Managing Legal Compliance in Video-Interview Systems. Rules-Based Auditing

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Abstract. AI-powered recruiting software could entail ethical and legal implications. The same applies to many other domain-specific AI applications. One of the current questions of AI is the challenges behind the automated analysis of job video-interviews. Conceptualising HR corporate information and Labour Law of the country where the company is incorporated and/or recruiting could facilitate compliance throughout the selection process. Legal reasoning becomes a necessity when it comes to handling controversial issues, pros and cons of the use of AI in recruitment processes, and subsequent ethical and legal consequences for stakeholders. There is a deficit of regulation and a need for external and neutral auditing for the types of matching carried out in interviews. We propose a multiagent systems architecture for neutral auditing, going into further detail about the legal agent, the one in charge of checking compliance with current legislation. This auditing could reduce potential employment discrimination, for example, based on race and gender. Additionally, we include a formal conceptualisation of HR terms and domains Labour Law in Spain and the US to achieve a knowledge-based system to foster interoperability at company level and legal compliance.

Keywords: Domain-Specific AI, Rules-Based System, Human Resources, Legal Compliance.

1 Introduction to Research Question

In recent years, Artificial Intelligence (AI) has been used extensively for automated extraction of candidate skills from CVs. Lately, we are experiencing a trend towards models such as promotion prediction models and video-interviewing powered by AI.

Apps and systems like HireVue[1], Montage[2], SparkHire[3] and WePow[4] have been changing how recruitment is carried out. An AI-based video interview system analysed with machine learning techniques could be programmed to check, during an interview, features such as age, lighting, tone of voice, cadence, keywords used (sub-

[1] https://www.hirevue.com/
[2] https://www.montagetalent.com
[3] https://www.sparkhire.com
[4] https://wwww.wepow.com/es

stantial conversation), mood, behaviour (eccentric, movement or calm and not talkative), eye contact and, above all, emotions. AI targets specific traits of a customer-oriented role that employers want in their teams. HR recruiters speak positively about the benefits of introducing these proprietary software products. They significantly reduce the recruiting time, give the options of customising questions and answers and are not affected by the interviewer's personal bias and prejudices towards the interviewee.

But there are limitations for these video-interview systems too. Some are attributable to the very nature of the technology (incorrect or biased datasets) and others are related to the human bias or the specific agenda of the recruiting company resulting in a lack of fairness. However, the state-of-the-art in image analysis is so advanced that it may allow pre-selecting for age, sexual orientation or other controversial characteristics. The analyses could lead to ethical and legal consequences (e.g. in some countries it is forbidden to ask for age in processes). This is why fostering proper auditing of video-interview systems is important.

When it comes to describing a video-interview system, the initial entry point of the system and settings will be the *set of interview questions* designed by Human Interviewer, later distributed to the hiring candidates. The output will be a ranking/list of candidates plus reports and warnings. Video interviews produced in subsequent stages will be subjected to general and customized analysis. Several features will be measured and tracked according to the recruiter's choices, to name but a few: Is there only one person appearing in the video? How long does it take to answer (candidate time)? Does the candidate look directly into the camera (eye time)? Does the candidate have a high percentage score in commercial profile (body language, intonation)?

Following, we describe the concrete research questions we address in the doctoral work:

RQ1: How to achieve an improvement of interoperability in Recruiting. Is it applicable to a use case/controlled business scenario?

RQ2: How to achieve accurate automatization and legal reasoning in domain Human Resources.

RQ3: Is it possible to implement a comprehensive legal auditing or compliance system given the current state-of-the-art?

The first research question is related to the improvement of interoperability, full automatization and better ethical and legal auditing in Recruiting. To promote interoperability we will follow an ontology-based approach for legal knowledge and information extraction from video-interview systems analyzed with Artificial Intelligence. This will help the compliance process with Labour Law.

Similarly, for the third research question, the introduction of ethical and legal auditing test in the domain we will consider Multi-Agent System, rules engines to prove the appropriateness of this approach.

2 Problem Statement. Legal Compliance in Recruiting

The choice of questions in interviews and analysis of some features so as the positive discrimination poses challenges for governments and regulatory entities. Law scholars have used the term discrimination by proxy extensively for years, we are seeing a trend on analysis of intentional and unintentional proxy discrimination as a second related to the effects of AI analysis. In this article, we address the legal compliance related to the intentional selection according to protected attributes. Select by race, derived into an unlawful employment practice or being law-compliant (recruiting in the fashion industry). Signalising discriminatory technical bias in datasets is not covered in this article, but part of our research. Typical and classic algorithms in Computer Science were initially created and tested by white people with biased datasets and this fact keeps affecting technology nowadays.

