Automated system to monitor and predict matching of vocational education programs with labour market

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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
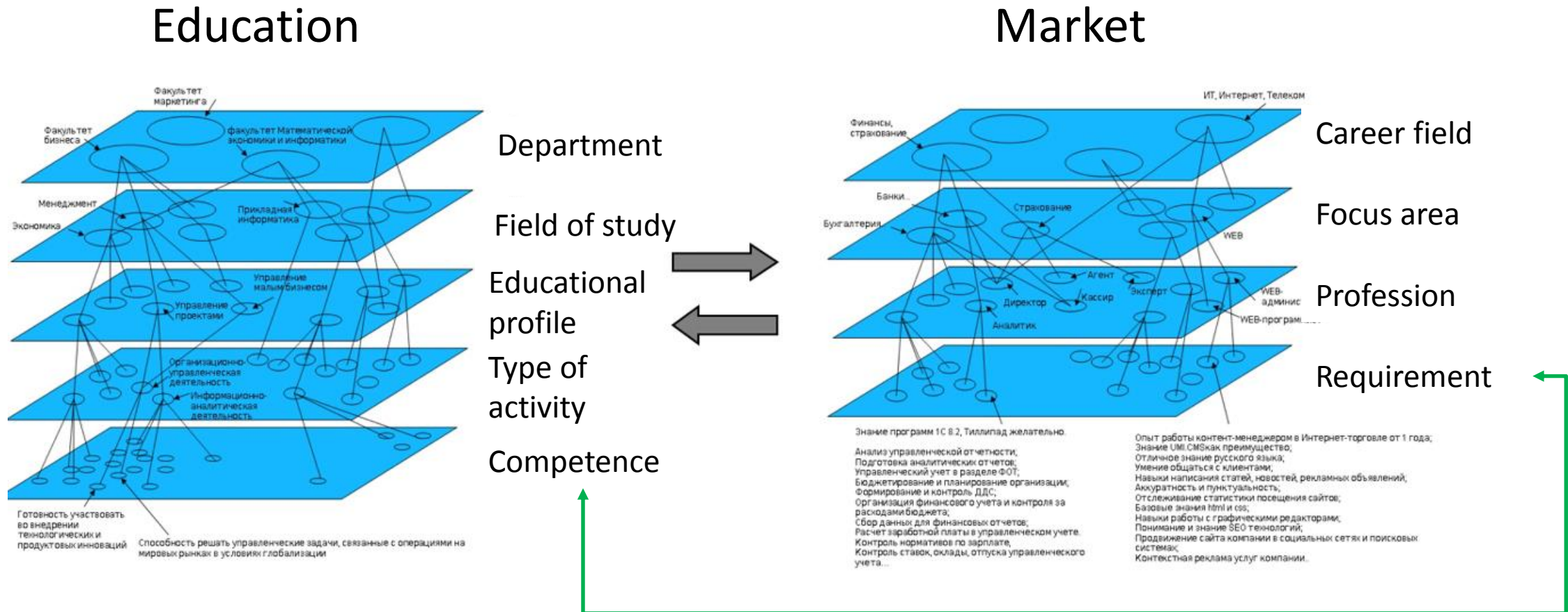
Initial data sources

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

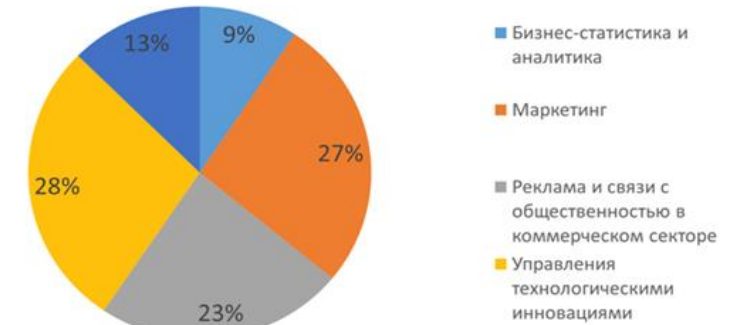# Matching educational programs with real-life market needs

