Exploiting semantics to support education and labor worlds

Ph.D. thesis presentation

Tutor: prof. Claudio Demartini

Ph.D. candidate

Valentina Gatteschi
Exploiting semantics to support education and labor worlds
Mobility
Employability
“With my degree will I be able to find a job abroad?”
“What kind of job could valorize at best my competences?”
“How could I identify competences possessed by a job seeker?”
European Qualification Framework (EQF)

Eight levels (from 1 to 8)

Definition of what a learner:
- knows
- understands
- is able to do

learning outcomes
But...

The adoption of EQF is still in progress

level 2

level 3
Or...

People are still reluctant to speak in terms of:

• Knowledge
• Skills
• Competences
Knowledge
Skills
Competence

Creation of qualifications tailored on labor market’s needs
Job matchmaking
Knowledge
Skills
Competence

1

Creation of qualifications tailored on labor market’s needs
Work profiles

Common profile

Training profiles
Knowledge

Action verbs

Context

competence skill

Δ

\[ C_i \equiv S_i \rightarrow AV_i \rightarrow K_i, K_j \]

\[ CX_1 \]
To be able to apply selling techniques

Action verb
- Act
- Assess
- Apply
- Identify

Knowledge
- Selling techniques
  - Communication techniques
    - Customer identification
    - Full responsibility
  - Customer
    - Customer needs
      - Customer additional needs
      - Customer complaints
      - Customer doubts
    - Full resp. in the identif. customer and his needs
- Communication techniques knowledge
Methodology

4 different approaches, receiving as input a range

Knowledge

- _Cleaning techniques knowledge_
- _cleaning means and tools_
- ✔️ _cleaning methods_
- _cleaning methods means and tools_
Identification of the EQF level for each KSC belonging to the COMINTER profile, by means of a computation based on the EQF levels of Learning Outcomes belonging to working and training profiles inserted in the database (below you can find the details of the computation).

<table>
<thead>
<tr>
<th>Type</th>
<th>KSC COMINTER profile</th>
<th>Percentage of item(s) found</th>
<th>EQF</th>
</tr>
</thead>
<tbody>
<tr>
<td>S</td>
<td>Managing the coordination the buying and selling administration</td>
<td>1/2 (50%)</td>
<td></td>
</tr>
<tr>
<td>S</td>
<td>Keeping track of document files import and export</td>
<td>1/2 (50%)</td>
<td></td>
</tr>
<tr>
<td>S</td>
<td>Identifying setbacks, applying alternative and appropriate solution to overcome setbacks</td>
<td>1/2 (50%)</td>
<td></td>
</tr>
<tr>
<td>S</td>
<td>Carrying out quality control</td>
<td>1/2 (50%)</td>
<td></td>
</tr>
<tr>
<td>S</td>
<td>Aspiring Service Relationship Management</td>
<td>1/2 (50%)</td>
<td></td>
</tr>
</tbody>
</table>
# EQF ruler

<table>
<thead>
<tr>
<th>Description</th>
<th>Task areas</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Sales and Customer relations</td>
</tr>
<tr>
<td>EQF 2 Responsibility and authonomy</td>
<td>Tasks and Learning outcomes</td>
</tr>
<tr>
<td>EQF 3</td>
<td>...</td>
</tr>
</tbody>
</table>
• Overcome heterogeneity of qualifications

• Ad hoc taxonomy
• Manual annotation
Job matchmaking
Scenario

Heterogeneous curricula
Expressed with different level of detail
Analyzed by non-skilled people
WordNet

Words grouped in synsets
More than 117,000 synsets

Relations among terms

- java
- a programming language
- a platform-independent object-oriented programming language
- coffee
- an island in Indonesia
But...

Annotation takes time (and requires skills)

Solution:
- Automatic annotation
- Check by project partners
Profiles

Italy
Bartender
Motor vehicles body repairer
Deliverer
Mechanical Maintainer
Leather tanner
Warehouse Keeper
In-home caregiver
Cleaning Assistant
Waiter

France
Mason
Cook

Spain
Health and social care to people at home
Geriatric care in social institutions for dependent people.

Netherlands
Shop Assistant
Logistics Assistant

Poland
Waiter
Cook
Fast food employee

Slovenia
Shop assistant
Cleaner's assistant
**Learning outcome**  LINKS/CATEGORIES
.criteria for assigning **tasks** and distributing workloads

**Definitions already assigned to tasks**
a specific piece of work required to be done as a duty or for a specific fee
any piece of work that is undertaken or attempted

**Definitions found for tasks**
a specific piece of work required to be done as a duty or for a specific fee
any piece of work that is undertaken or attempted
use to the limit
assign a task to
give an assignment to (a person) to a post, or assign a task to (a person)

Add a new definition  ADD DEFINITION

Definitions found using the user's lemma below
Profile: Motor vehicles body Repairer and Painter (Italy)

Tasks/Subtasks
- Customers' assistance
- Diagnosis of damage to the car frame and body
- Processing of the bodywork and car frame of the vehicle
- Disassembly and assembly of mechanical parts and accessory parts of the car body

Knowledge
- Characteristics of...
- Technical character...
- Elements of techn...
- Elements of therm...
- Accident prevention...
- Rules and proced...
- Legislation on th...

