Web IR Report

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Abstract

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1 Background & Motivation

At first we wanted to make a search engine for humans. Much like OSINT where you can search for people and find their social media accounts, contact information, and other personal data. We thought this would be a great idea because it would allow people to find others easily and quickly.

However, we realized that most of the data available online is from social media sites such as: LinkedIn, Facebook, Twitter, Instagram, etc. And that scraping these sites is against their terms of service. So we decided to make a search engine for professors from the top ranked universities in the world.

What we ended up with is **Sorgle** (profes**sor** goo**gle**), a search engine that allows users to search for professors from the high ranked universities in the world.

Figure 1: Sorgle Logo

2 Related Work

3 System Design Overview

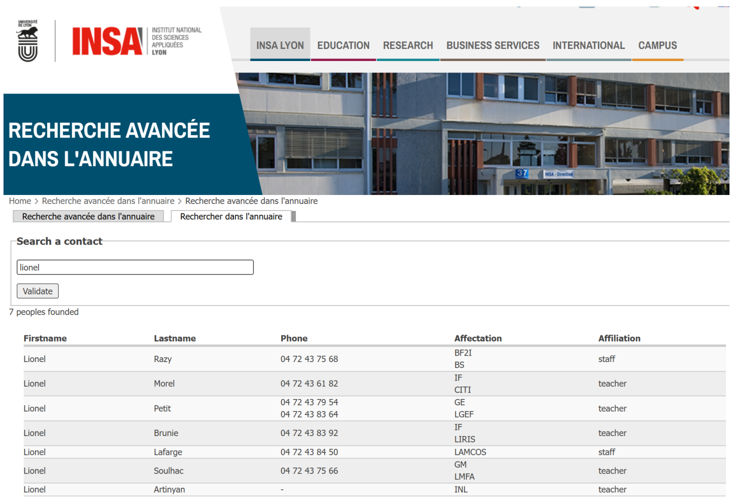
A search engine is a system that allows users to search for information on the internet. It consists of two main components: a crawler and a search engine. The crawler is responsible for collecting data from the internet, while the search engine is responsible for searching and displaying that data.

Since we are a team of two, we decided to split the work into two parts: one person will work on the crawler and the other person will work on the search engine. This way, we can work in parallel and complete the project faster.

3.1 Crawler

We both started by crawling our own universities, mine being INSA Lyon in France. I used **Selenium** to send requests and **BeautifulSoup** to parse the

HTML content. **Selenium** was used because INSA Lyon's website is a single page application that only allows users to search people by name, as shown in Figure 2. This means that we cannot scrape the entire list of people from the website, but we can search for them by name. In the end, to get the full list of professors, I had to search through every two lettter combination of the alphabet (from ”aa”, ”ab”, ”ac”, ..., ”zz”) and store the results in a CSV file. Then clean it up by removing duplicates, students and staff.


INSA
INSTITUT NATIONAL DES SCIENCES APPLIQUÉES LYON
INSA LYON
EDUCATION
RESEARCH
BUSINESS SERVICES
INTERNATIONAL
CAMPUS
RECHERCHE AVANCÉE DANS L'ANNUAIRE
Home > Recherche avancée dans l'annuaire > Recherche avancée dans l'annuaire
Recherche avancée dans l'annuaire
Rechercher dans l'annuaire
Search a contact
lionel
Validate

7 peoples founded

Firstname	Lastname	Phone	Affectation	Affiliation
Lionel	Razy	04 72 43 75 68	BF2I BS	staff
Lionel	Morel	04 72 43 61 82	IF CITI	teacher
Lionel	Petit	04 72 43 79 54 04 72 43 83 64	GE LGEF	teacher
Lionel	Brunie	04 72 43 83 92	IF LIRIS	teacher
Lionel	Lafarge	04 72 43 84 50	LAMCOS	staff
Lionel	Soulhac	04 72 43 75 66	GM LMFA	teacher
Lionel	Artinyan	-	INL	teacher

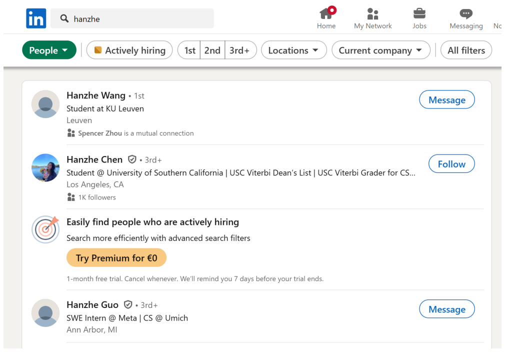
Figure 2: INSA Lyon's Results Page

Now that I had data from my university, I wanted to start designing the layout of the search engine. I wanted to have a simple and clean design that would allow users to easily search for professors

3.2 Search Engine

I started by looking at different people search engines: LinkedIn, Instagram, Facebook, etc. I wanted to see how they display the results and what information they show. I also looked at different search engines such as Google to see how they display the results. Since the type of data we are dealing with is moslty related to the professors themselves, I wanted to display the name, title, and university of the professor as well as the picture if available. Therefore, I greatly inspired my design on LinkedIn's search results page (Figure 3 and Figure 4) and its profile page (Figure 5 and Figure 6).

