Delft University of Technology

Bachelor Graduation Project

Initial Research Report

UrbanSearch

Authors:
Tom Brunnik
Marko Malis
Gijs Reichert
Piet van Agtmaal

Supervisor:
Claudia Hauff
Clients:
Evert Meijers
Antoine Peris

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TU Delft

!!!!!!!!!!!!!
Aspects: Algorithms Framework Component technology References [3]

Abstract

It is yet to be discovered how the importance of cities in the global network can be elucidated. In this paper, we develop a methodology to be able to reveal an answer to this matter. ...
Keywords: urban, city, data mining, document analysis, filtering

1 Introduction

Common belief is that agglomeration benefits are key to economic growth [3]. However it may be that this econmic growth's primary cause is the increase in (inter)national network embeddedness.

The huge amount of textual data generated online or the numeric historic archives are great sources of information on social and economic behaviours and constitute the bulk of information flowing among each other. Advanced text mining on newspapers and websites containing city names would allow to better understand the role of information in shaping urban systems.
Similar to research efforts in other domains such as financial trade [4] and sales forecasting [7], the idea is to develop search queries that capture urban-urban interactions as they can be found on the web through the co-occurence of geographical names on websites e.g. "Zeeuws-Vlaanderen + Amsterdam " OR "Amsterdam + Zeeuws-Vlaanderen".

We will start by looking at related work that has been done on data from search queries, discussing the similarities to our research. Next we will further analyse the problem in its four mian subsections: the extraction of data from the internet; the filtering and categorizing of this data; the development of search-able queries and last the visualization of the found data. From this problem analysis we will draw the requirement analysis. The requirement analysis is then used to decide upon the framework and tools we are going to use. And last we will give a short conclusion.

2 Requirements

2.1 Must haves

1. General
   (a) Adding city names
   (b) Grouping relations and "zooming" on these relations
2. Search Engine
   (a) Filter results
   (b) Data mining
3. Filtering
   (a) Logic Filters
   (b) Relations Filters
4. Machine Learning
   (a) Types of relations
5. Visualization
   (a) Statistics of relations? Query relations

(b) Strength of relations

(c) Types: ML CBS defined

2.2 Should haves

1. General
   (a) Pluggable datasets
2. Machine Learning
   (a) Generalising relations, grouping relations

2.3 Could haves

1. General
   (a) International city names
2. Visualization
   (a) Front end for the app

2.4 Would haves

3 Frameworks and Tools

3.1 Extraction

3.1.1 Information Sources

Common Crawl Common Crawl [1] is a freely accessible corpus of the pages across the web. Their data is updated and released on a monthly basis. Many researchers have used the data for varying purposes [6] [2] [5]. Since the UrbanSearch project requires us to crawl the web (see section FIXME), the corpus is a very suitable candidate for us to work with.

The data of Common Crawl comes in three formats:

`WARC`

`WAT`

`WET`

For extracting data from Common Crawl, many open-source libraries are available. Common Crawls' official website refers to `cdx-index-client`[1] as a command line interface to their data. It allows for, among others, specifying which index to use, supports multiple output formats (plain text, `gzip` or `JSON`) and can run in parallel.

Eurostat FIXME @Gijs: niet iets zeggen over wat het is? We identified Eurostat as a source that is not useful for the problem we're going to solve. Although Eurostat contains a lot of statistics on European cities, there is not enough useful information which contributes to giving more insight into the network connectivity of cities. Therefore, we did not include Eurostat as an information source.

[1] https://github.com/ikreymer/cdx-index-client

3.1.2 methods

3.2 Filtering and Categorizing

3.2.1 Clustering

3.2.2 Filtering

3.2.3 Machine Learning

3.2.4 TF-IDF

basic idea: 1. using training data to assign values on words - filter meaningless words - assign words with highest value as categories? 2. Do the same on training data for each category (choose a few documents manually per category) and then check for websites for which categories has the highest value.

3.3 Search Queries

3.3.1 Enter Queries

3.3.2 Get Results

3.3.3 Specifications

3.4 Visualisation

3.4.1 neo4j?

3.4.2 Connection between cities

3.4.3 The Strength of these connections

References

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