



Labour market monitoring system

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Motivation

Goals

- Automated monitoring of the demands of human resources on the levels of companies, regions and country
- Discovering qualitative and quantitative correlations between labour market and educational system
- Forecasting the situation on the regional labour markets

Challenges

- Labour market and educational system “speak” different languages
- The data from both sides is not uniform and structured enough

Initial data sources

Labour market

- Recruitment advertisements
- Job postings, CVs

Educational system

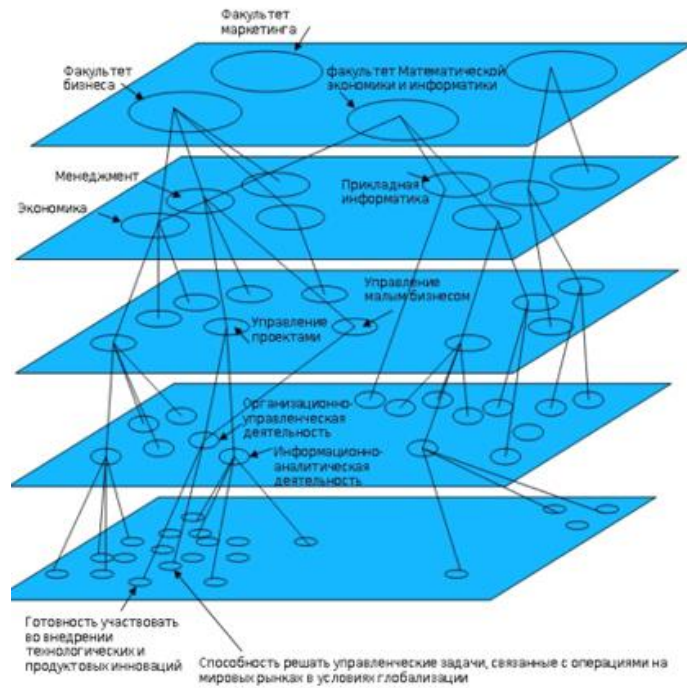
- State educational standards
- Professional standards
- Universities' educational programs
- Expert knowledge on the key points of the professions

Matching professions and educational programs with the labour marker

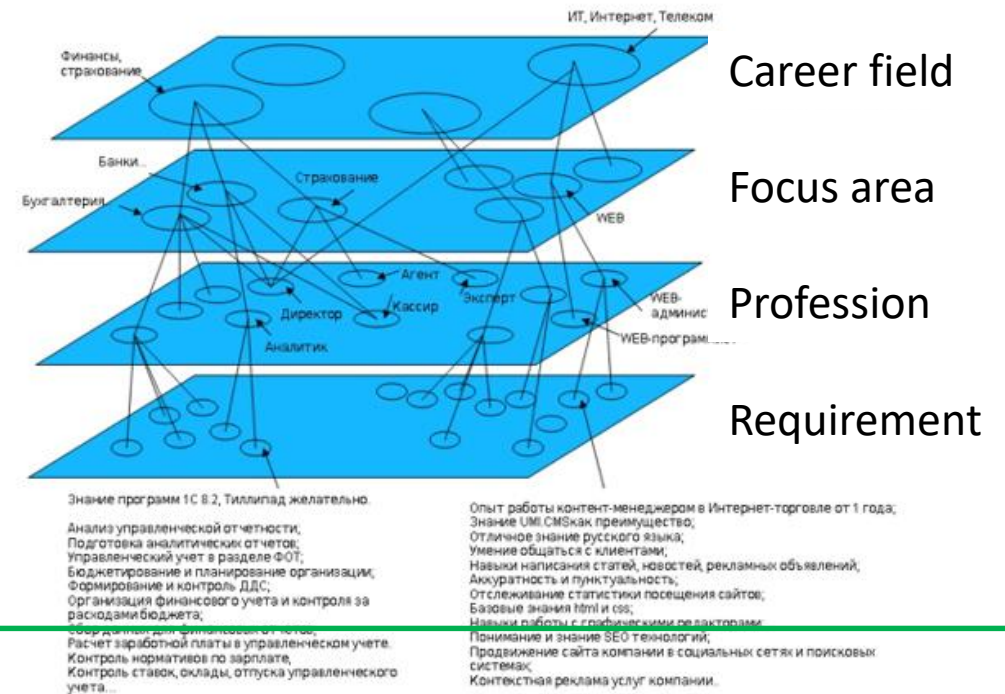


Matching educational programs with real-life market needs

Education



Market



Department

Field of study

Educational profile

Type of activity

Competence

Career field

Focus area

Profession

Requirement

Meanings comparison

What is in question

- Vacancies: title, description, requirements, industrial area, etc.
- Education: competencies, skills, experience, pieces of knowledge, etc.

