Finding a suitable job in the AI era by using Machine Learning & Neural Networks

Leveraging computer AI models to generate matchable CVs

Mordehai Poritski, Bar-Ilan University,

Management Department

poritski@gmail.com

Oshrat Barzilay, Bar-Ilan University,

Management Department

oshrat1609@gmail.com

Noam Ephrat, Bar-Ilan University,

Management Department

noamephrat94@gmail.com

Galia Gridish, Bar-Ilan University,

Management Department

ggridish@gmail.com

ABSTRACT

All of us recently, or at some point in our professional careers, tried to apply to a company and received a negative reply: "We are glad that you are interested in our company, but after a careful examination of your resume, we have decided to continue with other candidates." This is very insulting and even causes a decrease in motivation for the most successful candidates, such as WhatsApp co-founder Brian Acton, who was rejected by Facebook when he applied for a job there in 2009.   (In 2014, the messaging service sold itself to the social network for $19 billion). Did we even think that in 87% of cases, this harsh response is sent automatically by an AI mechanism that made a final decision not to continue with your application, and our CV file is not even seen by the most junior HR in the company? With the development and implementation of AI and with the use of ML algorithms (and Neural Network Models) by huge companies while recruiting and screening potential candidates, for us humans, it is almost impossible to be accepted and find a suitable position in big companies such as Google, Amazon, Facebook, Apple, Deloitte, and even Intel. We must use almost the same but reverse AI & ML tools to succeed and be hired by those giant companies.
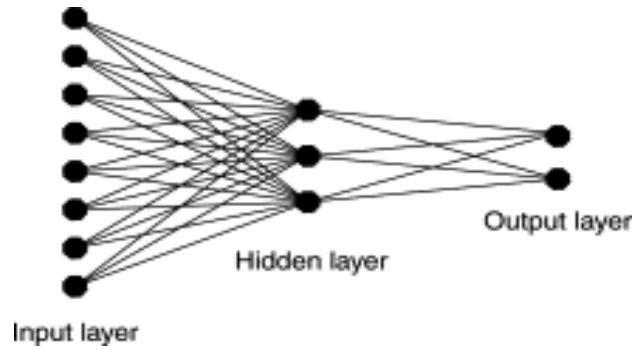
CCS CONCEPTS

- Information Systems -> Data Mining.

- Security and Privacy -> Web Security.
- Computing methodologies -> Machine learning

KEYWORDS

- Artificial Intelligence.
- Machine Learning.
- Adversarial Learning.
- Neural Networks [7].
- AI-Enabled recruiting.
- Client Targeting [8].
- Digital Recruiting Technology.
- Human Resources

Figure (1) form [7]

1 INTRODUCTION

Systems based on Machine Learning (ML) and Artificial Neural Networks (ANN) [7] in their early development stages have found wide applications and assisted in candidate recruitment processes for large hi-tech companies (e.g., Google or Facebook). In recent years, the systems mentioned above have entered the private market and entities such as the military, industry, medicine, legal, and consulting. As their integration into the modern world's infrastructure continues to grow, they begin to pose a severe obstacle for job seekers. They immediately became more tempting targets [8] for placement companies, and agencies who decided to make money on this subject. Therefore, the groups above began to develop a manual recruitment model that meets the requirements of the recruiting company.

As is known, the giant companies have developed an algorithm based on ANN that helps in making decisions in the recruitment process of the candidates, which saves a lot of money, and a lot of resources and learns every time anew from its data.

To solve the compatibility problem, the placement companies began, on the one hand, to read the requirements of a particular position and, on the other hand, to turn the requirements into qualifications and personal skills in the candidate's CV file. They began to manually fill the input layer of the recruiting company's neural network in the hope that it would fire up neurons in sub-layers as well and eventually lead to a fateful decision by the system to continue recruiting (13%) or to automatic negative promotion signs (87%).

What the placement companies did not consider is the fact that the automatic machines and the machine learning model learn much faster. In simple words, if it takes months or even years for a representative of the placement company to learn how to pass the initial recruitment stage at some point the learning machine of a huge company can create a profile of the potential candidate in few hours, and it is a million times more advanced than the human representatives in opposite placement companies.

