task harder is that user input might be informal, "slang like content with emojis ,

hash tags, even full with sarcastic sentences which would lead to unreliable results of sentiment analysis.

2.2 Application of sentiment analysis in various companies and non-profit organizations

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2.3 Most used tools for sentiment analysis

Commercial solutions:

Google Analytics Radian6 Brandwatch

Open source solutions:

NLTK Stanford’s CoreNLP Text-Processing

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Chapter 3

Sentiment analysis workflow

This chapter describes the workflow used to analyze the sentiment of social media comments and their corresponding posts. In order to outline the workflow, a top down approach was taken where each subsequent section provides an ever more detailed insight into a particular step of the workflow. The big picture is shown in Figure 3.1 and consists of four parts:

1. Obtaining data
2. Sentiment prediction using an API
3. Determining real sentiment of data
4. Evaluation of that API's performance

First part is the simplest one and as such doesn't merit a more detailed recounting other than mentioning that we were provided with a small sample dataset which, most relevantly, contained about 6000 comments.

In the sections that follow, each of the three remaining parts are broken down into conceptual steps describing the methodology used whilst not cluttering it with too many implementation details. Additionally, it is interesting to note that the first and third steps are done only once. This means that, for each new API we want to use, the workflow for sentiment analysis effectively consists of only steps 2 and 4, namely sentiment prediction and performance evaluation.

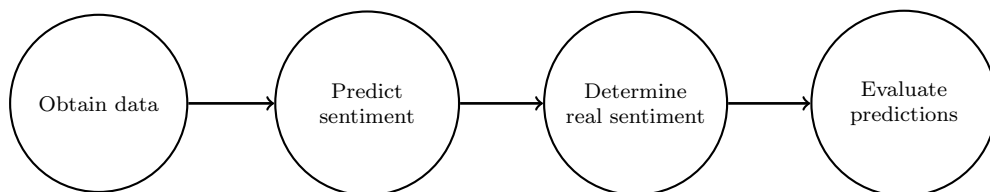


Figure 3.1: Sentiment analysis workflow

3.1 Sentiment prediction workflow

Let's assume we have access to an API for sentiment prediction. And by having access we mean being able to programmatically call the API with a text payload and have it return a prediction in some data format. The end goal is to analyze sentiment of all the comments in our sample dataset and aggregate the obtained data on a per post basis in order to infer whether it was positively or negatively received, or even if it had no emotional impact whatsoever. And we want this to be done automatically, practically with a push of a proverbial button. By automatizing the process, it is easy to see how it can derive value for possible future ventures that extend far beyond our modest 6000 comment database.