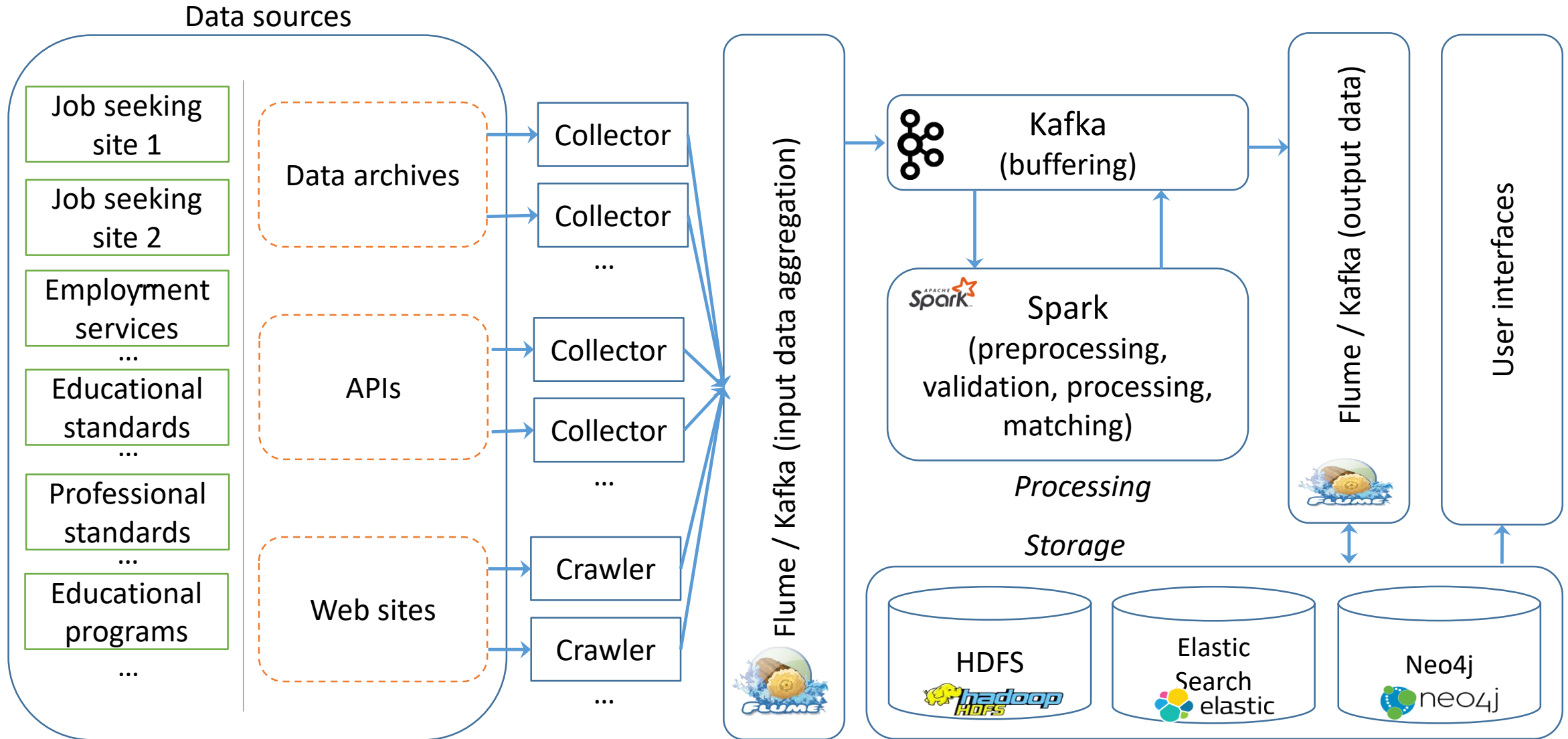
Semantic parsing

- Usually wordings are short (about 10 words)
- Vector representation are in use (*word2vec*)
- Models are based on big general corpora (like *RusVectōrēs* for Russian language) and custom ones built for the semantic areas