To really solve the recruitment problem process in the artificial intelligence era, we suggest in this article to use the professional AI & ML tools of advisory learning used in cyber-attacks for example, known as a counterattack on learning systems of the ML & Neural Network model type. More than that, we suggest studying and even using a Deep Learning Algorithm to discover the components of the input layer (the most important for the ML), the potential hidden-layers and the key components for weight and interrelationships (the links) between all the layers that help to make a final decision (true or false) and the lights the positive neurons to maximum percentage in the final output layer.

Job seekers and researchers have developed attacks on various types of ML systems, including supervised classifiers and regression/prediction. The focus of this article is on modern attacks on supervised classifieds.

2 RELATED WORKS

AI-Enabled Recruiting was proposed in 2020 by Stuart Black and Patrick Van Esch for the purpose of analyzing the simple features of digital recruiting and how it has improved the efficiency of recruiting processes [1]. Black & Esch have found in their work the strategic and necessary steps recruiting managers need to take to find the main benefits.

The other article [3], posted in 2020 by Ana Isbel Canhoto and Fintan Clear [3], discusses the advantages and disadvantages of using AI & ML models that can, on one hand, improve the efficiency of business processes, and on the other hand destroy the business value of the company. The problem of failure to identify and manage this risk may cause some managers to delay the adoption of these technologies and thus prevent them from realizing their inherent potential. [3]

In [4], for example, the authors present a new ontological user-based profiling for E-orientation platform, which helps giant companies to collect and provide guidance regardless of user's goals, knowledge, abilities, or preferences (in other words interests, work experience, private information, skills, etc.). This kind of information is usually used as raw data for preprocessing and building the input layer of a Neural Network Model.

2.1 Manual Methods of passing the AI test algorithm

From the point of view of the job seekers, in [6] published how to manually create a resume file that meets the requirements of the hiring company and passes the first stage of selections.

2.2 AI Methods on HR Recruiting practices

However, from the point of view of the recruiting company, in [5] the authors show how Blockchain, and AI are affecting the HR Practices and automates the verification of information, resulting in more accurate approaches to hiring employees.

3 METHOD

Match the candidate's characteristics to the required job by building an input layer in a neural network and be invited to the next stage without sending CVs.

3.1 MANUAL ALGORITHM

Nowadays, the useful algorithm is the manual algorithm, which is used by job seekers or placement companies to match the candidate to the required position. After all, it is known that currently there is not much success in sending resumes to different companies. The main idea of this article is not to send hundreds of CV files to companies and expect that a ML & DNN engine of one of the companies will find a match and invite the candidate to the next stage of the recruitment process. The main idea is to create a perfect profile on the internet, interested in the required topics, having the required projects on sites like GitHub for example, having the most impressive official LinkedIn page, meeting the requirements of personal experience and skills, and having the necessary certificates for the required position. The big companies don't sort candidates today, they pay a lot of money to analytical companies who provide them with raw data of potential candidates and even build a virtual profile on an internet network about a specific candidate. The AI age has come and gone, and people continuing to send resumes to huge companies. In this article we change the thinking vector and turn it exactly to the opposite side and in the direction of the candidate. The candidate, step by step, performs an order of operations and the recruiting company itself contacts him with the job offer on social media channels or even through advertising in Google banners. True, it will appear as if the company is offering you a certain job, but behind this is an ongoing column of machine learning and compatibility testing even before deciding to contact this company.

3.1 AI-BASED ALGORITHM

To understand the source of the problem and get down to the depths of the details, we will use the Adversarial Learning (AL) attack engine to find a perfect match to the ML & DNN recruiting model and even be invited to an interview by the employing company. The AL against the ML, this is the ultimate solution to the problem of filtering potential candidates.

