Job Market Finland

Meeting place for people and jobs

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Job Market Finland

- Shared platform for
  - Job seekers
  - Employers
  - Employment offices
  - Service providers (public, private, third-sector)

- Developed by KEHA Centre and Ministry of Economic Affairs and Employment

- ~224 000 job seeking profiles (active ~24 000)

- ~20 000 active job postings

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AI utilized for various purposes

1. Skill and occupation recommendation based on free text

2. Detecting words that describe the skills and occupation in a job description

3. Detecting required and optional language skills from job descriptions

4. Matching jobs and seekers

5. Recommending metadata for service descriptions

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Skill and occupation recommendation

- Input: free text

- Output: recommended skills and occupations (ESCO ontology)

- Used in several use cases
  - Job seeker's user interface
    - recommend skills and occupations based on free text profile description
  - Job posting import
    - automatically find relevant skills and occupations based on job description
  - Service provider's user interface
    - recommend skills and occupations when creating service description

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Skill and occupation recommendation

- Recommendation model based on
  - ESCO labels and descriptions
  - ESCO links between skills and occupations
  - Custom occupation description data
  - Model: TF-IDF on character level

- Supports Finnish, Swedish and English

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Example 1: Job seeker profile

"I have worked as an accountant and have studied finance."

Occupations:

- public finance accountant
- financial manager
- accountant
- financial controller
- …

Skills

- tax legislation
- accounting techniques
- bookkeeping regulations
- …

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Example 2: Job posting

"Our company is looking for a welder. During your working days you are welding and assembling custom-made products from scratch. You work with painted and galvanized steel, stainless steel and anodized aluminum."

Occupations:
- *welder*
- *welding engineer*
- *welding coordinator*
- *welding inspector*
- *spot welder*
- *...*

Skills:

- *types of metal*
- *ferrous metal processing*
- *welding techniques*
- *operate welding equipment*

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Detecting relevant words in job descriptions

- Challenge: Sometimes job descriptions are long and contain passages that do not describe the actual job
  - General description about the employer
  - Description on the labour hire company handling the recruitment process
  - Description of the recruitment process

- Both matching and skill-occupation recommendation can be improved if irrelevant passages are filtered out.

- We use a neural network model to detect relevant words that describe the occupation and the skills needed in the job.

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Example: Detecting relevant words

Our customer is looking for a *fearless ELECTRICIAN* for our client company for *electrical renovations* and *installations of new buildings.* You can *independently make installations* in the *premises* specified by the customer. We are one of Finland's largest personnel service companies. We offer a wide range of temporary work in different industries. We recruit experts from various fields, from management level to employees, directly for our client companies. Send your application to our HR manager N.N. <email> <phone>

Our company is hiring an *HR manager.* Experience in *recruiting* and *HR legislation* required. Our company is one of the largest construction companies in Finland.

- The model utilizes also context to select the relevant words.

- For example **HR manager** and **recruiting** are considered irrelevant on the left example, but relevant in the right example.

Detecting required and optional language skills

- Separate model that detect language requirements in job descriptions

- Input: *"We are looking for a customer support agent. Ability to communicate fluently in* `Finnish` *and* `English` *is required.* `Swedish` *language skills also appreciated"*

- Output:
  - required: fi, en
  - optional: sv

- First phase detect which words describe language requirements and whether they describe a required or optional skill
  - We use a pretrained multi-lingual large language model
  - Fine-tuned on our own semi-automatically generated training data

- Second phase figures out the best matching language code for each detected requirement

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Matching jobs and job seekers

- Matching is done in both directions
  - Best matching job seekers recommended for an employer
  - Best matching jobs recommended for a job seeker

- Matching is based on
  - Structural data
    - ESCO occupations and skills selected in the profile
    - ESCO occupations and skills in the job posting
  - Natural language
    - Free text descriptions in the job seeking profile
    - Free text description in the job posting
    - Models based on FastText, TF-IDF and skill-occupation recommender

- Supports Finnish, Swedish and English

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Recommending metadata for services

- When a service provider is creating a service description
  - Recommend relevant skills and occupations
  - Recommend relevant keywords and service classes

- For keyword recommendation, we use an open-source tool Annif developed at the National Library of Finland

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Challenges

- Job descriptions are not always very good
  - Can contain a lot of text that is not so relevant for matching
  - Sometimes very little concrete text about the job and required skills

- Imported job postings can contain inaccurate metadata
  - The selected occupation code can be incorrect
  - Job description may be marked as Finnish, but the text contains also English or Swedish

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Challenges

- ESCO ontology is not perfect
  - Some skill and occupation descriptions are very short
  - Some skills and occupations are really specific, some very general
  - For some profiles it is difficult to find a suitable occupation

- Getting real-world data and feedback
  - Real-world profile data would be useful for testing and training purposes but currently not possible for privacy reasons
  - It would be useful to get better feedback how well the matching and recommendations work for real users

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Future ideas

- Recommend various employment services and trainings based on job seeker's profile

- Use modern large language models for skill and occupation recommendation

- Using machine translation (job postings and services) to improve multi-language support

- Fill job seeking profile automatically from an uploaded CV

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