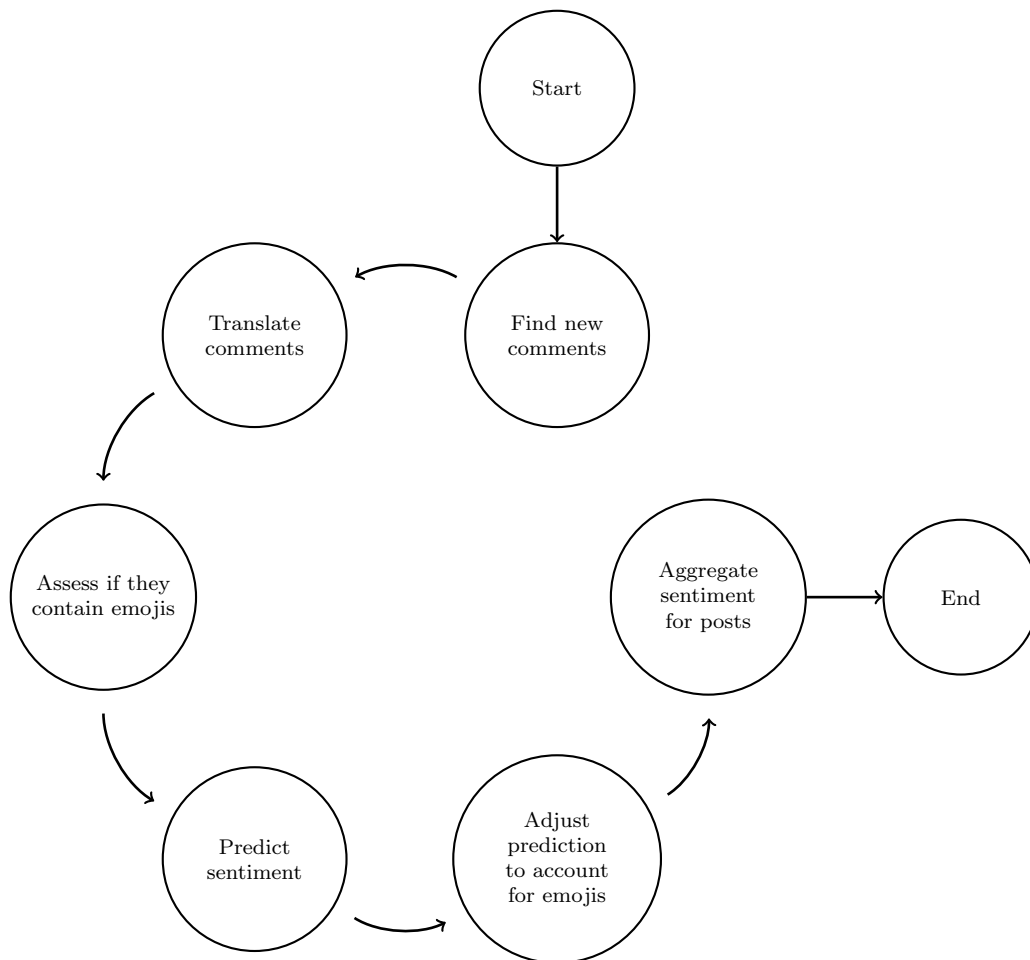


Figure 3.2: Sentiment prediction workflow

Figure 3.2 shows the main concepts that build up the workflow of our sentiment analysis. Since the term *workflow* can be a bit ambiguous, let us clarify exactly what we mean by it. In our case it is simply a python script named named *au-*

tomated_sentiment_analysis.py that can be run manually, or scheduled to run on a server at desired times/intervals. Sections that follow will explain each step in more detail and will also provide motivation for some, perhaps not so obvious, choices.

Find new comments

This part quite straight forward Once run, the script scans the database looking for comments that don't have a sentiment record and inserts one.

for the sake of completeness The inserted rows' sentiment columns default to a json shown in Listing 3.1. The reason for this particular choice of json and for using the json format in the first place is discussed at length in Section 4.1.

```
{
  "sentiment_label": "",
  "sentiment_stats": {
    "positive": 0,
    "negative": 0
    "neutral" : 0
  }
}
```

Listing 3.1: Default sentiment json

Translate comments

Translate comments, Mark comments containing emojis, Predict sentiment, Account for emojis, Calculate aggregate sentiment for posts by new we mean unanalyzed

...

3.2 Determining real sentiment workflow

How do we know our predictions are any good? real sentiment input can be done either by hand or by the REST API GUI or the REST API curl calls

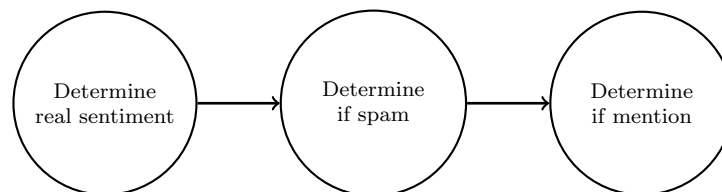


Figure 3.3: Determine real sentiment workflow

3.3 Evaluation workflow

performance evaluation of that particular API. how to evaluate? human input!

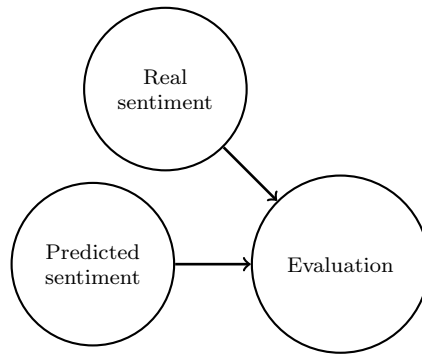


Figure 3.4: Sentiment evaluation workflow

Chapter 4

Framework

4.1 Design

Why json when it violated the 1NN rule? already in mysql, will eventually support json, and easily movable to nosql db, or even elastic search.