Skills
- To adopt allocation arrangements and custody of the removed parts...
- To adopt procedure...
- To apply technique...
- To determine poss...
- To recognize the...

Competences
- To be able to anal...
- To adopt allocatio...
You selected this learning path Motor vehicles repairer 2009-01-09 2011-02-14. If you want to turn back click here

**C:** Responsible for maintenance and **repair** of cleaning utilities and repo...

**K:** Technical specifications of a car **repair** workshop for the use of tool...

**K:** Characteristics of a car workshop or body (**repair**) shop for the use o...
Degree of similarity of word number 0: 1
Unadjusted score100%
Distance between words0
Adjusting coefficient1
Adjusted score100%

**S:** To adopt allocation arrangements and custody of the removed parts...

**K:** Technical specifications of a car repair workshop for the use of ...

**S:** To identify technologies, tools and sequential steps necessary to rep...

**C:** To able to perform a correct diagnosis of the car frame and bodywork ...
<table>
<thead>
<tr>
<th>ID</th>
<th>First name</th>
<th>Surname</th>
<th>Date of birth</th>
<th>Nationality</th>
<th>Country</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Giacomo</td>
<td>Rossi</td>
<td>1976-03-03</td>
<td>Italian</td>
<td>Italy</td>
</tr>
<tr>
<td>8</td>
<td>Luigi</td>
<td>Deluca</td>
<td>1983-03-09</td>
<td>Italian</td>
<td>Italy</td>
</tr>
<tr>
<td>3</td>
<td>Joaquina</td>
<td>Delgado</td>
<td>1987-03-05</td>
<td>Spanish</td>
<td>Spain</td>
</tr>
</tbody>
</table>
## Change visualization

Comparison between job offer **1** job(s) as **Car painter** in City(Country) valid from **2012-02-10** until **2012-02-29** and your CV

<table>
<thead>
<tr>
<th>Searched LOs</th>
<th>Job-seeker's LOs</th>
</tr>
</thead>
</table>
| Characteristics of a car workshop or body (repair) shop for the use of tools, technologies and processes | • Technical specifications of a car repair workshop for the use of tools, technologies and processes  
• To be able to analyze the components and car body parts ensuring a correct phase of disassembly and assembly of parts |
| To define an estimate of intervention times and costs on the motor vehicles  | | • Technical specifications of a car repair workshop for the use of tools, technologies and processes |
| To identify technologies, tools and sequential steps necessary to repair the vehicle | | • Technical specifications of a car repair workshop for the use of tools, technologies and processes |
| To able to perform a correct diagnosis of the car frame and bodywork of the vehicle in order to assess the damage and schedule an appropriate repair plan. | | • Technical specifications of a car repair workshop for the use of tools, technologies and processes  
• To be able to analyze the components and car body parts ensuring a correct phase of disassembly and assembly of parts |
| Elements of technology of the car for the correct execution of basic mechanical operations on elements of the car frame and body | | • Technical specifications of a car repair workshop for the use of tools, technologies and processes  
• To be able to analyze the components and car body parts ensuring a correct phase of disassembly and assembly of parts |
| Equipment for the paint drying with the use of ovens, infrared lamps, etc. | | • Technical specifications of a car repair workshop for the use of tools, technologies and processes  
• Communicate with colleagues and with the superior |
| To adopt techniques of painting, drying and polishing with respect to different materials to be treated | | • Technical specifications of a car repair workshop for the use of tools, technologies and processes  
• Communicate with colleagues and with the superior  
• To adopt allocation arrangements and custody of the removed parts and components |
| To be able to perform the painting of the vehicle or articulated lorry ensuring compliance with quality standards set by the automotive company | | • Technical specifications of a car repair workshop for the use of tools, technologies and processes  
• To be able to analyze the components and car body parts ensuring a correct phase of disassembly and assembly of parts |
| Characteristics of the types of paint to be use (metallic and non-water-based, pastel) and tinting systems | | • Technical specifications of a car repair workshop for the use of tools, technologies and processes |

---
• Reduction of the workload when inserting a cv / job offer
• Different contexts & sectors

• WordNet is limited
Conclusion

- Semantics could support the comparison of qualifications and job offers/demands

- Annotation
  - Limited thesauri
  - Manual insertion of job offers and curricula
Future works

Improvements:
• Link to existing job portals
• Data extraction from curricula
• Integrate other thesauri

New contexts:
• Include the training sector
Thank you!