Available online at www.sciencedirect.com

ScienceDirect

Procedia Computer Science 122 (2017) 727–734

Procedia Computer Science

www.elsevier.com/locate/procedia

Information Technology and Quantitative Management (ITQM 2017)

Analytics in Human Resource Management The OpenSKIMR Approach

Peter Mirski[a,]*, Reinhard Bernsteiner[a], Dania Radi[a]

[a]Management Center Innsbruck (MCI), Department Management, Communication & IT, Universitaetsstrasse 15, 6020 Innsbruck, Austria

Abstract

Matching skill sets of individuals with highly demanded skill sets of jobs or occupations in the IT area is a great challenge – adding necessary learning items and visualizing the result is a very promising end to end approach. With the "Open Skill Match Maker" (OpenSKIMR) young people shall be able to plan and simulate their individual learning and career routes towards their desired career destination, like with classical route planning software. Using the ESCO, a multilingual classification of occupations, skills, competences and qualifications, will ensure a consistent understanding of the skills and qualification of the talents. This paper aims at showcasing the possibility of matching data about skills, learning items and job offers. It opens up the opportunity to simulate career paths through visualization in order to support decision making in a world of imperfect data and information and overall this project shall also support the Europe 2020 target for inclusive growth as it aims to motivate people in acquiring new digital skills.

Peer-review under responsibility of the scientific committee of the 5th International Conference on Information Technology and Quantitative Management, ITQM 2017.

Keywords: human resource management; business analytics; big data, skill matching; graph database; graph analytics; social network analysis;

1. Introduction

Gathering data about job seekers, learning items and job offers is a complicated endeavor as the quality of data is poor in all of the mentioned fields. Nevertheless, the authors and initiators of the project are strongly motivated to showcase the possibility of doing so, via using the ESCO catalogue and three different sets of algorithms, supporting the decision-making process of young talents towards their dream job.

The ESCO (European Skills, Competences, Qualifications and Occupations) classification project is supported by the European Commission with the aim to create a standard nomenclature for skills, competences, qualifications and occupations and make them comparable across Europe. This is the basis for an easy

* Corresponding author. Tel.: +43-512-2070-3500; fax: +43-512-2070-3599
E-mail address: peter.mirski@mci.edu.

1877-0509
Peer-review under responsibility of the scientific committee of the 5th International Conference on Information Technology and Quantitative Management, ITQM 2017.
10.1016/j.procs.2017.11.430

communication between labor markets, employees and education institutions as well. The goal is to unify the existing semantic data from different sources like national job databases, job descriptions, assessment centers or qualification details. These data are provided in a machine-readable format using the Linked Open Data (LDO) framework [1].

The ESCO database is built on three pillars, skills and competences, occupations and qualifications. Skills and competences are the basis of the entire ESCO project, containing a collection of around 13.000 different skills/competences and around 3.000 occupations which can currently be found on the labor market. The next pillar, occupations, provides a set of occupations and occupation groups. Furthermore, these occupations are linked with skills that are required for a specific occupation. Qualifications are the formal outcome of an assessment and validation process which is obtained when a competent body determines that an individual has achieved learning outcomes to given standards.

To deploy ESCO across Europe, the data have to be provided in the 25 official EU languages. Additionally, the data structure has to be comparable with similar models like ISCO (International Standard Classification of Occupations) [2].

The project is aimed at directly linking job-seekers with Europe's industry and relevant content providers. The core idea for the future is to build an end to end solution - starting at the ESCO skill level and ending up with specific job offers. The usage and user behavior of the main stakeholders on the platform shall provide all players with anonymized, relevant and in time information about skills, learnings and jobs.

This paper provides insights in the first steps of this analytics endeavor bringing together the most important stakeholders on the labor market, namely the European Commission, industry, educational institutions and talents. This project is guided by a standard process model for data mining and analytics as they represent the basis for the further realization and implementation of the software tool which is an essential outcome of the entire OpenSKIMR project.

2. The ESCO Catalog and OpenSKIMR

OpenSKIMR is build up on the latest version of the European classification system ESCO. It can be described as a standardized terminology for skills, competences, qualifications and occupations across Europe with all its different languages. ESCO targets to bridge the gap between the world of education, training and the labor market by creating common understandable terms for skills and competences.

With OpenSKIMR a skill assessment tool using the ESCO terminology and structure should be developed. The integration of job offerings which are annotated according the ESCO descriptions allow an automated matching system between a talent's skill sets and the required skill sets of a specific job offering. Furthermore, potential skill gaps between a talent and job offering can be identified and related trainings can be proposed.

As a consequence, these requirements lead to some advanced functionalities which have to be provided by OpenSKIMR. In order to enable the matching between a talent's skill set, the ESCO occupations and real job postings, talents have to be enabled to assign the related ESCO skills in OpenSKIMR. In turn, the same must be provided for job offerings and trainings offered by educational institutions. In a first step an annotation guide to support and unify the annotation of a talent's skill set, job offerings and trainings with the ESCO nomenclature has been developed. In future releases and a stable ESCO catalog this process can be supported by the system.

ESCO currently consist of more than 14.000 skills and competences which are assigned to the ISCO hierarchy. To reduce the complexity of the assignment of the ESCO nomenclature to skill sets the number of skills has been reduced. A clustering algorithm was used to achieve this goal.

From a technical perspective, the ESCO catalog provided by the European Union is transferred to OpenSKIMR by using a classical ETL process. Besides the clustering algorithms which have to be applied the data structures have to be transformed to a graph-oriented structure as described later in this paper. The ESCO catalog is currently in pre-release status and the single datasets are still being completed.