What are the protected attributes? Since the Universal Declaration of Human Rights in 1948, different pieces of legislation have dealt with discrimination, recent Constitutional texts and amendments. More recently, Equality Act 2019 in the United States, the one that amends the Civil Rights Act that and Equal Opportunity Act, keeps claiming that it makes unlawful for someone (employer, employment agency or third party) to discriminate against you because of certain protected characteristics such as age, marital status, pregnancy, disability, religious belief, breastfeeding, political associations to name but a few. In certain countries, it is illegal to ask some questions to candidates (e.g. age) and candidates are asked to fill informative questionnaires asking about ethnicity, gender, sexual orientation or upbringing at the end of the selection process. It is advisable to look at frequently asked questions in US interview settings that are illegal [14]. HR managers often ask questions on issues such as marital status, children, previous arrests, country of origin, first language, debt status, social drinking, and military discharges.

Companies are given the option of customising their systems and have their agency for selecting the features of their future employees. Would it be *ethical* to classify men or another subset in the first place? This idea of black box assessment does not help in the empowerment of some collectives, which could be marginalised or be given unfair treatment in the round of interviews due to cost-saving factors. Another issue of debate is the *legal implications* of indirect discrimination. Image recognition technology is so widely developed to the point that it could even identify the race [1] and sexual orientation of a candidate through the analysis of their facial features [2]. These facts reinforce the need for efficient legal and ethical automatic reasoning

3 Related Work

The complicated issue of handling unstructured data in big organisations and the ontology-based solutions to deal with it is a recurring topic in previous work. In the specific case of Human Resource data, the proposed solutions are mainly related to the extraction of information from Resumes [5] and ontology-based information extraction system for matching résumés to job openings [6]. Concerning legal ontologies, it is recognised that Ontologies have been widely used by legal scholars, sometimes to facilitate tracking of new laws.[17]

With regards to the implementation of the auditing system, Multi-agent systems pose similar challenges concerning information formats that traditional complex distributed systems and the problem is more acute in firms.

The *current approach* is the definition of agents tasks and implementations and the exploration of both MAS and ontologies and shared lexicons for Human Resources [12] and legal domain, which foster domain specification and interoperability, an idea supported in previous works [3] so as to the introduction of MAS in complex corporate settings such as manufacturing industry [11].

The idea of coordination and interoperability of agents in heterogeneous domains has been widely used in many different domains and complex organisations [4], such as health care, emergencies due to natural disasters [8], smart cities [9], etcetera. So far there is not much literature related to applications of HR and MAS as enabling technology, but these types of architectures have been extensively used, as noted above, in manufacturing and corporate control production (e.g. Ciortea et al. [11]).

Additionally, we supported our research on previous works in legal formalization [4] [13]. The domain of law and legal formalization is open to MAS applications and has been addressed over the last decade by law scholars such as Walker. It is important for rules-based systems a proper model of the legal rules and a proper integration in our very case of integrating rules and ontologies. [15] Here Gosh targeted this problem for other subdomains. Finally, Visser et al., who attempted to conceptualise Labour Law in 1997. It is interesting to mention it as one of the first works specifically for this subdomain, covering Dutch unemployment benefits [16].

4 Preliminary Ideas and Proposal

The hypotheses behind our research is that automatization of tasks, the use of ontologies and semantic descriptions and the introduction of proper auditing could improve first the business processes in Human Resources and second improve legal reasoning to achieve full compliance.

The most relevant innovation of this proposed work will be the attempt to automatise part of this legal and ethical auditing as well as some analyses carried out by the different distributed agents. It has been attempted in previous work in corporate business processes, not HR. Many sectors have adopted an intelligent process automatisation technology so far. Activities like data extraction, creation of reports without human intervention and access to databases are now normal.

The *specific contribution* and progress made thus so far is mainly the proposal of semantic descriptions for Human Resources and a Multi-agent systems architecture for auditing HR [Fig 1]. Additionally, there has been prototyping of some parts -legal rules engine.