How will the candidate know that the AL algorithm was able to learn the counter algorithm? The answer is simple: he will start receiving job offers on Facebook or LinkedIn Page for example. This means that the algorithm found a single point of failure in the counter algorithm that breaks the full match and causes the ML to hesitate and not be sure of its own subjective decision only and transfer the ongoing recruitment process of the candidate to a human factor.

4 EXPERIMENTS

We built several virtual candidates. We started manually creating databases (building a shining LinkedIn profile, creating points of interest, using <u>active searches</u> on scientific websites, and providing the possibility of data analysis for companies dealing with this without turning off access to cookies, proven skills, building a portfolio of projects, etc.). It is important to note that at this stage we did not contact companies with fake resume files, so everything is legal for the editor of the experiment stage. We created one virtual account of an accountant and one of the 4 companies in the consulting fields started sending job offers to the virtual profile massively through the Facebook social network. Here we realized that we succeeded (see photo number 3). The match was so perfect that the company's ML engine only asked if you were interested in working as an accountant and all you had to say was yes and send your personal details through Facebook. The ML machine found the optimal candidate (our candidate) and even recruited him through Facebook, moreover the ML machine sent an OK to the HR team who automatically sent the candidate to the "Adam Milo" institute for the future testing stages, without even a simple personal conversation with the candidate.
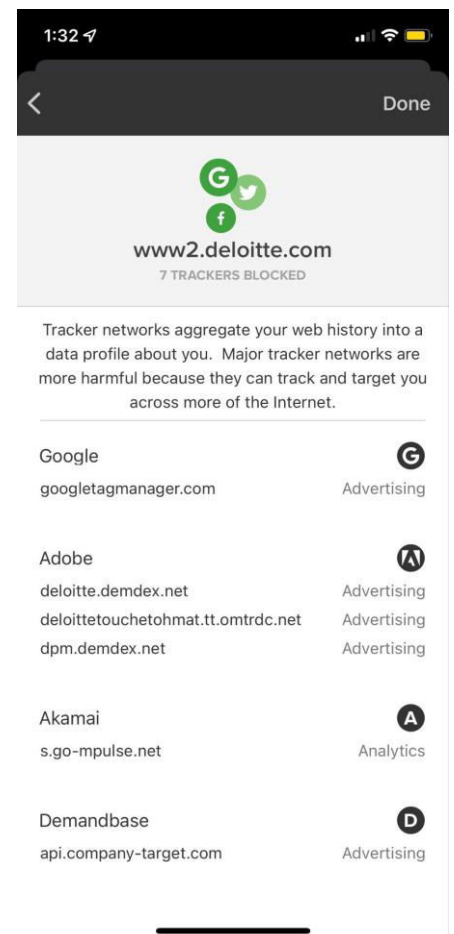
- <u>active searches</u> - means the candidate lets the browsers, such as Chrome, collect and track the information about user activities, share private and local information. Simple example of blocking the trackers with the confident browsers is shown in Image 5.

6

4.1 Dataset

Building a dataset and raw information causes positive and negative neurons to be ignited in the input layer. How will we know which neurons are considered negative information when building the candidate's digital profile? For example, a gap of half a year between the jobs in the resume on the LinkedIn website or writing offensive material at the age of 16-17 on social networks, even if the information is deleted after a few minutes, the information is saved by the machines and is a serious and reliable tool for data mining. All this, and even far more than humans can imagine, causes those negative neurons to be ignited with the heaviest relational weight, which leads to a fateful decision not to recruit the candidate and send him a negative response accordingly. In our days with the development of blockchain technology [5] and its implementation in data saving processes in data mining it is almost impossible to change the candidate's past. That is why it is very important during our lifetime as future candidates to create "positive data" that will be used by the machines in candidate selection procedures that will lead to a positive decision after all. So, at this stage of the experiment, we were required to produce a virtual profile in which there were much more chances of success in recruitment procedures than the real profile of any candidate. The experimental results show the proposed manual algorithm that achieved best overall performance in all datasets.
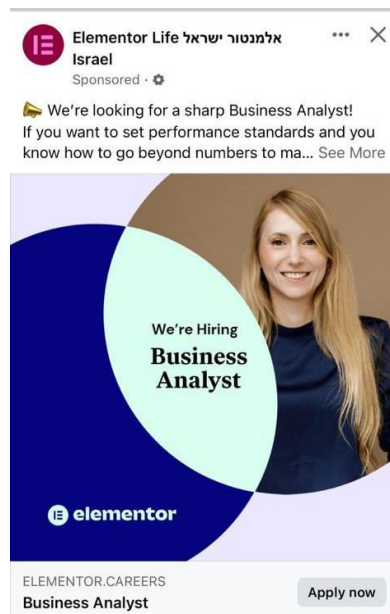
Especially on the audit CV dataset, the proposed approach achieved the main goal (to be invited to interview) with the maximum score of success. We finally started receiving job offers from the giant companies (one of the BIG Four) on social networks and even invitations to the professional meetings (Images 7-9).