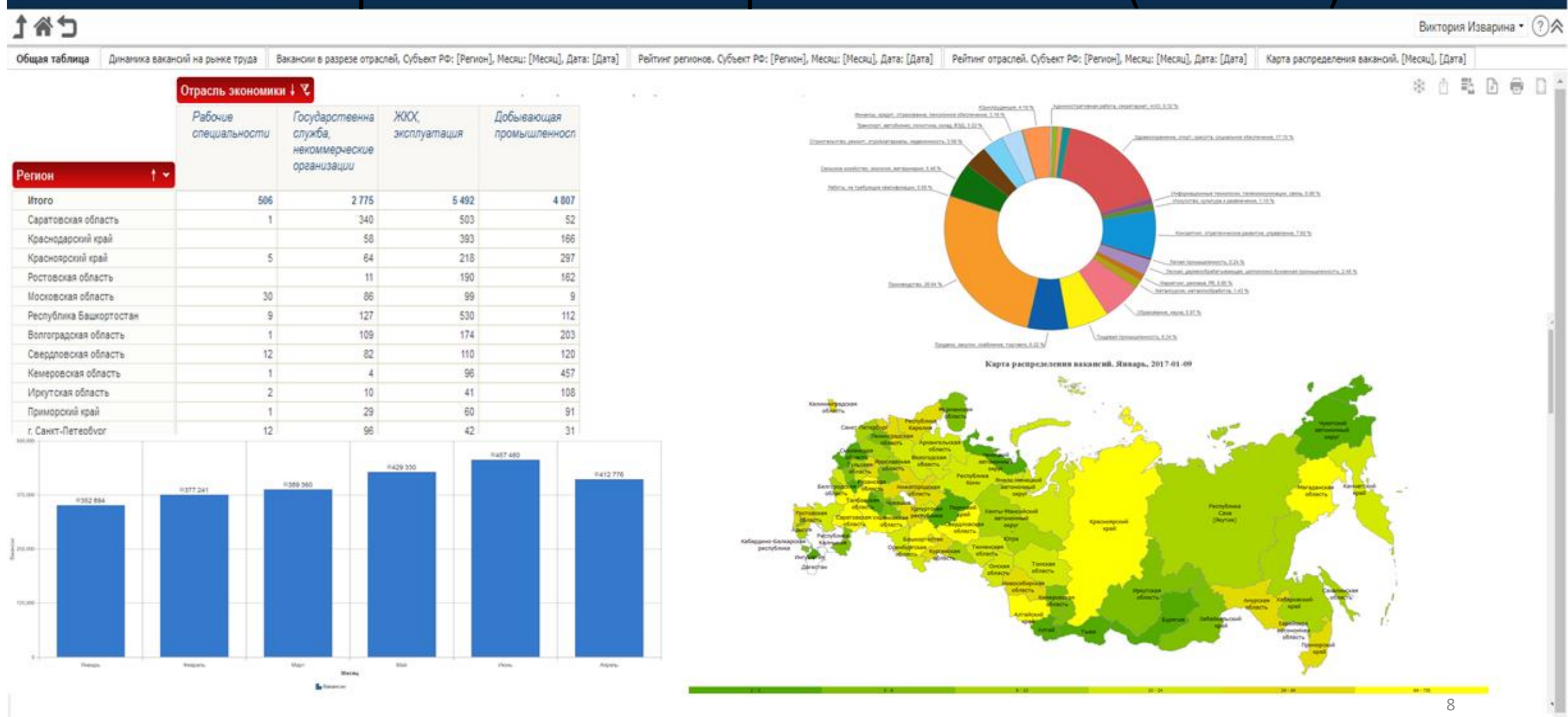
Comparison

- Weighted cosine distance gives good results, however we are considering other approaches at least for validation