Picture based on: Gushin A.N., Provisioning of educational process based on FGOS-3 standards by means of educational technologies // Educational technologies. 2013. № 4. C. 84–89.
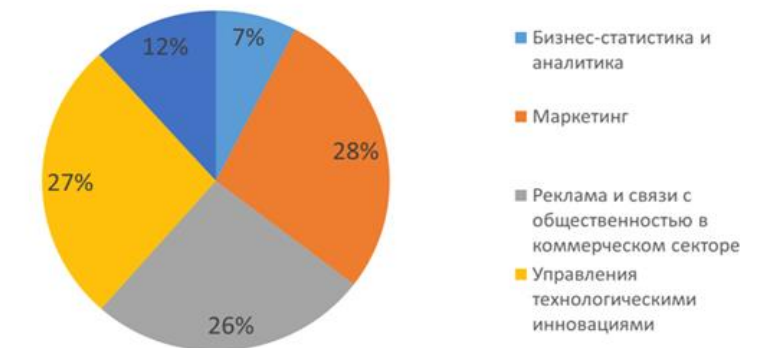
Demands for the specialists of economic specialties by Plekhanov Economic University in regions
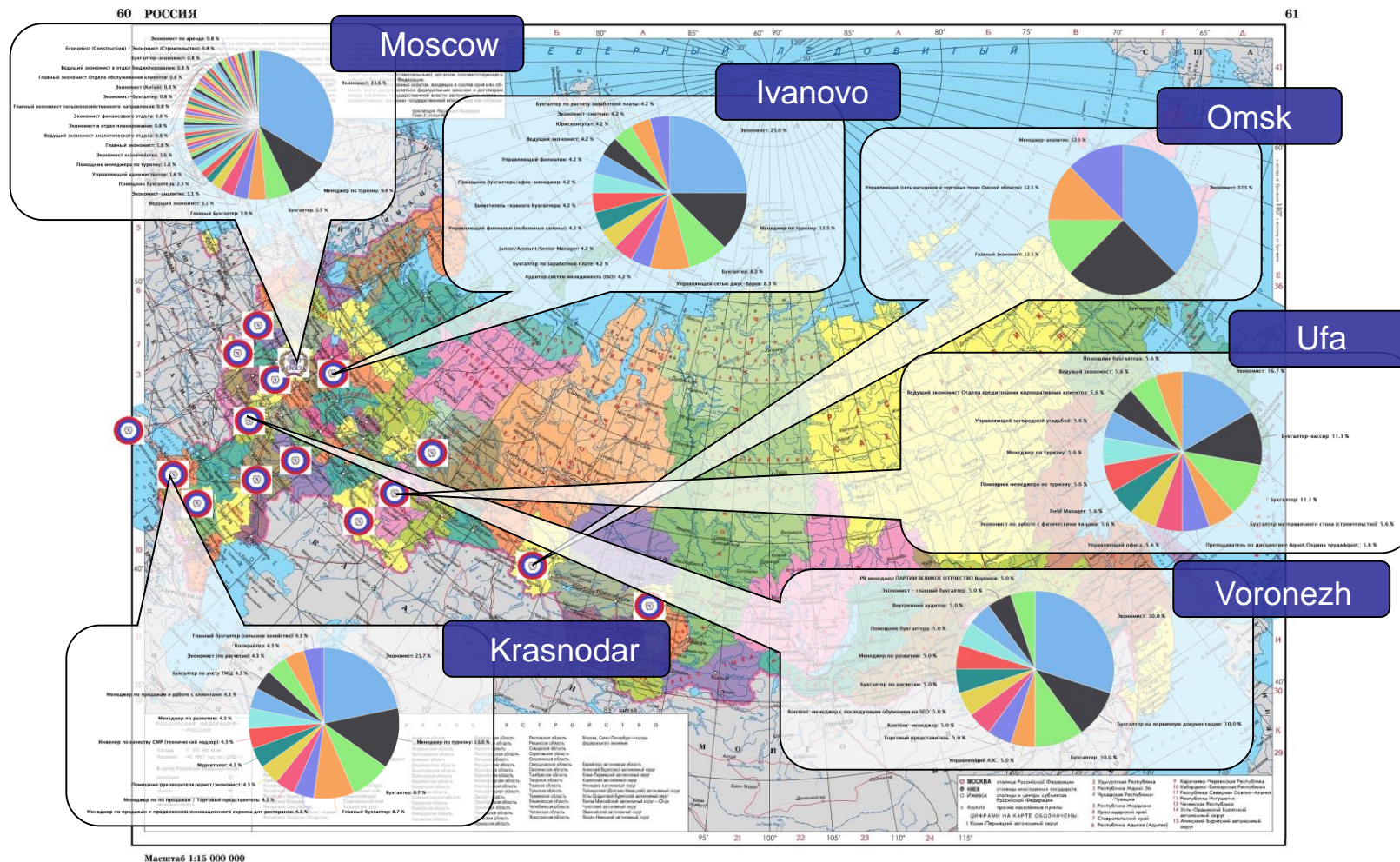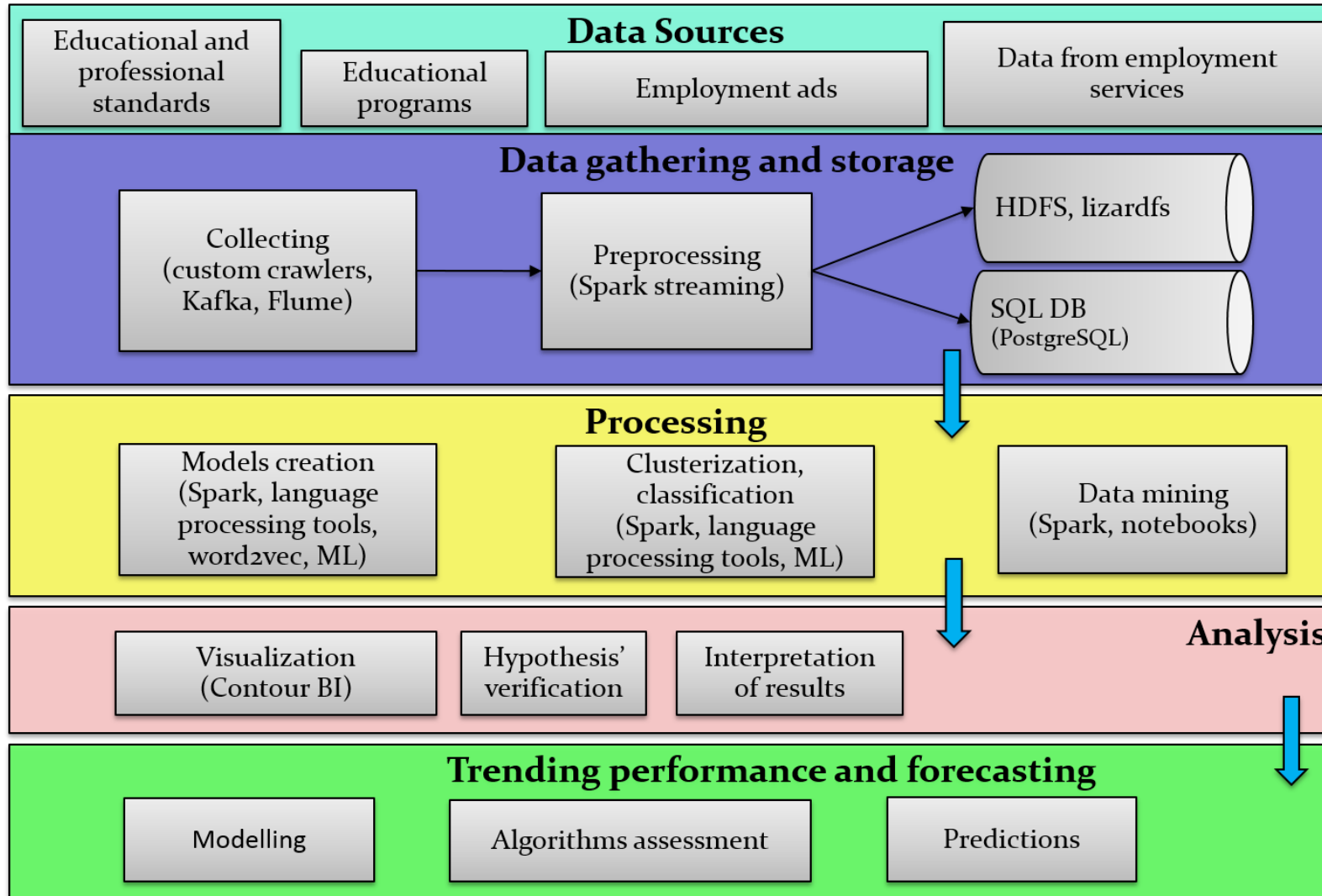
Data processing

