LinkedIn: A Brief Analysis

Individual Work

Pedro Monteiro
97484

Aspetos Profissionais e Sociais da Engenharia Informática

June 30, 2022

Contents

1 Introduction **2**

2 Summary and Objectives **2**

3 Framework **2**

4 LinkedIn **2**

4.1 What is? . . . 2

4.2 How does LinkedIn work and what is it for? . . . 3

4.3 The LinkedIn Algorithm and How It Works . . . 4

4.3.1 Behind-the-Scene of LinkedIn Algorithm . . . 5

4.4 How LinkedIn's Recommendation System Is Generating The Perfect Job Match For You? . . . 6

4.4.1 Profiling With AI . . . 6

4.5 How LinkedIn Updates 'People You May Know' Recommendations? . . . 7

4.5.1 LinkedIn Connections . . . 7

4.5.2 'People You May Know' recommendations . . . 8

4.6 How Useful is LinkedIn Really in Terms of Job Search? . . . 9

5 Example **10**

5.1 People You May Know Example . . . 10

5.2 Job Recommendation Example . . . 11

6 Conclusion **12**

7 References **13**

1 Introduction

This assignment will focus on LinkedIn, and will mainly answer the following questions:

- What is LinkedIn?
- How LinkedIn works?
- How LinkedIn's Recommendation System Is Generating The Perfect Job Match For You?
- How LinkedIn updates 'People You May Know' Recommendations?

2 Summary and Objectives

According to APSEI[1] curricular plan, this assignment is the result of the second individual work, and, as mentioned in the introduction, this assignment will be about LinkedIn, starting with a small overview of what LinkedIn is and how it works, and moving on to the main subject that is its system of recommendations for connections and jobs.
The main two objectives are:

- Analyze the algorithms behind the LinkedIn recommender system;
- Provide an example of recommendations for a new user on LinkedIn;

3 Framework

In an increasingly competitive and global market, companies need to establish a solid online presence if they want to stay ahead of the competition.
LinkedIn makes it possible to establish this presence, being the main social network that is dedicated to professional contacts and can also be used by companies

4 LinkedIn

4.1 What is?

Launched in 2003, LinkedIn is the most famous and largest professional social network, focused on generating connections and relationships.
Here, professionals can create their resumes, search for jobs and make contact with people from all over the world. Companies, on the other hand, are able to search for ideal candidates for their potential customer profiles.
LinkedIn is, therefore, a professional network where each user creates their profile and can follow or make connections with other people. Each member is associated with their professional identity, indicating their most important information such as:

- Profile photo and cover;

[1] Aspetos Profissionais e Sociais da Engenharia Informática

- About/Biography;
- Activities (articles, publications, reactions on posts);
- Professional experience (resume with a list of companies where you have worked or work);
- Academic education;
- Licenses and certificates;
- Competencies and recommendations;
- Achievements (awards, projects, publications);
- Interests.

4.2 How does LinkedIn work and what is it for?

LinkedIn started with basic functions, with the aim of increasing the professional networking of its users. However, with the increase in its user base, the platform acquired other features, which made it a business version of other social networks.
The biggest benefit to a LinkedIn account is career management. By connecting with other users in your line of work, you network with people who are relevant to your career both now and in the future. By joining groups in your industry, you access job posts, industry news and discussions that can help you with your job. While LinkedIn is a professional networking site with social overtones, it is a valuable resource center.
Another key feature of a LinkedIn profile is the capacity to be recommended by current and past employers and to be endorsed for a specific range of abilities. While it's ordinary to incorporate letters of recommendation with a resume, on LinkedIn these recommendations are visible to all connections.

Figure 1: LinkedIn.

4.3 The LinkedIn Algorithm and How It Works

The LinkedIn algorithm is not the same as the Facebook algorithm, and places a high value on personal connections and related content. It also considers information on profiles, such as interests and abilities, and which members work with, among other things.
LinkedIn has implemented a four-step process for content distribution across its network to reduce the chances of spam or inappropriate content:

- **Create Content** - the content shared on LinkedIn should be optimised for engagement and quality;
- **User Flagging** - LinkedIn sends a post to a subset of an audience and watches to see if they respond;
- **Universal Content Filtering** - depend on how the first test goes, it determines to promote it to additional individuals and continue testing;
- **Human Editors** - is content great?