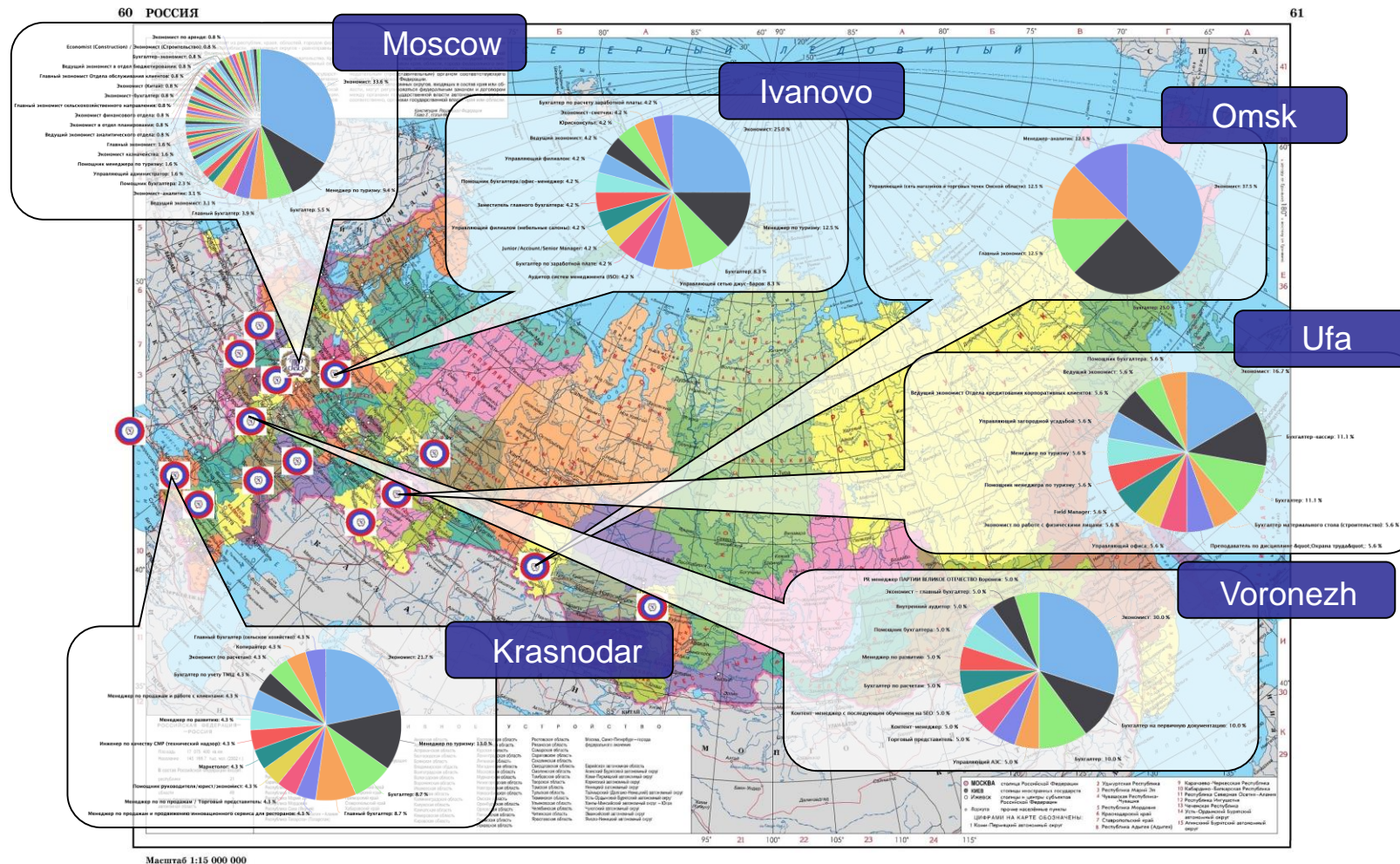
Workflow



Monitoring of job offers and professional qualifications (Russia)



Demand for the economic specialties of Plekhanov Economic University in regions



Another approach – per-competence analysis

- Comparison of competencies gap in IT area for Polish and Russian markets
 - in collaboration with Cracow University of Economics



Stages:

1. Job offers retrieval
2. Tokenization
3. Definition of competences, Selection of exemplary phrases for competences
4. Transformation and text mining analysis

