Lecture Notes on Data Engineering
and Communications Technologies 161

Leonard Barolli *Editor*

Advances in Internet, Data & Web Technologies

The 11th International Conference on Emerging Internet, Data & Web Technologies (EIDWT-2023)

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Lecture Notes on Data Engineering and Communications Technologies **161**

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Leonard Barolli
Editor

Advances in Internet, Data & Web Technologies

The 11th International Conference on Emerging Internet, Data & Web Technologies (EIDWT-2023)

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Welcome Message of EIDWT-2023 International Conference Organizers

Welcome to the 11th International Conference on Emerging Internet, Data and Web Technologies (EIDWT-2023), which will be held from February 23 to February 25, 2023.

The EIDWT is dedicated to the dissemination of original contributions that are related to the theories, practices and concepts of emerging Internet and data technologies yet most importantly of their applicability in business and academia toward a collective intelligence approach.

In EIDWT-2023, topics related to Information Networking, Data Centers, Data Grids, Clouds, Crowds, Mashups, Social Networks, Security Issues and other Web implementations toward a collaborative and collective intelligence approach leading to advancements of virtual organizations and their user communities will be discussed. This is because Web implementations will store and continuously produce a vast amount of data, which if combined and analyzed through a collective intelligence manner will make a difference in the organizational settings and their user communities. Thus, the scope of EIDWT-2023 includes methods and practices which bring various emerging Internet and data technologies together to capture, integrate, analyze, mine, annotate and visualize data in a meaningful and collaborative manner. Finally, EIDWT-2023 aims to provide a forum for original discussion and prompt future directions in the area.

An international conference requires the support and help of many people. A lot of people have helped and worked hard for a successful EIDWT-2023 technical program and conference proceedings. First, we would like to thank all authors for submitting their papers. We are indebted to Program Area Chairs, Program Committee Members and Reviewers who carried out the most difficult work of carefully evaluating the submitted papers. We would like to give our special thanks to Honorary Chair of EIDWT-2023 Prof. Makoto Takizawa, Hosei University, Japan, for his guidance and support. We would like to express our appreciation to our Keynote Speakers for accepting our invitation and delivering very interesting keynotes at the conference.

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EIDWT-2023 Keynote Talks

Fueling the Data Engine to Boost the Power of Analytics

Wenny Rahayu

La Trobe University, Melbourne, Australia

Abstract. Data analytics is often considered in isolation. The attractiveness of the problems that need to be solved, the sophistication of the solutions, and the usefulness of the results are certainly the significant strengths of work on data analytics. However, the input data is often too simplistic, or at least the assumption that the data is already readily prepared for data analytics often neglects the fact that preparing such an input data is in many cases, if not all, actually the major work in the data life cycle. The pipeline from the operational databases that keep the transactions and raw data to the input data for data analytics is very long; it often occupies as much as 80% (or sometimes even more) of the entire life cycle. Therefore, we need to put much effort to this preparation and transformation work in order to value the work and the results produced by data analytics algorithms. Having the correct input data for the data analytics algorithms, or in fact for any algorithms and processes, is critical, as the famous quote "garbage in garbage out" had said. Even when the original data is correct, but when it is presented inaccurately to a data analytics algorithm, it may consequently produce incorrect reasoning. This talk will present a systematic approach to build a data engine for effective analytics.

Impact of Uncertainty Analysis and Feature Selection on Data Science

Ricardo Rodriguez Jorge

Jan Evangelista Purkyně University, Ústí nad Labem, Czech Republic

Abstract. Data science applications usually need a previous preprocessing stage for feature extraction and data validation. The data needs to be preprocessed and analyzed to minimize the dataset while preserving variance and patterns in order to find the optimal feature vector configuration. The feature selection algorithm allows finding the feature vector configuration to ensure minimal uncertainty in mapping the corresponding outputs and feature vectors. In data science, feature vector designs can be performed by different techniques and the validation can be performed by uncertainty analysis. These considerations are timely because wearable devices are increasingly being used on a large scale in different scientific fields. This talk will contribute to recommendations for the use of signals and data as a means of informing the impact of different uncertainty analysis and feature selection methods for data science applications. Using this new knowledge together with machine learning, data science applications can be evaluated with more confidence.