[Image 7]   [Image 8]   [Image 9]

5 Proposal for a follow-up article

In our article we built a model that meets the requirements of the employing companies and uses reverse engineering tools manually. Our model basically changes the rules of the game for job seekers and ultimately leads to a multiple choice among the employers who offer instead of receiving only one offer from an employer that you came to by the recommendation of a friend. However, those who know how to write code and are willing to invest time and resources to build an automatic engine for searching and offering a job will be able to profit greatly and build an adversarial neural network (AL & DNN), or in other words, a living-learning machine that allows full adaptation to the requirements of the employing companies.

6 CONCLUSIONS

Many successful candidates, who later built huge companies in their careers, were rejected in the prime stages of their careers not by human resources, but by the machine. This article dares to raise awareness that the leading companies are missing the next generation and relying too much on algorithms and machine learning. But it has long been known that every machine has shortcomings and is never perfect, even for a machine that automatically detects a face from the threshold of one misplaced pixel - and the machine already misses the right choice. To beat a machine, and not even at chess, one must use a counter-learning machine that helps build the necessary neural network. As of today, in order to succeed and receive a desirable job offer, it is not even necessary to build a resume file, it is enough just to meet the requirements of the learning system in the first stages.

7 ACKNOWLEDGMENTS

8 REFERENCES

1. Black, J. S., & van Esch, P. (2021). AI-enabled recruiting in the war for talent. *Business Horizons*, *64*(4), 513–524. https://doi.org/10.1016/j.bushor.2021.02.015

2. *Adversarial Learning Targeting Deep Neural Network Classification: A Comprehensive Review of Defenses Against Attacks*. (2020, March 1). IEEE Journals & Magazine | IEEE Xplore. https://ieeexplore.ieee.org/abstract/document/9013065

3. Canhoto, A. I., & Clear, F. (2020). Artificial intelligence and machine learning as business tools: A framework for diagnosing value destruction potential. *Business Horizons*, *63*(2), 183–193. https://doi.org/10.1016/j.bushor.2019.11.003

4. Adib, J., Abdelouahid, R. A., Marzak, A., & Moutachaouik, H. (2022). Ontological user profile for E-orientation platforms. *Procedia Computer Science*, *198*, 417–422. https://doi.org/10.1016/j.procs.2021.12.263

5. Michailidis, Maria P. "The challenges of AI and blockchain on HR recruiting practices." *Cyprus Review* 30.2 (2018): 169-180. https://cyprusreview.org/index.php/cr/article/view/763

6. Caprino, K. (2019, March 25). *How To Write A Resume That Passes The Artificial Intelligence Test*. Forbes. https://www.forbes.com/sites/kathycaprino/2019/03/23/how-to-write-a-resume-that-passes-the-artificial-intelligence-test/?sh=572cd0386ea7

7. Keijsers, N. (2010). Neural Networks. *Encyclopedia of Movement Disorders*, 257–259. https://doi.org/10.1016/b978-0-12-374105-9.00493-7

8. Horani, L. F. (2020). Identification of target customers for sustainable design. *Journal of Cleaner Production*, *274*, 123102. https://doi.org/10.1016/j.jclepro.2020.123102