Definition of competences in question

K1: computer system administration, operating systems, computer networks,

K2: computer system security, personal data security

K3: computer programming

K4: information systems

K5: mobile applications

K6: hardware

K7: project management

K8: data base systems

K9: data analysis, data warehouses, OLAP

K10: web services, web sites

K11: customer support systems

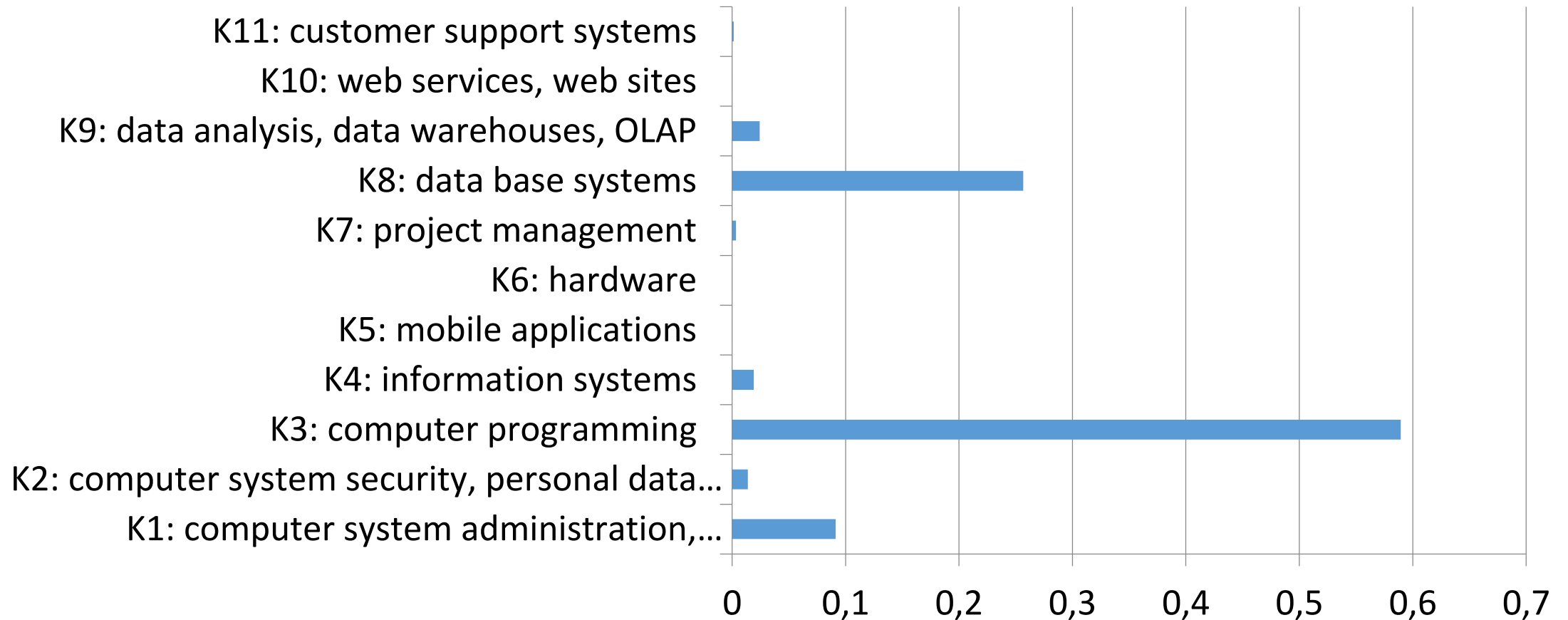
Initial idea

- The initial idea was to use LDA (Latent Dirichlet Allocation) method to estimate the importance of competences for employers.
- This method allows to identify topics in text documents corpus and then we can merge topics into competences.
- Initial results for this method were quite poor.