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Talent Incubator System: A Conceptual Framework of Employee Recruitment Strategy in Digital Era

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Abstract. Recruitment methods in business organization adopt many new approaches. Several approaches have attempted to adapt the benefits of digital technology, including the internet, data, and the web. However, based on existing literature, improvements are still needed to be applied to business intelligence, including combining the recruitment method with the onboarding method. This combination could improve the quality of the workforce by helping to close the gap between the competencies desired by the business and the competencies possessed by the workforce candidate. This study aims to propose a framework of talent incubator system to overcome the competence gaps between the need of business and workforce candidate. We establish a talent incubator prototype to enhance the quality of workforce competency in business organizations. As consequence, all parties, including the company, society, job providers, job seekers, and talent institutions, will benefit from matching the need for workforce competence.

Keywords: Competency · Workforce · Recruitment · Talent management

1 Introduction

Recruitment is one of the important aspects of Human Resources Management (HRM) practices in meeting the availability of a workforce according to qualifications to achieve a competitive advantage in a business organization. A business organization, large, small, or micro, faces competition in recruiting the qualified workforce candidate from a society as a job seeker. Business intelligence can take advantage of the response from job seekers during selection process in recruitment to attract and retain intangible, rate, and unique competencies. It is essential to investigate the embedded talent to manage the competency of the workforce in the recent digital age, as the benchmark of business's success is determined by the contribution of the workforce [1]. Meanwhile, globally, the workforce landscape will experience endurable changes related to the latest technology such as demands for automation, virtual cooperation, IoT, AI, Blockchain, and so forth.

Recent research on Human Resources (HR) digital recruitment shows the relevance of social networks as a determinant of the success of sustainable HR activities [2]. Several studies related to the use of digital technology in HR activities, especially recruitment in small and medium scale business have also been attempted [3–5].

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More specifically on HR activities in the terms of training and recruitment, recent trends in the use of digital technology have been attempted by Hassan Onik et al. [6]; Jeong and Choi [7], Dhanala and Radha [8]; Serranito et al. [9]; Al Hamrani and Al Hamrani, [10] by focusing on recruitment systems in design and application. However, from several studies related to the new technology usage for recruitment, nothing has led to how to match competence availability from job seekers to match the competence qualification of the job provider to the work formation required by the business organization. A few studies also state that HRM practices frequently encounter problems related to workforce recruitment qualification, and are not always able to employ competence workforce in accordance with the expected performance [11, 12]. As a consequence, finding a match workforce with high competence in accordance with the standards required to fill the work formation position provided by the job supplier remains a challenge. One of them is that the workforce that has managed to pass the selection procedure in the recruitment process to take up the available work formation has not been able to meet the minimum competency [4, 13–16].

The talent incubation in recruitment process transformation is expected to enhance workforce competence in accordance with the competency needs of small business in creative industries. Utilization of technology in the form of existing training to meet workforce competency requirement. Recent studies related to the use of digital technology have been proposed for mitigating competency gaps in the workforce. For example, Fachrunnisa and Hussain [17] have proposed the development of a blockchain-based HR framework to match company needs and workforce competencies by involving a corporate training center for skills gap mitigation. Hence, the needs of the workforce with the qualifications required by the business in such industries will always fit the current situation in the long run. As a result, Blockchain assist in analyzing the information and data effectively. However, it has not led to the talent training building serving as an incubator for workforce candidates to learn relevant knowledge, thereby providing an outcome on the attainment of the competencies required to fill various work formations. To address the aforementioned gaps, we propose a new recruitment strategy in the form of a Talent Incubator design. The prototype could serve as a meeting place for job providers to create a workforce with standard competencies that match the work formation available from job providers based on the talent to be transformed into the competencies required.

2 Literature Review

2.1 Recent Technology Application for Recruitment System

Few research has been provided new technological application for the recruitment management system [3, 17]. The results of case study revealed that the proposed system outperformed the current HRM system Hassan Onik et al. [6]; developed a digital certificate management platform to be used in recruitment processes; and used the Blockcerts platform to manage blockchain services and digital certificates. On this framework, applicants receive certificates based on their previous performance, the validity of the certificates is checked, all certificates are stored, and changes to saved record keeping are impossible. Jeong and Choi [7] emphasized that blockchain technology is an effective

tool for verifying and securing data, and developed a recruitment system supported by blockchain technology in their study. In their study, they explained the process of this system supported by blockchain technology. They described the system's operation as follows: First and foremost, the recruitment firm submits the candidate list to the system, which automatically checks the candidate information from databases such as schools and law enforcement agencies, and the verified data is stored in the blockchain. Furthermore, the company evaluates the approved candidates on the blockchain and decides whether or not to hire.

