НАЦИОНАЛЬНЫЙ ИССЛЕДОВАТЕЛЬСКИЙ
УНИВЕРСИТЕТ

Forecasting Methods for Estimation of Changes in Professional Skill Sets on Labour Market

Research Draft

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Outline

Labour Market Trends

- Digitalization and automation on labour market
- Growing number of vacancies (new professions)
- Skill-set broadening (combination of skills)

Practical Side

- Ambivalent "methodology" of demand for personnel prediction
- Request for forecasting methods by State labour authorities

Scientific Contribution

- New methodology (labour market supply-demand modelling)
- Model calibration on real data (use of "big" data)

Motivation

Research Goal

Assess demand for personnel based on the estimation of changes in professional skill sets on the labour market

Research Objectives

- Define the demand for personnel and analyse forecasting methods in labour market studies
- Identify factors affecting the changes in skill sets on labour market
- Build the analytical model that takes into account changes in skill sets from sides of employer and employee
- Build the mid-term forecast for estimation of changes in skill sets on Saint-Petersburg labour market

Main Directions in Researches

Research	Methods	Authors
Prediction of labour market supply	Data Mining; Decision Trees	Alsultanny, 2013; Congregado, Carmona, Golpe, Van Stel, et al., 2014; Johnston, Zweig, Peran, Wang, and Rosenfeld, 2017; Pitukhin, Moroz, and Astaf'eva, 2015
Macro-economic analysis of labour markets	Forecast Decomposition; Time-Series	Giesecke, Tran, Meagher, and Pang, 2015; Putilov, Bugaenko, and Timokhin, 2018; Wilke, 2018
Demand side analysis on labour market	Econometric modelling; Data Mining	Lovaglio, Cesarini, Mercorio, and Mezzanzanica, 2018; Roshchin and Solntsev, 2017; Scheffler et al., 2018

Research Design

Research Gap

No common methodology for empirical estimation of changes in professional skill sets on labour market based on micro-level data

Hypotheses

- We expect to see an increase in the number of vacancies that do not strongly relate to a specific industry
- We do not expect to see any demand decrease for workers in technical specialities who have received secondary specialized education, despite production processes digitalization

Data Collected

- HeadHunter CVs ≈1.5M obs. (2015-2017 + career path)
- HeadHunter vacancies ≈60k obs. (2015-2017)
- Labour Committee dataset ≈10k obs. (2016-2017)

Data Analysis Methods

- Supply-demand models (CES-functions)
- Time-series models calibration
- Machine learning techniques (non-structural features extraction & data classification)

Anticipated Results

- Set of forecasting models for estimation changes in professional skill sets on labour market
- Mid-term prediction of demand for personnel and changes in professional skill sets in Saint-Petersburg

Note: Work Progress

- Vacancy codes are assigned (accuracy ≈60%)
- Skills (text field from CVs) are lemmatized
- Education and profession are assigned to CV entries
- Set of ARIMA predictions for each vacancy is built and normalized by official labour statistics data

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Q&A