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

Sample reports: distribution by area and profession

Sample reports: high-demand educational profiles

Распределение вакансий по направлению обучения

	Год	Месяц	Дата
	2017		
	Сентябрь		
	2017-09-23		

Направление обучения ФГОС	Вакансии	Средняя заработная плата
31.05.01 Лечебное дело (уровень специалитета) 31.08.39 Лечебная физкультура и спортивная медицина (ординатура)	28 978	24365,91
34.02.01 Сестринское дело	13 824	15878,86
19.01.17 Повар, кондитер	11 025	16767,92
23.01.04 Водитель городского электротранспорта	10 987	22226,75
44.02.06 Профессиональное обучение (по отраслям) 44.03.04 Профессиональное обучение (по отраслям)	10 769	17239,06
38.01.02 Продавец, контролер-кассир	9 488	17092,40
28.03.01 Нанотехнологии и микросистемная техника (уровень бакалавриата) 28.04.01 Нанотехнологии и микросистемная техника (уровень магистратуры)	9 000	17966,00
22.02.06 Сварочное производство	8 415	21755,80
44.03.01 Педагогическое образование (уровень бакалавриата) 44.03.05 Педагогическое образование (с двумя профилями подготовки) (уровень бакалавриата) 44.04.01 Педагогическое образование (уровень магистратуры)	7 894	13735,72
22.02.03 Литейное производство черных и цветных металлов	6 574	22077,18
35.01.11 Мастер сельскохозяйственного производства, 35.01.13 Тракторист-машинист сельскохозяйственного производства.	6 163	20238,00
38.02.01 Экономика и бухгалтерский учет (по отраслям) 38.03.01 Экономика (уровень бакалавриата)	5 985	20724,72
11.02.02 Техническое обслуживание и ремонт радиоэлектронной техники (по отраслям)	5 956	24271,39

Vacancies on the map

| 74 - 1,594 | 1,594 - 3,206 | 3,206 - 4,826 | 4,826 - 8,046 | 8,046 - 18,902 |

Summary

- System is being implemented and already gave some relevant results
- Proposed approach allows to have a quantitative measuring of matching of educational profiles to real market expectations
- Research is conducted in close touch with Russian Labour Research Institute, corporate universities and professional standards committees
- Further developments will be mainly focused on having more data sources, models' quality improvements and prediction features

Thank you!