On the way to an efficient Europe-wide e-Recruiting System

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Abstract. This short report touches on the issue of predicting a job candidate’s suitability during an electronically supported job search and recruiting process. The favored solution consists of personality based detection of a candidate’s suitability via analysis of social networking data. The approach is being discussed in regard to the issue of information privacy as well as its economic potential.

1. Introduction

When recruiting new employees it is necessary to consider a candidate’s suitability or fit for a vacant position in advance [K96]. A good fit leads to better job performance, greater job satisfaction, higher commitment and a longer duration of employment [HW06, LC11, RG10, VBW03]. In order to predict the fit between applicant and position the recruiter can currently form an opinion based on the traditional means of personnel selection (CV, personal interview, etc.). Candidate fit is composed of three aspects: (1) the candidate’s personality should match the business culture (person-organization fit, P-O), (2) his or her social skills and competences should match the work group (person-group fit, P-G) and (3) the candidate's abilities, skills and knowledge should match the precise position (person-job fit, P-J) [KZJ05, Bue14a].

Existing recruiting solutions and job recommendation systems mainly focus on the match between job requirements and a candidate’s abilities exclusively (P-J fit) and thus cover only one of the three aspects of the candidate fit. It is precisely here that great potential for e-recruiting solutions and job recommendation systems lies. Internet based social networks such as LinkedIn, XING, Twitter or Facebook contain all the data necessary to identify the entirety of a candidate’s fit. One promising trend within e-HRM (electronic Human Resource Management) is the inclusion of online social networks (OSN) [Bue16a, BB16a, Bue15e, Bue15b, Bue15a, Bue14b, FBS+12]. In recent years e-recruiting in OSN (OSN-Recruiting) has therefore evolved into an area of research of its own within the greater field of information systems [Bue11]. The analysis of such large scale and complex data allows for the deduction of a candidate’s personality, organizational culture, communication styles and roles relevant to group dynamics [Bue15c, Bue14c, Bue14a]. If that analysis occurs with the explicit permission of the applicant or even by him or her during the usage of job recommendation systems, a socially beneficial and economically efficient solution would be created that is in line with privacy laws allowing candidates to search for jobs more comfortably and more quickly while offering companies a faster way to find suitable employees. Besides requirements concerning information privacy and the technological connection of social networks, data mining procedures need to be implemented that can, for example, calculate scores for the extraversion personality trait based on social network information such as the number of steady social contacts, intensity of use, number of profile pictures, number of group memberships, number and extent of comments as well as profile depth.

At the Institute of Management & Information Systems (mis) we have developed such a data mining procedure along with a barrier-free system prototype of high usability [Bue15f, Bue15d, BSME15, BSW+14, Bue14a]. Due to its high degree of innovation and its economic significance the respective research project „efficientRecruiting 2.0“ was funded by the German Federal Ministry of Education and Research (BMBF; sponsorship no. 03FH055PX2).

2. Data Extraction from Social Networks for the Prediction of Candidate Fit

In order to determine candidate fit, personality, organizational culture, communication style, role behavior, abilities, skills and knowledge are required. These pieces of information can be extracted from social networks.

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Traits relevant to personality are extracted based on the Five Factor Models that describe personality using five dimensions [CM92]:

- Openness to experience
- Conscientiousness
- Extraversion
- Agreeableness
- Emotional Stability

First of all the hypothesis that only manipulated or overly “whitewashed” profiles can be found on OSN has been proven wrong. Many psychological studies have identified strong correlations between personality traits and usage behavior of social networks. A high score in trait extraversion is for example correlated with an above average number of contacts in OSN.

A manual way of determining organizational culture utilizes questionnaires to survey members of an organization. However, analogous to the deduction of a single user’s personality from OSN, organizational culture can also be automatically detected. Preliminary work has for example shown that cultural features can be extracted from OSN through text-mining based analysis of individual pieces of written text (posts, querying and answering behavior, etc.).

The deduction of communication styles and role behavior from OSN poses yet another promising field of research. The frequency of use of the Facebook wall feature and the connection of OSN profiles with communication services such as Skype, ICQ or Twitter allow for a judgement of communication frequency and intensity. First patents regarding this concept by companies like Cisco and Yahoo already exist. Given that a group member’s personality predicts his or her potential role behavior, the role behavior itself is conveyed through the personality traits deducted from OSN. It has thus been shown that the role of the “initiator-contributor” is associated with four of the Five Factor personality dimensions. The role of the “information seeker” can be deducted from Facebook usage or the number of Twitter accounts a user follows, while the role of the “harmonizer” on the other hand stems from the usage of group features in OSN.

Another interesting area of research lies in the measurement and standardization of abilities, skills and knowledge. HR-XML constitutes a current standard for the machine readable expression of abilities, skills and knowledge. The German Federal Employment Agency has taken up this format and developed its own specification called HR-BA-XML. It will not be long before particularly work related OSN, such as XING or LinkedIn, develop a universally accepted, machine readable standard for CVs, certificates and letters of recommendation.