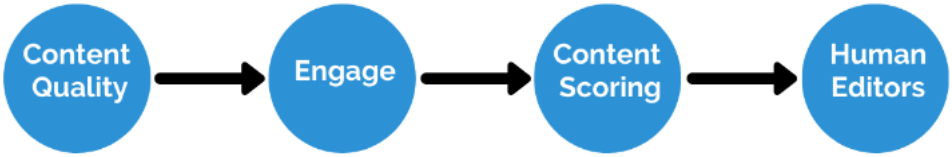

Figure 2: LinkedIn Algorithm.

4.3.1 Behind-the-Scene of LinkedIn Algorithm

Whenever you post an update on LinkedIn, here's what happens behind the scenes:

Beginning with Initial Filter
Every time you post an update to LinkedIn (even if it's an image), a bot immediately places the content into one of three categories:

- Spam
- Low-quality
- Clear

The category where the content should be is 'clear'.

Testing Session The second part is the audience testing process.
Once the robots have categorized the post, they send it to an audience to see how popular the content is. At first, they show it to a smaller group of people.

Content Scoring
This phase is the Hogwarts house points!
The score of the post will decide its future or its fate. For example, a "like" may only have one point, whereas a comment has two points. A "share" shows that the content is popular, so three points.
It will either be demoted because it's low-quality or be shown to more people because it's high-quality.

Real People Assessment
If the post gets engagement, the last phase is passed along to "genuine people at LinkedIn. Who then read every post and decide to send your content out to more people, or whether this is the end of the line. The editors will also send the content to people outside of your network if the content is working well.

4.4 How LinkedIn's Recommendation System Is Generating The Perfect Job Match For You?

One challenge the engineering team at LinkedIn faces is maintaining consistency on both ends - job poster and the candidate.
The algorithms have to learn respective preferences of both job seeker and poster and deliver a relevant search by unifying multiple aspects like skills required, preferred job location or roles preferred- leadership beginner.

4.4.1 Profiling With AI

Before delivering the results, the algorithm associated with the hiring process would consider information from job postings, search queries, feedback of the candidate. This information is aggregated in real time to learn about a user's preference for a specific opening.
This can also be interpreted in terms of fundamental mathematical equations as follows:
The weight of a term i of type t from rating r in sourcing channel s is determined by the following equation:

$$w_{t,s,r} = \frac{c_{i,t,s,r}}{\sum_{r' \in R} c_{i,t,s,r'}} \tag{1}$$

Where:

- S is set of all channels, R is set of all feedback types;
- T is set of term types
- ci,t,s,r is the number of candidates

Whereas, the Personalization Feature for a candidate with term type t from rating r in sourcing channel s is determined by the following expression:

$$z_{t,s,r} = < w_{t,s,r} > . < p_t > \tag{2}$$

The above expression gives the results regarding customised search which is a combination of various profile attributes and corresponding weights.
These personalisation scores are then run through XGBoost model. This model then produces results which can then be manipulated for matches by checking the scores of specific attributes like skills or experience.

4.5 How LinkedIn Updates 'People You May Know' Recommendations?

4.5.1 LinkedIn Connections

Each person's network is created based on the connections made and their professional relationships, whether they are their co-workers, university colleagues, clients or references in their field.
LinkedIn has a categorization of connections, divided into different degrees. To identify your connection level with each profile, you can see a 1st, 2nd or 3rd degree icon next to the names:

- **1st degree connections** - profiles that have a direct connection to yours, either because you accepted their connection invitation or because they accepted your invitation;
- **2nd degree connections** - people connected with your 1st degree connections, but who don't yet have a direct connection to you;
- **3rd degree connections** - people connected to your 2nd degree connections;
- **LinkedIn user** - are LinkedIn users who do not fit into the connection degrees, that is, they are outside your network.

Figure 3: LinkedIn Connections Degrees Example.

4.5.2 'People You May Know' recommendations

LinkedIn has refined the recommendation algorithm for its 'People You May Know' feature, in order to ensure that users are not adversely impacted by various factors - such as where they grew up, where they went to school, or where they work - in building their professional networks.
As LinkedIn said:

"PYMK[2] primarily uses data like the Economic Graph and platform interactions to mine features and use ML algorithms to come up with relevant recommendations. However, like any AI system, a significant challenge for the accuracy of this system is controlling for external sociological factors, like a member's general visibility off-platform or the tendency for technologies (such as professional social networks or the internet) to be adopted gradually. This can lead to situations where AI-powered products can reflect an existing bias towards some groups of people over others."