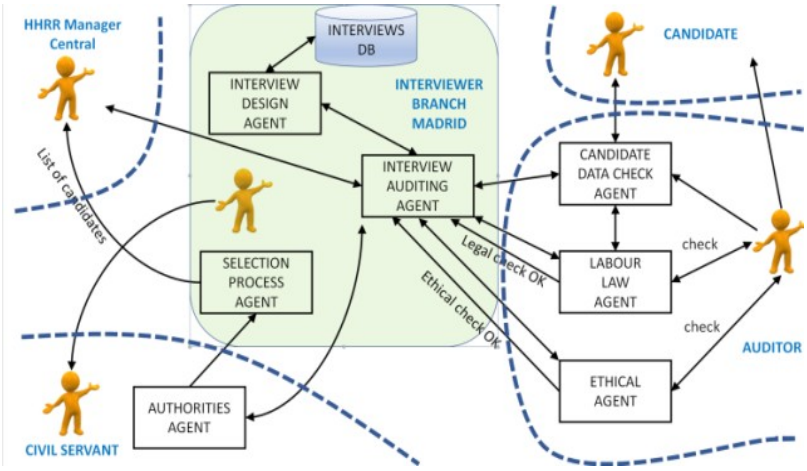

Fig. 1. Multi-agent Systems Architecture

The core of the architecture comprises three different parties that must collaborate: (i) a recruiter/company, (ii) external auditor, and (iii) government/authorities. An Interview design agent, based at the company's central headquarters, is responsible for designing a general interview. The Interview auditing agent is based in company branches and applies the general interview format to a regional scenario of the country where the recruiting is taking place. The Selection process agent can cancel the process due to controversies or give back a list of candidates to the central office if the process is fair. It is also capable of running checks with authorities and auditors. If the features analysed in the recruiting process break any law or if the process contravenes basic civil rights, the interview process agent would ask for the approval of the Labour Law Agent or Ethical Agent if necessary. If the recruiting process is dealing with a candidate's personal information, it would require the candidate's approval for data handling. If a company is recruiting in another country it would need to register with the Authorities agent. [18]

Further information on the multi-agent systems architecture and interaction of agents is available at [19]

4.1 Towards automated support for auditing HR. Rules-based approach

The main objective of the auditory will be the legal check carried out by Labour Law agent when necessary [Fig.2]. To achieve full legal reasoning we need previous knowledge (both Human Resources and Legal Knowledge) and a reasoner in itself.
We consider a rules-based approach to develop our reasoner. Authors categorize reasoning within the legal system can be categorized into a rules-based system, case-based reasoning, neural networks, fuzzy logic and so on [13]. Lately, other approaches like Reasoning on legal ontologies are being followed.

Once the auditing process begins, the proprietary nature of the software and the confidentiality of datasets in HR are the two major obstacles. HR Data (interview format and candidate responses) is often confidential but due to the suspicion of any legal infringement, they will be processed by the external Law agent to make sure there are no infringements of Labour Law of the countries carrying out the process.

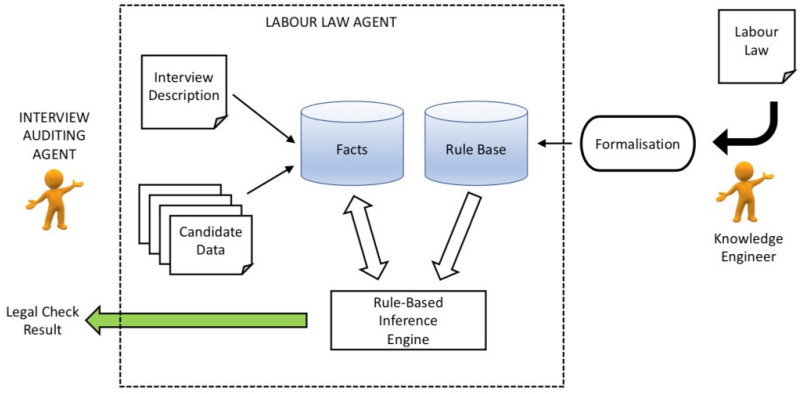

Fig. 2. Labour Law Agent

In the first place, to simplify our reasoning, it was proposed to write up simple Labour Law measures existing in a particular country using the format of rule and include/exclude as a result of executing the rule. [Table 1] The following representation of rules follows first-order-logic structure, considering some exceptions like some operators of comparison, like <. We have decided not to express variables and conform to the main source of knowledge, the information extracted directly from codes, Estatutes that would be extracted by a legal expert.