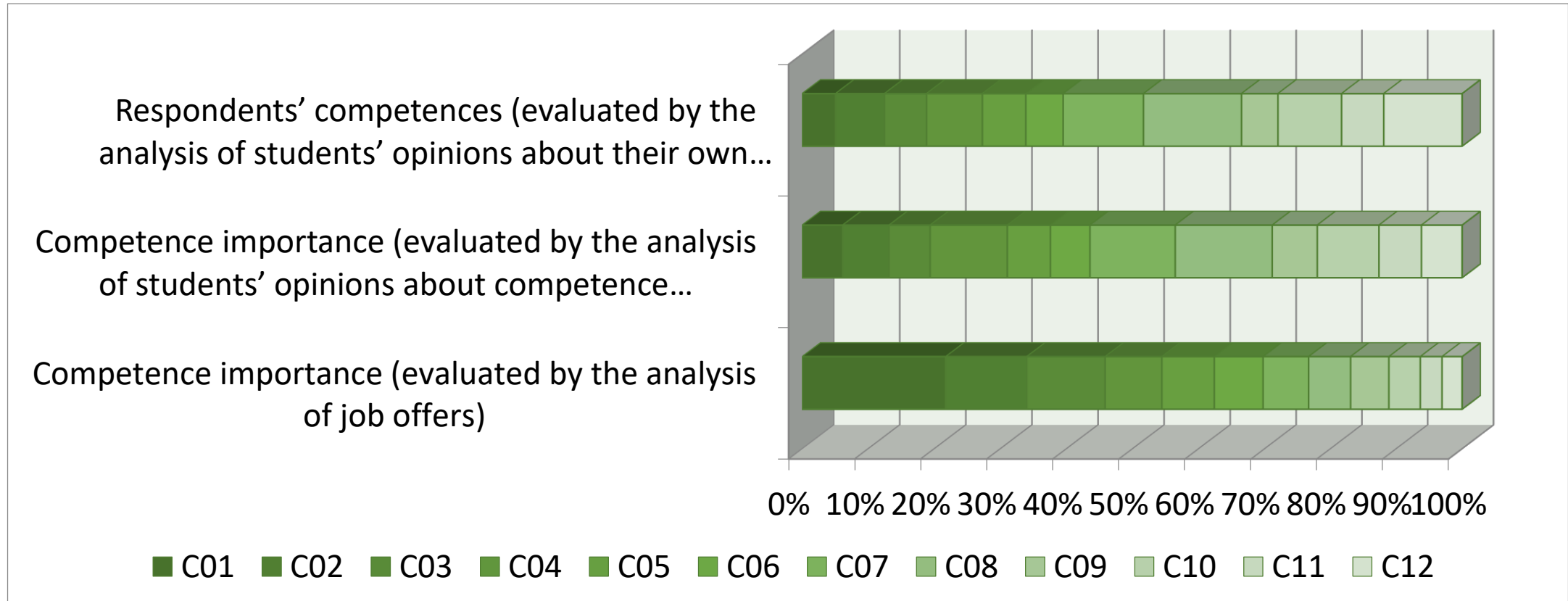
Exemplary offer analysis (1) K3 K8 K1

Wybrana osoba będzie odpowiedzialna za diagnozowanie problemów ze sprzętem i oprogramowaniem oraz optymalizowaniem wydajności systemu. Poszukujemy pasjonata, który z chęcią poszerza swoją wiedzę w obszarze IT.; Kluczowe zadania:; re-instalacje systemu oraz konfiguracja sterowników; bieżące wsparcie innych w przypadku problemów z obsługą komputerów; codzienna praca w środowisku Windows oraz Linux; sprawne zabezpieczanie komputerów przed wirusami; archiwizowanie i zabezpieczanie danych; Szukamy Ciebie jeśli:; posiadasz wykształcenie wyższe informatyczne (akceptujemy także aplikacje studentów ostatnich lat studiów); znane są Ci zagadnienia związane z sieciami TCP/IP oraz protokoły LAN/WAN; w stopniu podstawowym znasz środowisko Microsoft SQL i Oracle DB oraz języki TSOL lub PL\SQL; wiesz z czym wiąże się programowanie w języku Java, JavaScript; cechuje Cię kultura osobista, łatwość w nawiązywaniu kontaktów i dobra organizacja pracy własnej; oczekujesz codziennej pracy w otwartym i współpracującym zespole; posiadasz prawo jazdy kat. B; Zapewniamy:; poszerzanie swojej wiedzy w obszarze IT, a także szkolenia z systemów operacyjnych; pracę z najnowszymi technologiami, rozwiązaniami i bycie częścią ich wdrażania w nowoczesnym zakładzie produkcyjnym; stabilność zatrudnienia w oparciu o umowę o pracę w naszej centrali w Wadowicach

Exemplary offer analysis (2)