For the results page, I wanted to keep the design simple and clean, with a search bar at the top and the results displayed below it. I kept the information display very brief; the name, university and department because this



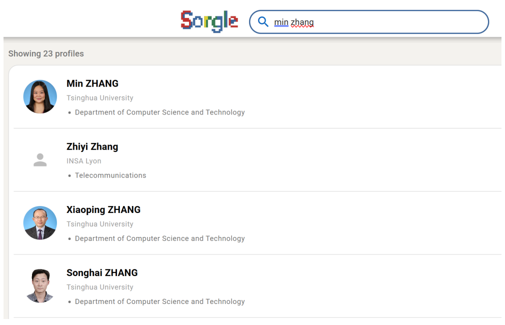
Hanzhe Wang • 1st
Student at KU Leuven
Leuven
Spencer Zhou is a mutual connection

Hanzhe Chen • 3rd+
Student @ University of Southern California | USC Viterbi Dean's List | USC Viterbi Grader for CS...
Los Angeles, CA
1K followers

Easily find people who are actively hiring
Search more efficiently with advanced search filters
1-month free trial. Cancel whenever. We'll remind you 7 days before your trial ends.

Hanzhe Guo • 3rd+
SWE Intern @ Meta | CS @ Umich
Ann Arbor, MI

Figure 3: LinkedIn Results Page



Showing 23 profiles

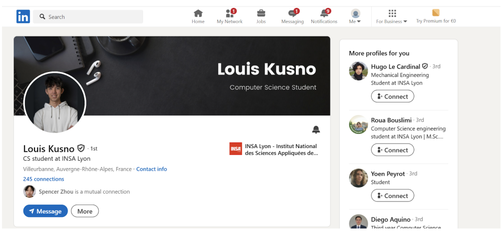
Min ZHANG
Tsinghua University
• Department of Computer Science and Technology

Zhiyi Zhang
INSA Lyon
• Telecommunications

Xiaoping ZHANG
Tsinghua University
• Department of Computer Science and Technology

Songhai ZHANG
Tsinghua University
• Department of Computer Science and Technology

Figure 4: Sorgle Results Page

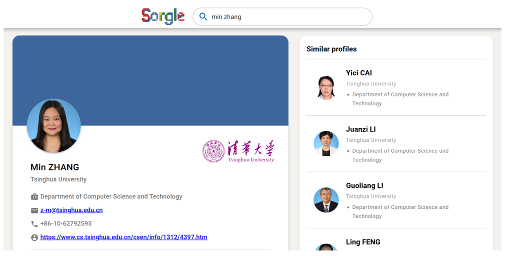


Louis Kusno
Computer Science Student

Louis Kusno · 1st
CS student at INSA Lyon
Villeurbanne, Auvergne-Rhône-Alpes, France · Contact info
245 connections
Spencer Zhou is a mutual connection
INSA Lyon - Institut National des Sciences Appliquées de...

More profiles for you
Hugo Le Cardinal · 3rd
Mechanical Engineering Student at INSA Lyon
Roua Bouslimi · 3rd
Computer Science engineering student at INSA Lyon | M.Sc....
Yoen Peyrot · 3rd
Student
Diego Aquino · 3rd
Third year Computer Science

Figure 5: LinkedIn Profile Page



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https://www.cs.tsinghua.edu.cn/csen/info/1312/4397.htm

Similar profiles
Yici CAI
Tsinghua University
• Department of Computer Science and Technology
Juanzi LI
Tsinghua University
• Department of Computer Science and Technology
Guoliang LI
Tsinghua University
• Department of Computer Science and Technology
Ling FENG

Figure 6: Sorgle Profile Page

is the data that all profiles have in common. I also really liked LinkedIn's color scheme. Even thought I set all my apps to dark mode, I think that light mode allows for a better looking website.