4.2 Implementation

4.3 User interface

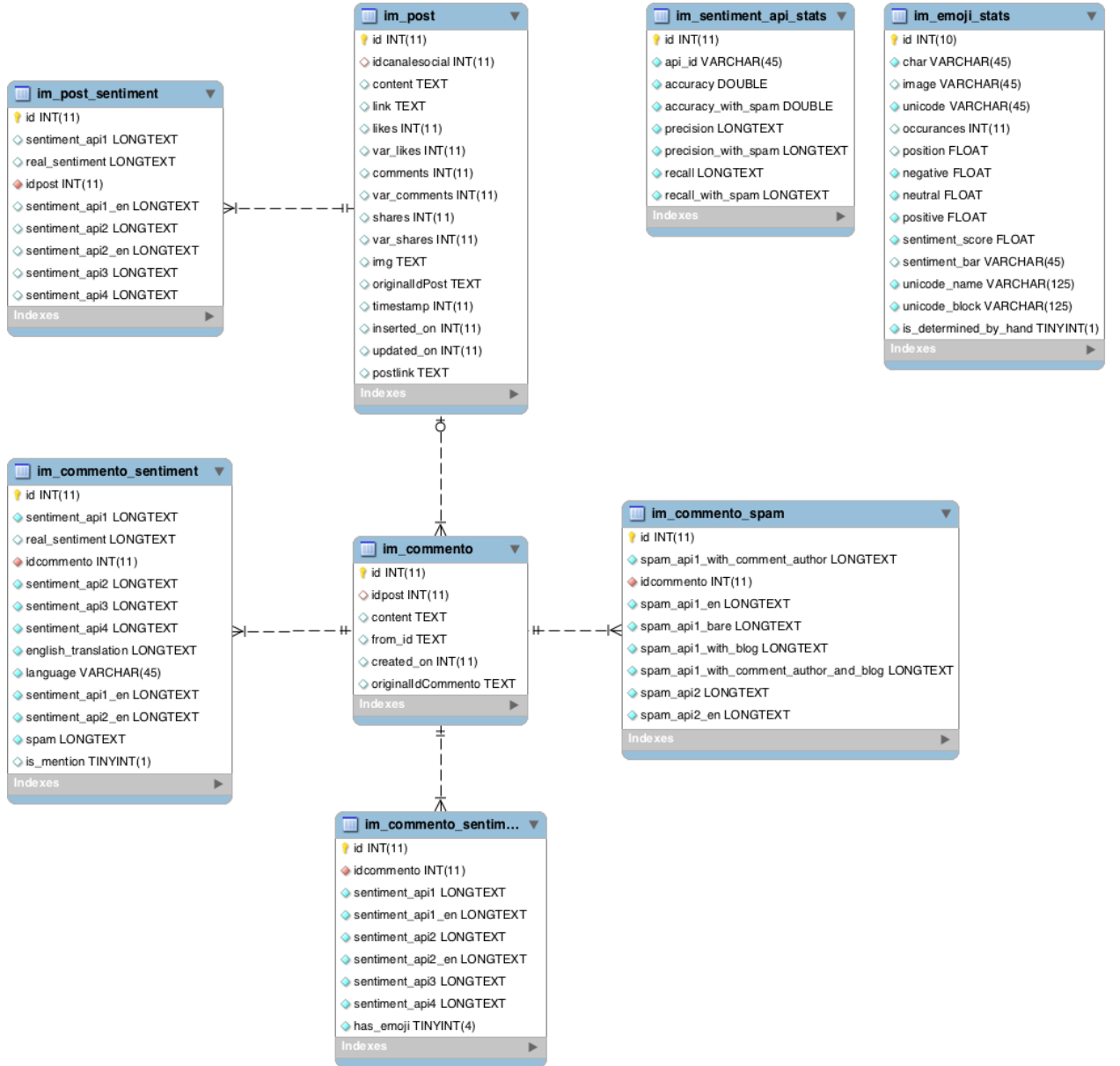


Figure 4.1: TTest caption

Chapter 5

Results

Chapter 6

Conclusion

Chapter 7

Future work