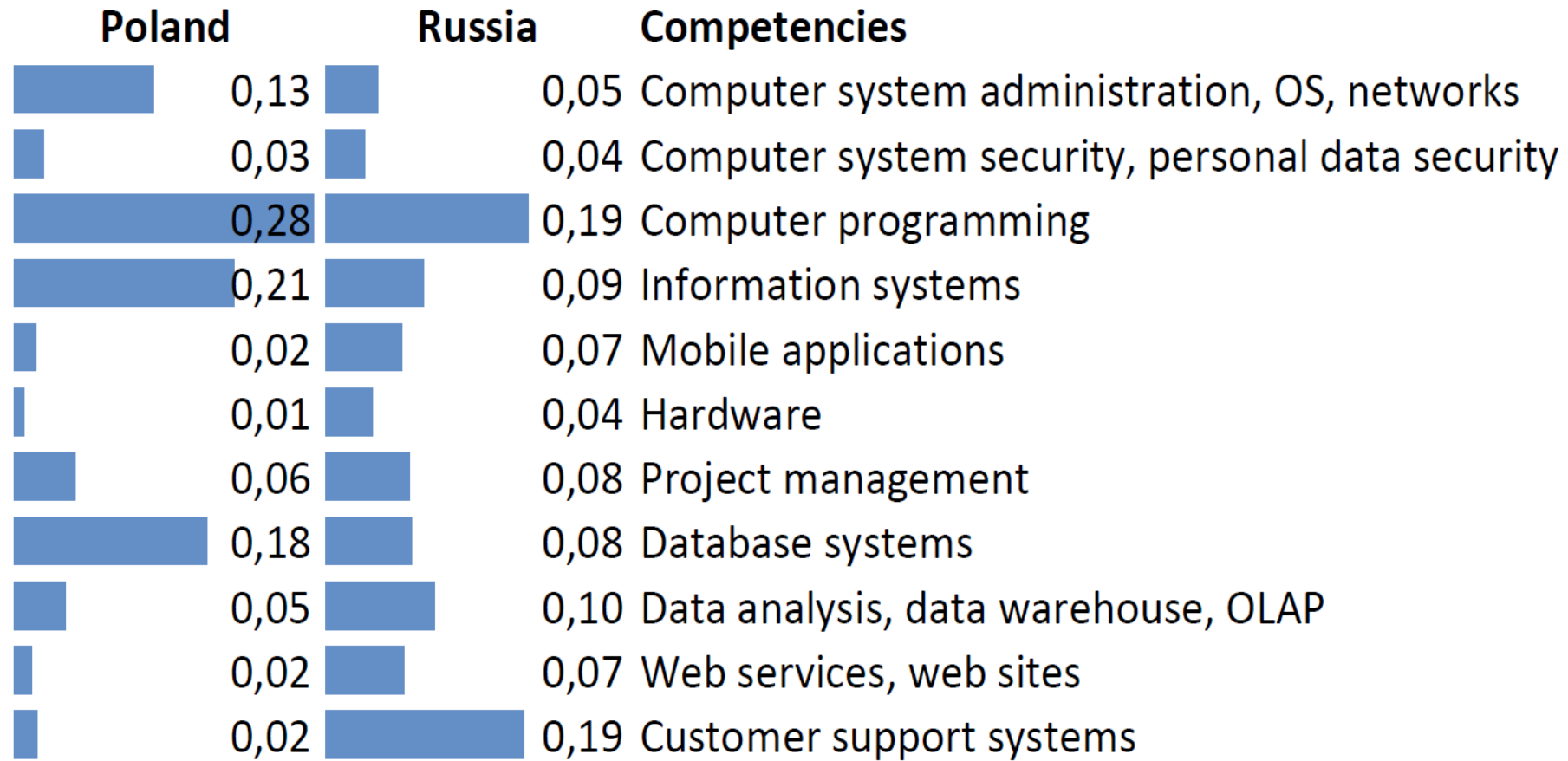


Comparison of different evaluations of the key competences (Polish market)



From: S. Belov, K. Wójcik, Automatic Monitoring System for the Competency Gap Evaluation at the Russian and Polish Market, ECDA 2018

Example: importance of competencies in system administration and programming



From: S. Belov, K. Wójcik, Automatic Monitoring System for the Competency Gap Evaluation at the Russian and Polish Market, ECDA 2018

Summary

- Implemented labour market monitoring system is in production
 - Has real users, e.g. Russian Ministry of Labour and Social Protection
- Proposed approach allows to have a quantitative measuring of matching of educational profiles to real market expectations
- Analysis could be done for different languages at the same time, suits to different labour markets
- Cross-checks with other approaches shows promising results

Plans

- More precise initial job offers categorization
- Matching job offers with the educational standards of different universities and CVs
- Precise count of competent gaps
- Put all the computations to the hybrid HPC system, GPU usage
- Prediction for the future competencies importance

Thank you for your attention!