The first analysis for simplicity will be checking the legal age of the candidate and then the analysis will focus more specifically on advanced criteria to avoid or at least to track discrimination. For example, biased decisions tracked in the Natural Language Processing of the interview towards hiring individuals of a certain age, e.g. <40 or native speakers only, or women only or individuals of certain sexual orientation. The bias will be displayed in the form of informative warnings.

Table 1. Spanish Labour Law rule format.

Age>=18=>include
Age<18 AND emancipated AND consent parents/tutor=>include
Age<18 AND not emancipated AND non authorized =>exclude
Age <18 AND not emancipated AND authorized mother AND consent father=>include
Age <18 AND not emancipated AND authorized father AND consent mother=>include
Age <18 AND not emancipated AND total orphan AND authorized legal tutor=>include
Age <18 AND not emancipated AND total orphan AND not authorized legal tutor=>exclude
Age <18 AND not emancipated AND partial orphan AND authorized mother=>include
Age <18 AND not emancipated AND partial orphan AND authorized father =>include
Age <18 AND not emancipated AND partial orphan AND not authorized mother=>exclude
Age <18 AND not emancipated AND partial orphan AND not authorized father =>exclude
Age>60 AND legally retired=>exclude
Age>60 AND not legally retired=>include
Age>60 AND legally retired AND active retirement status=>include

The Ethical check carried out after pre-selecting individuals by gender or age merely based on fiscal benefit for the employers and positive discrimination.

As it is observed in Table 2, the rules consider both fiscal benefits for enterprises according to citizen groups and laws infringement in Spain. Warnings signalise situations likely to qualify for benefits or not benefits that should be reviewed afterwards.

Table 2. Spanish Tax Reduction rule format.

R1: candidate<30 ∧ firstjob ⇒ warning
R2: candidate>45 ∧ long-term unemployed ⇒ warning
R3: terrorism victim ⇒ warning
R4: Gender=Woman ∧ domestic violence victim ⇒ warning
R5: candidate<30 ∧ ¬firstjob ⇒ warning

The Labor Law agent allows it to easily adapt to new legal scenarios considering multiple countries and jurisdictions. In the case of legal infringement, it would inform the main agent, i.e. the Selection process agent. It is relevant to the topic introduced the case of American legislation, which is particularly protective of racial differences. Quoting directly from Title VII of the Civil Rights Act of 1964 it "prohibits employment discrimination based on race, colour, religion, sex and national origin". Thus, any subtle reference to race in a hiring process and exclude in one iteration could be marked to be watched (warning) and be processed for reporting or statistic purposes [Table 3].

Table 3. Minorities rule format.

R1: Candidate non-white ∧ rejection ⇒ warning R2: Candidate mixed-race ∧ rejection ⇒ warning R3: Candidate minority ∧ rejection ⇒ warning

U*NLAWFUL EMPLOYMENT PRACTICES* [5]
SEC. 2000e-2. [Section 703]
(a) Employer practices
It shall be an unlawful employment practice for an employer -
(1) to fail or refuse to hire or to discharge any individual, or otherwise to discriminate against any individual with respect to his compensation, terms, conditions, or privileges of employment, because of such individual's race, colour, religion, sex, or national origin; or
(2) to limit, segregate, or classify his employees or applicants for employment in any way which would deprive or tend to deprive any individual of employment opportunities or otherwise adversely affect his status as an employee, because of such individual's race, colour, religion, sex, or national origin.

The following excerpt from Title VII of the Civil Rights Act of 1964 could be presented in rule format. Although SWRL seemed not especially efficient, we set out the problem considering various formats [Table. 3]

Table 3. US Law Rule formats (in SWRL)

Intentional_Exclusion_ByRace(exclusion), exclusion_towards(exclusion, ?x), excluded_by (exclusion, ?y)

(b) Employment agency practices
It shall be an unlawful employment practice for an employment agency to fail or refuse to refer for employment, or otherwise to discriminate against, any individual because of his race, colour, religion, sex, or national origin, or to classify or refer for

[5] https://www.eeoc.gov/laws/statutes/titlevii.cfm

employment any individual on the basis of his race, colour, religion, sex, or national origin.
[...]
(f) Members of the Communist Party or Communist-action or Communist-front organizations
As used in this subchapter, the phrase "unlawful employment practice" shall not be deemed to include any action or measure taken by an employer, labour organization, joint labour management committee, or employment agency with respect to an individual who is a member of the Communist Party of the United States or of any other organization required to register as a Communist-action or Communist-front organization by final order of the Subversive Activities Control Board pursuant to the Subversive Activities Control Act of 1950 [50 U.S.C. 781 et seq.].