Based on this process, more high-profile users will appear more often within these recommendations, because LinkedIn's system uses platform interactions as a proxy for those others may want to connect with, which can disadvantage those with less visibility:

"There are a subset of members on LinkedIn who receive a large number of connection requests, e.g., an influencer in an industry, a high-profile senior executive, or a recruiter from a big company. At a high level, having a disproportionate number of connection requests may appear to simply run counter to our stated goal of closing the network gap. However, it can also lead to the member's network becoming overrun with feed updates and notifications that may seem random or from members who are only tangentially relevant to their own career."

Another key problem with this is that these people can be key connectors to opportunity, and it's therefore important to highlight a broader spectrum of connection recommendations to these users to help maximize networking potential.
To address this, LinkedIn's improved system now seeks to better balance recommendations to highlight people who are not seeing as many connections requests, helping to broader exposure through the function.
The result is that a wider pool of people are now receiving more connection requests, as opposed to the majority going to fewer members - which provides more opportunity for users to grow their networks on the platform.
According to the initial results, the update reduced the number of connection requests going to people who are often overloaded with them, while it also resulted in a small increase in the number of requests people going to less popular users.
The project is part of LinkedIn's broader effort to facilitate equal opportunities and give people more ways to find connections without any downsides as a result of their education.

[2]People You May Know

4.6 How Useful is LinkedIn Really in Terms of Job Search?

Simply creating a profile on LinkedIn won't get you hired, so it's important to manage your expectations, and therefore, regarding job search on Linkedin, there are some advantages and disadvantages to consider:

Advantages

- **Research Prospective Companies** - LinkedIn pulls information from employees' LinkedIn profiles, so users can learn key information, such as the types of jobs the company has and the skills needed. Companies are also able to create LinkedIn pages that introduce their brand to candidates;
- **Connect With Existing Contacts** - reaching out individually to former managers or colleagues can be time-consuming and maintaining current contact information is often challenging. LinkedIn makes this easy, because it's one platform that can connect you to most of your network, considering the sheer volume of people who use it;
- **Easily Expand Your Network** - You're able to reach out to people who work at companies you're interested in, join groups relative to your field and so much more.

Disadvantages

- **All Employers Don't Post Jobs on the Site** - using LinkedIn exclusively in your job hunt will likely cause you to miss out on those who don't recruit through the platform;
- **It Can Be Hard to Get Noticed** - Given the number of people on LinkedIn, simply having a profile on the site isn't enough. Getting noticed by a potential employer requires a sizable amount of attention — i.e., regularly updating your profile.

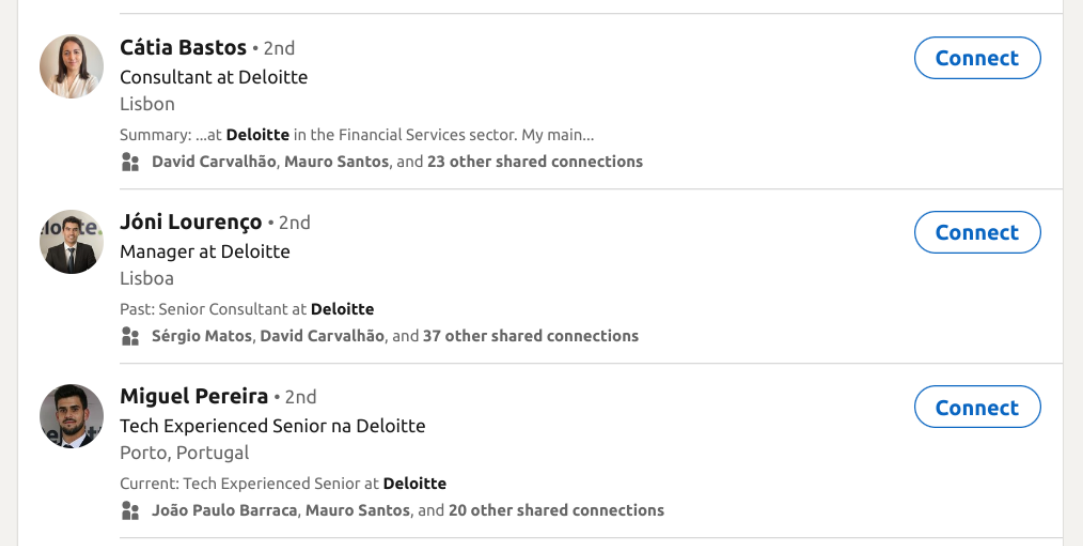

Figure 4: Company People Search Example.