3. Information Privacy

In practice it obviously cannot be assumed that all information contained in OSN is openly accessible. The availability of data is limited by users’ privacy settings, standard form contracts used by OSN, data protection directives and privacy laws. The relevant legal guidelines originate from mainly two different fields of law, privacy and labor law [BP11] and can be found in the German Bundesdatenschutzgesetz (BDSG), a federal data protection act, the German Telemediengesetz (TMG) which regulates tele-media, and in §§ 57, 87 of the German Betriebsverfassungsgesetz (BetrVG) which directs the interaction between employees and employers. Generally all legal and sociopolitical guidelines must be followed when automatically extracting personality or organizational features. Notably, as little personal data as possible should be collected, processed and used. If possible anonymized information should be used, failing this personal data needs to be pseudonymized. Users of the e-recruiting system must be educated about the investigation’s method, extent and purpose in a transparent manner and where applicable agree to the data collection, processing and usage. Additionally the e-recruiting system should not form the sole basis for a decision on an admission to employment or turn into an extended application process. Personal data has to be deleted once it no longer serves a purpose and its storage is unnecessary. Data that contains information on heritage – ethnical or other, ancestry, nationality, religion or
ideology, disabilities, age, political or unionized activity or attitudes as well as gender or sexual identity requires particularly strong protection.

The prognosis of candidate fit, however, refers to the P-O, P-G and P-J aspects outlined in the introduction. The said aspects are the decisive factors in a recruiting decision – not the aforementioned grounds of discrimination. That is why the „efficientRecruiting 2.0“ project implements such a nondiscriminatory solution. The respective existing laws will most likely become even stricter in the future as the intense sociopolitical debate on this matter is ongoing.

4. Business Models

The approach to recruiting presented in this article could become common practice within different business models. One such business model proposes the use of the project’s final results as a software add-on with costs for existing recruiting-IT or as independent recruiting platform. Recruiting companies are thus offered the chance to improve their prediction for candidate fit fully automatically and to make more educated choices before personal job interviews – if the user consents to this process.

Another business model refers to the operators of social networks such as LinkedIn or XING who are highly interested in mechanisms of candidate fit. By integrating these mechanisms, users of those occupational networks receive more adequate job recommendations which boosts the attractiveness of LinkedIn, Xing, etc. The same applies to online job markets. Their appeal will also be increased by an integration of the mechanisms developed in the „efficientRecruiting 2.0“ project.

Furthermore this functionality could be offered as an independent web service for which recruiting companies and people seeking employment could register to receive recommendations for ideally suited candidates or applicable corporations respectively.

All those options (recruiting software for companies, additional function for occupational social networks, additional function for online job markets, independent web service) are, according to internal and external appraisal, both plausible and feasible.

5. Economic Effects

The economic effects of the presented project are far reaching. According to a study by the German Federal Ministry of Family Affairs, Senior Citizens, Women and Youth the monthly costs of a vacant position in the middle income group, e.g. due to a loss of production resulting from a lack of market and customer service, amount to up to €1,600. If this amount is extrapolated under consideration of the average time until reoccupation which is 2.3 months the effective costs of a vacant position adds up to €3,600. For a position in a high income group this number even rises to €10,800. If, with the help of the suggested approach to recruiting, the period until reoccupation of a middle income position can be decreased by merely two weeks to 1.8 months, €720 per position in the middle income range would be saved. If just 5% of the 434,353 positions that have been reported as open in Germany in 2013 had been filled using the highlighted recruiting approach, the total savings would have amounted to €15.6 million a year. The potential savings for high income positions would thus be even higher. This estimation is solely based on the advantages of an efficient recruiting solution, while secondary advantages regarding effectiveness additionally emerge from a better candidate fit in the context of personnel selection.

6. Degree of Innovation and Industry Partners

The presented project is highly innovative both technologically and economically. Its innovativeness stems from the further development of groundbreaking multi agent technology as a subarea of artificial intelligence (see [BDW13, LB12a, LB12b, BL12, Bue10a, Bue10b, BK08, Bue07a, Bue07b, Bue06a, Bue06b]), of personality mining in OSN (representing another innovative web 2.0 technology) and its technological application to the
economically and managerially highly relevant challenge of recruiting specialists. The goal of which is to accelerate personnel acquisition as well as improve candidate selection.

The implementation of the proposed e-recruiting approach will not only facilitate the recruiters’ task of finding experts to fill vacant positions but also check whether an applicant is well suited for his or her future work group and the business culture [Bue14b].

The following business corporations are involved in the project „efficientRecruiting 2.0“ as industry partners:

- advola GmbH, Munich
- Airbus Operations GmbH, Hamburg
- brainGuide AG, Pöcking
- Dahmen Personalservice GmbH, Düsseldorf
- Deutsche Bahn AG, Frankfurt
- HCM4all GmbH, Munich
- HR4you Solutions GmbH & Co. KG, Grossefehn / Timmel
- Leaders In Science - Die DHV-Personalberatung, Bonn
- Pape Consulting Group AG, Munich
- Philips Deutschland GmbH, Hamburg
- Portalwerk AG, Pöcking
- SanData Solutions GmbH, Garching
- Taylor Wessing Deutschland Partneregesellschaft, Munich

7. Future work
In order to practically apply social media data for personality mining, future work will apply personality-based recruiting services within a queue of recruiting projects, funded by the German Federal Ministry of Education and Research (BMBF) under contracts 17103X10 and 03FH055PX2 to sophisticate employee contracting in Germany through automated negotiation [Bue06a, Bue06b, Bue07a, Bue07b, Bue09, BK08, BL12]. In the next step this work will be extensively evaluated in our laboratory [Bue13a, Bue13, Bue14c, Bue15g, Bue16c, Bue16e, BDE+13, BDW13, BSME15], before it will be implemented in external recruiting software (i.e., career-oriented social networking sites [Bue15b, Bue15a] and crowdsourcing platforms [Bue14b, Bue15a]) and innovative personality-based recommendation services [Bue16b, Bue16d, Bue16f].

References