As seen above, US Law pleads an exception for members of the Communist Party, the categorization of employees that are "communist. We dealt with a specific "protected attribute" in the North American Legislation that gives the right to track -or exclude- a candidate for their affiliation to the Communist Party. [Table 4.]. Due to former historic or historical reasons, it is tried to control which citizens with affiliation to the communist party have access to positions of power. This would be a blatant case of conflict of law. It would be a permitted practice in the United States, but discrimination or unlawful employment practice in other countries. The result of firing the rule should be excluded but signalised with a warning for auditing purposes.

Table 4. Conflict of Laws situation (political affiliation)

R1: PoliticalIdeas=Communist ⇒ warning
R2: PoliticalAffiliation=CommunistParty ⇒ warning

5 Approach and Research Methodology

Our research addresses different parts, first the design process of HR ontologies, second legal ontologies and semantic information and the improvement of the proposal of multi-agent systems Architecture. For this article, we are narrowing our discussion to explain in further details the legal agent. The automated legal reasoning analyses it carries out follow a rules-based approach.
The possibility of reusing ontologies was examined in the early stages. Due to the lack of recent literature on HR semantic descriptions, we relied on existing ones. There is not much work directly in this area of Human Resources at the moment and we keep trying to consolidate a broad range of thinking linked to the topic.

The future direction and goal are either the total or the partial implementation of the automatisation in the Multi-agent System and extending the legal compliance to address ethical issues. We are counting on a simulated corporate scenario and have

implemented so far the Legal Agent in Java, namely a rules-based engine. It is dependent on the previously formalized rules file and it detects exclusion/inclusion cases in the same way a spam filter does.

Recently, we have been through the definition of the common ontology for HR and legal sources and the full formalisation and implementation of a subset of legal rules, only for Spanish and US Law. Both ontologies and legal reasoning combined could help in achieving good results.

Our aim is targeting complex Employment Laws similar to countries like Brazil as well as different conflict of laws situation. We face the dilemma of formalising other legal sources and narrow it to a set of rules. For the time being, only rules related to minimum age, fiscal benefits in Spain and work have been considered. The rules engine so far includes rules for detection of candidates allowed to work according to Spanish legislation, considering age, underage workers with a permit to work, active retirement and the query of race and sexual orientation for unethical purposes. In Spanish legislation, the candidate is not often asked about personal issues not even for survey purposes, like in the United Kingdom. The refinement of the algorithm for detection of bias would seem necessary here in our evaluation plan. For instance, if a candidate is excluded for valid reasons but happens to also be homosexual, the system should decipher whether exclusion is a result of bias or not.

Concerning challenges, so far, we are in the implementation phase, more concretely defining flows among agents and prototyping. The first implementation problem could be the use of different ontologies and the integration with the reasoning engine. As the doctoral work advances we intend to We are working further on the formalism we should follow for the rules to present a suitable representation. The question is adopting one of the existent formalisms or creating a brand-new one that suits our needs.

6 Discussion

In this paper. we have discussed the current challenges associated with interviewing technology and the need for further auditing. Working on auditing solutions and towards more automated analyses in Human Resources is crucial in international complex corporations. In this very case, is often when a conflict of laws question arises. Work contracts are governed by Labour law but the global and multicultural nature of companies makes necessary to target conflicts of Law and biased decisions. Different stakeholders are reigning over selection processes, companies, candidates, states and independent non-profit auditing bodies.

The contribution of the above-proposed solution is a step further in the formalization of Employment Law and automatization. The benefits of a Knowledge-based System, more specifically the Rules-Based Systems we detailed, will affect the accurate automatization of tasks in Human Resources more specifically the ethical and legal analyses of video-interview techniques. Our research addresses and gathers evi-

dence of real video-interview systems analyzed with AI and is focused mainly on HR business processes. However, it could presumably be generalised to other business processes rather than HR.

The suggested proposal seems to address two legislations that are particularly prone to biased selection or the use of protected attributes in the workplace. The work could break new ground in critically examining and auditing the video-interview systems so as in providing semantic description and ontologies for job positions/interviews and candidate criteria and competencies. Taking into consideration the two additional studies of Labour Law in two legislations, Spain and the US, it is expected that the work could be generalized potentially to other countries and legal systems. In the coming months, we will keep proving the effectiveness of a rules-based approach for this analysis. So far, it is offering very positive results.

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