5 Example

For the example case I decided to use my own LinkedIn profile, where I defined that I am a Computer Science Engineering Student at the Aveiro University, as can be seen in the figure below.

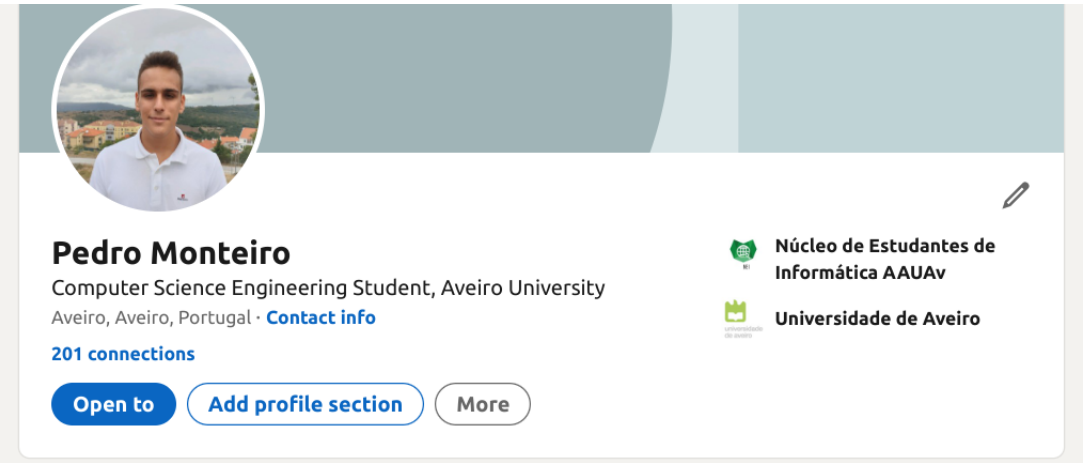

Figure 5: LinkedIn Profile Example.

5.1 People You May Know Example

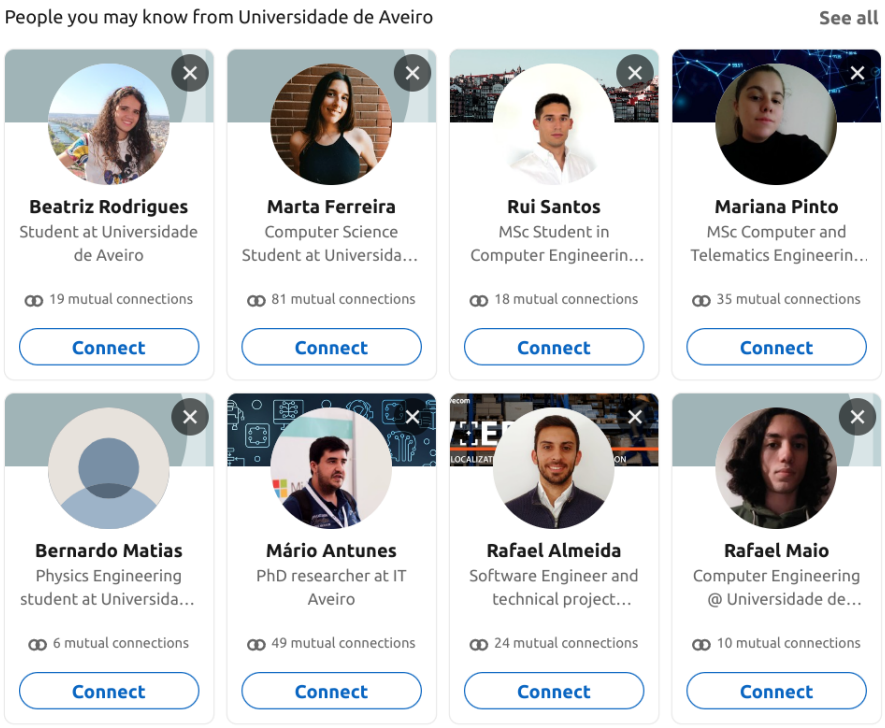

Figure 6: People You May Know Example.

After creating the profile, and having defined that I am a student at the University of Aveiro, as you can see in the image, I receive connection recommendations from LinkedIn from other students/professors who also belong to the Aveiro University.
This feature is very useful, as it helps me to connect with known contacts, thus making it possible for my network to grow, and also helping to reach potential recruiters.

5.2 Job Recommendation Example

Another example of a Linkedin functionality covered throughout the assignment is the job recommendation.