This system, which has been developed through smart contract tools on Ethereum platform, has been tested via Rinkeby and Ganache Software. Dhanala and Radha [8]; Serranito et al. 2020 [9] designed an ecosystem for certificate validation on a global scale. This ecosystem is based on the blockchain running smart contracts on the Ethereum platform. While higher education institutions in the ecosystem automatically save their education certificates to the blockchain, recruitment companies can question the certificate accuracy of the candidate by examining the registered information. The system developed in this study was applied to recruitment process in the public sector through a pilot study; by using the science of design research method, presented a model suggestion in which blockchain technology is used for the recruitment processes of people with disabilities in the United Arab Emirates. By means of this model proposal, they aimed to provide the authorities with decision support by accessing the education, health, course and promotion information of disabled people accurately and at low cost [10].

Moreover, [3] pointed out that the candidate information obtained in the traditional recruitment process has many shortcomings such as the risk of being inaccurate, the risk of data loss, being costly and requiring a long time in the data validation process. Moreover, they stated that blockchain technology can minimize the disadvantages of traditional recruitment methods. Several stages of the blockchain-based recruitment and selection process as follows: First, the candidates register to the systems. Second, the candidate information is verified via the blockchain system. Third, the managers make decision and employees are hired in right positions.

Of all the studies that have been carried out related to the use of new technology in the recruitment process, there are still several obstacles, for example, related to security and privacy, a potential risk in employee data, loss of privacy due to data transparency, problems of scalability and cost-effectiveness (system ability to maintain its performance), organizational business model mismatch, lack of knowledge, skills, and abilities of practitioners, and lack of cooperation between stakeholders.

Of the several technology application in the field of recruitment that already exist, among others; Jobstreet, LinkedIn, Karir.com, Glints, Urbanhire, and Kalibrr Disnakertrans [18], have not included the availability of training to produce workforce competence according to the company's needs in the recruitment process. Karir.com and Glints have tried to include training activities in the recruitment process, but they have not been optimal in how to producing training graduates into a workforce that is truly competent to match the work formation required by the company. Furthermore, efforts to match the standard competence needed by the company and the availability of competence from job seekers in 'E-Makaryo' have also been carried out by [19]. The 'E-Makaryo' system has attempted to bring together job providers and BLK (Job Training Centers)

throughout Central Java, involving the provincial and district/city governments as managers. This system offers an advantage such as it has tried to reach the entire society from the provincial level to the district/city level. However, job matching efforts are still limited based on the terms of job seeker location (province, district, or city), education, and keywords (for example, desired field of work).

2.2 Talent Management

The essence of talent refers to humans as a workforce who would have a major impact on business performance [20]. This could be through their abilities or, in the long term, by achieving their full potential. Talent management is the method of understanding what talent exist within an business, what talent populations are needed, and investigate workforce/candidates who are particularly valuable to the business by using data from the workforce, performance management, and preparedness tools [21]. It is critical to be able to identify and recruit the most effective methods for developing and retaining talent. It may necessitate specific business intervention, such as development programs, but it is also about the capability to develop custom-designed program to suit employee-employer specific needs. In essence, talent management focuses on how to attract, investigate, involve, retain, and place workforce/candidates who are a real benefit to a business organization. This could be due to their potency or even because they fulfill a crucial role on job formation.

Job will display numerous novel problems in the near future, for example, as automation and AI replace more routine roles and the employment market for highly qualified workers thickens [22]. Business actors will have to concentrate more on advancing than on recruiting new employees. A customizable, institution talent management strategy focuses on human capital investment and elevates talent acquisition to the top of business agenda. To achieve business performance, talent management can contribute to strategic goals such as meaningful work, increased productivity, a long-term learning culture, and high-quality workforce competence.

The talent survey report states several recommendations regarding future talent management [23]. Those recommendation include: remaining focused on skill development, even in difficult times such as pandemic, protecting the strategic learning and development budget; continuing to invest in ways for workforce candidates to access opportunities such as apprenticeships, training, industry placements, and post-A-level routes; ensuring skills training investigate 'essential' traceable competence gap such as problem-solving, teamwork, and communication; and ensuring competence building address 'vital' relevant skills. The emergence technology offers customized solutions based on personalization to support business and workforce matching based on talent in recruitment strategies.