For the profile page, I wanted to display more information about the professor, basically all the information that I could scrape from the university's website. This includes:

- Name
- University
- Department
- Profile picture
- Phone number
- Functions
- ORCID
- Bio

To display this information wihtout clutering the screen too much, I used logos that could best describe each field. Next, I really liked the idea of having similar profiles. This fills in the empty space on the right side of the page and allows users to use the search engine more efficiently (essentially increasing retention rate).

Lastly, the main page was inspired by Google's main page, this is coherent with my goal of having a simple and clean design.

Figure 7: Google Main Page

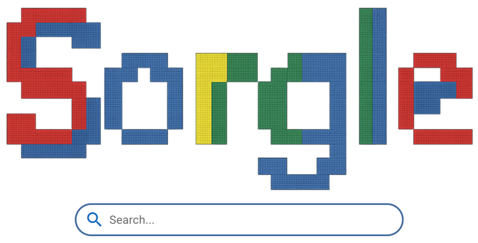

Figure 8: Sorgle Main Page

4 Technical Details

The faster and more relevant a seach engine retrieves results, the better the user experience. In this section, we will discuss the technical details of our search algorithm.

4.1 Search Algorithm

The search algorithm is the core of the search engine. Instead of using basic string matching, we implemented a fuzzy search that allows for more flexibility. Fuzzy search is a technique that finds matches even when the search terms are not an exact match to the indexed data. This is particularly useful for names, which can have variations in spelling.

4.2 Fuzzy Search

The closeness of the search results is determined by the Levenshtein distance, which measures how many single-character edits (insertions, deletions, or substitutions) are required to change one word into another.

- insertion: cot $\rightarrow$ coat
- deletion: coat $\rightarrow$ cot

- substitution: cot → cat

4.3 Implementation

Fuzzy search was implemented on the name of the professors, their university and their department. Each with different weights. The name of the professor has the highest weight (0.6), followed by the university (0.25) and then the department (0.15). This means that if a user searches for a professor's name, the search engine will prioritize results that match the name over those that match the university or department. I chose these weights based on the importance of each field as well as how long the field is. The name is the most important field but also the shortest, the deparemnt could be very long and therefore I wanted to give it a lower weight as it may skew the results.

The similar profiles are also determined by fuzzy search. This time the current profile's name, university and all department are used. The results are then sorted by the Levenshtein distance.

5 Experiments and Results

In this section, we will give an overview of the data we managed to scrape from the universities' websites.

Figure 9 is an overview of the whole data that we managed to scrape, this includes 4 universities: INSA Lyon, KU Leuven, Imperial College London, and Tsinghua University. And Figure 10 shows the most common first names among professors in the dataset.

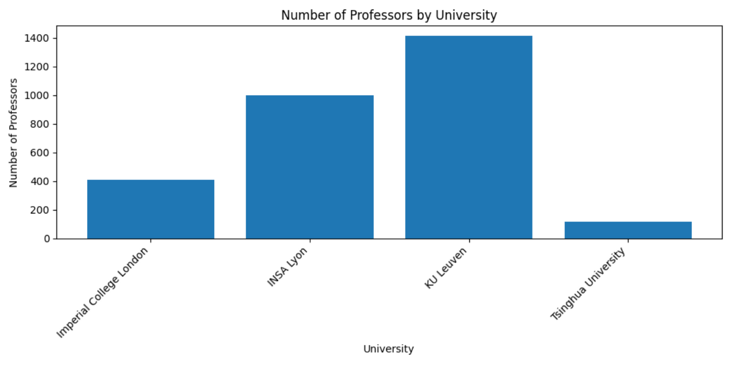

Figure 9: Number of Professors by University of the whole dataset

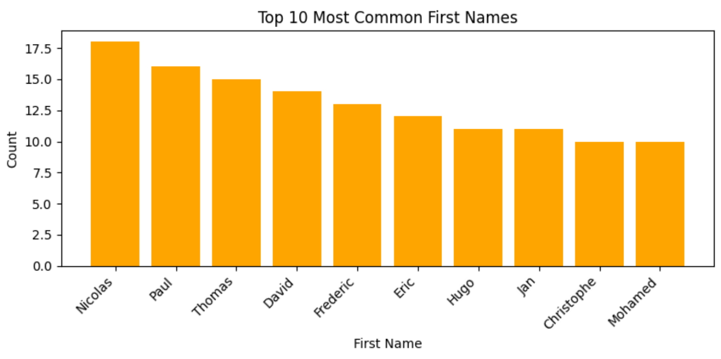

Figure 10: Most common first names among professors in the dataset

6 Conclusion & Future Work

As shown in [1], ...

References

[1] A. Einstein, "On the electrodynamics of moving bodies," *Annalen der Physik*, vol. 17, pp. 891–921, 1905.