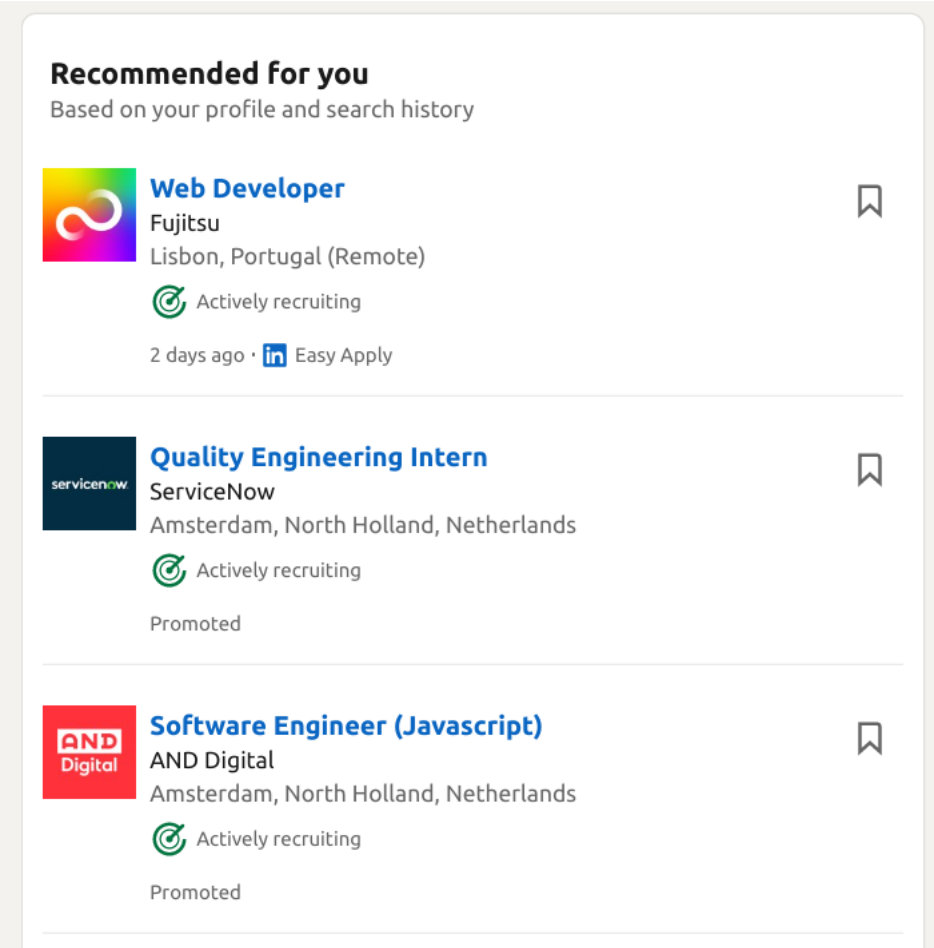

Figure 7: Jobs Recommendation Example.

As you can see, LinkedIn presents a list of recommendations based on my profile and my previous searches.
In this case, I defined that I liked working as a Javascript Developer/Web Developer and that I also liked remote work. This list is updated periodically as new job opportunities appear or my profile changes.

6 Conclusion

To conclude, with this assignment it was possible to better understand how LinkedIn works, as well as all the algorithms associated with its jobs and connections recommender system. LinkedIn is a good idea to network and start building a professional portfolio.

7 References

[1] "What is LinkedIn and How Can I Use It?" https://www.linkedin.com/help/linkedin/answer/a548441/what-is-linkedin-and-how-can-i-use-it-?lang=en

[2] "What is LinkedIn?" https://resultadosdigitais.com.br/marketing/o-que-e-linkedin/

[3] "Pros and Cons of Using LinkedIn for Your Job Search" https://www.htss-inc.com/2020/09/22/how-useful-is-linkedin-really-in-terms-of-job-search/

[4] "LinkedIn Updates 'People You May Know' Recommendations to Help Maximize Connection Opportunities" https://www.socialmediatoday.com/news/linkedin-updates-people-you-may-know-recommendations-to-help-maximize-con/604559/

[5] "What Is the LinkedIn Algorithm?" https://www.socialchamp.io/blog/linkedin-algorithms-to-keep-in-mind-this-year/

[6] "LinkedIn Algorithm" https://www.linkedin.com/pulse/linkedin-algorithm-everything-you-wanted-know-were-too-anderson/

[7] "How The LinkedIn Algorithm Works" https://www.searchenginejournal.com/linkedin-algorithm/424098/