Based on several previous studies and various forms of recruitment strategy to close the gap competences, it can be concluded that there is a need for new model that systematically engaged job provider and job seeker integrated into digital infrastructure in the form of a talent incubator.

3 Proposed Framework

This research proposes a conceptual framework of incubator system by which job seeker and job provider can communicate automatically with the help of AI. In this scenario, talent incubator is a place by which for workforce candidate will have better preparation to attend the recruitment process. Likewise, from job provider interest, it can be easier to find candidate that meet the selection criteria. The framework can be visualized in Fig. 1.

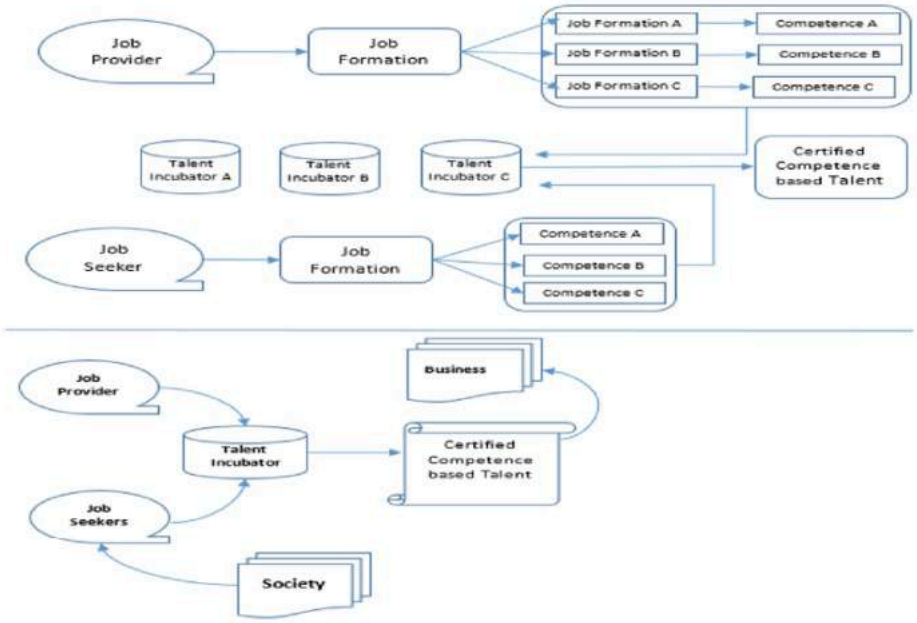

Fig. 1. Conceptual framework of talent incubator system

The detailed working of our framework is as follows:

1. Society
   Society consists of people with different educational background, competencies, work experience, geographical locations, etc.
2. Job Seeker
   Job seekers come from a society that requires information services to find the desired job according to their competence.
3. Job Provider
   A job provider is a provider of work formation data and information needed by the competency standard qualifications required by the company.
4. Talent Incubator
   A talent incubator is a learning and virtual business organization that provides talent investigation and management to train, develop and retain the required competencies based on work formation information from job providers. This incubator

will train job seekers based on the talent that is embedded in them to be trained and developed so that it can be transformed into several competencies needed to fill several available work formations. Furthermore, the talent incubator processes information related to several competencies-based talent needed in curriculum materials to train job seekers. The outcome of incubator talent in the form of workforce competence matches creative industry business competence needs in the form of certified competence-based talent.

5. Business Organization

   Business organization consist of several business in specific sector that require talented workforce candidates to fill the workforce formation following the required competencies.

The framework proposed aims to provide a platform in the form of a learning and virtual business organization to investigate, manage, train, and retain embedded workforce talent. Furthermore, transforming talent into matching competence between the workforce candidate and the job seekers as part of a society with various work formation and competencies required by the job provider.

4 Conclusion

The urgency of the talent incubator as a new approach to match the competence of the workforce of Job Seekers (candidates/early career workers) against the minimum to high competence required by the business organization to fill several job formations available from Job Providers. The talent incubator is a link in the input-to-output process. In this study, input means the talent embedded as resource of competencies required by the small business creative sector provided by job providers as a part of business organization. Process means approval from the talent incubator as investigation, management, and training provider. Output means the competence- based talent of the workforce that is by the qualification standards required by the company to fill several job formations. Meanwhile, to get data and information about the competencies required by job providers, we use technology applications. A technology website can be used as an incubator to transform the tasks of human resources in the field of recruitment strategy. Future research is needed to validate the proposed framework by using artificial intelligence and blockchain.

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