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FORECAST OF SEASONAL FLUCTUATIONS OF SUPPLY IN THE LABOR MARKET OF BELARUS

ПРОГНОЗИРОВАНИЕ СЕЗОННЫХ КОЛЕБАНИЙ ПРЕДЛОЖЕНИЯ НА РЫНКЕ ТРУДА РЕСПУБЛИКИ БЕЛАРУСЬ

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ABSTRACT

LABOR MARKET, SUPPLY FORECASTING, SEASONAL FLUCTUATIONS, ARTIFICIAL INTELLIGENCE

The article suggests the method of collecting information and making a forecast of seasonal fluctuations of supply at the labor market of Belarus, based on the technology of artificial intelligence with the use of the method of seasonality analysis by U. Parsons. Obtaining information and making forecast values was carried out on the basis of data from the job search portal Jobs.tut.by and GSZ.gov.by from January 2015 to December 2019.

АННОТАЦИЯ

РЫНОК ТРУДА, ПРОГНОЗИРОВАНИЕ ПРЕДЛОЖЕНИЯ, СЕЗОННЫЕ КОЛЕБАНИЯ, ИСКУССТВЕННЫЙ ИНТЕЛЛЕКТ

В статье предлагается методика сбора информации и составления прогнозных значений сезонных колебаний предложения на рынке труда Республики Беларусь, основанная на технологии искусственного интеллекта с применением метода анализа сезонности У. Парсонса. Получение информации и составление прогнозных значений осуществлялось на основании данных портала поиска работы «Jobs.tut.by» и «GSZ.gov.by» с января 2015 г. по декабрь 2019 г.

When analyzing the dynamics of supply on the Belarusian labor market, there are periods of decline and increasing activity of those who want to find or change jobs. In other words, the labor market, like most social structures, is subject to seasonality.

In order to draw a graph of the seasonality of the labor market and obtain its forecast values, the first stage was to collect resumes from Belarusian job search websites. The websites Jobs.tut.by and GSZ.gov.by were chosen as the primary source of resumes as they contain the maximum number of submitted resumes by job seekers.

Collection of resumes and their preparation for further analysis was carried out by a software product based on artificial intelligence, developed by the Department of Management in Vitebsk State Technological University. This process was implemented by methods of scraping, SpaCy, and machine learning and included stages: extraction of resumes from web sources, data cleaning, deduplication, job classification, saving the collected data in the program Superset [1, 2]. Figure 1 shows the initial data for seasonality analysis of the collected resumes.
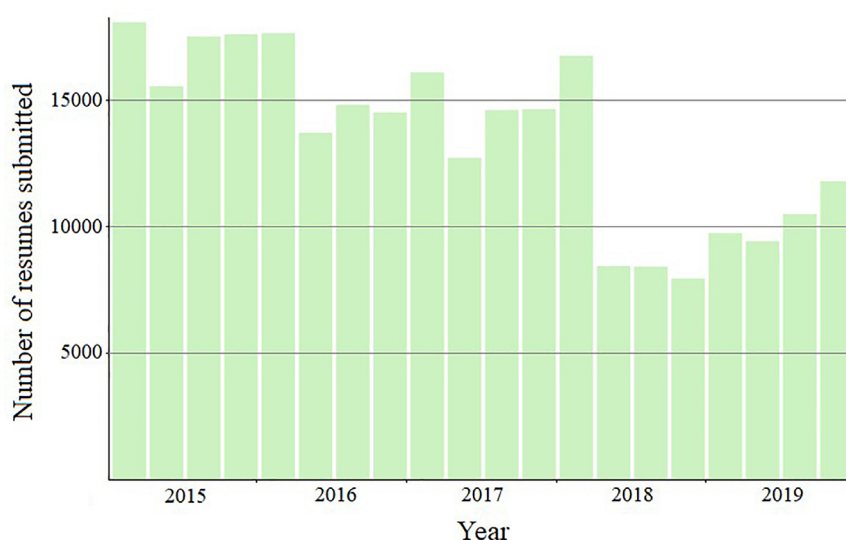
Figure 1 – Input data for seasonality analysis

Source: compiled by the author.

As a result of the analysis of technologies for forecasting seasonal market fluctuations, it was found that the most accurate are the methods by which the measurement is made directly from empirical (statistical) data without preliminary processing. Thus, W. Parsons' method was chosen as the optimal method of forecast development, which allows to eliminate the error caused by the influence of the general trend with the help of the average coefficient of rise (fall) of the general trend for complex percentages [3].

The technology of seasonal wave construction by W. Parsons' method consists in calculation of chain relations of initial values of the number of submitted summaries

and determination of average median values of chain relations. Calculations of values are presented in Table 1.

Table 1 – Construction of a seasonal wave

Year	Quarterly, thousands of resumes				Total for the year
	I	II	III	IV	
2015	18	15,5	17,5	17,6	68,6
2016	17,6	13,7	14,8	14,5	60,6
2017	16,1	12,7	14,6	14,6	58
2018	16,7	8,44	8,42	7,95	41,51
2019	9,74	9,42	10,5	11,8	41,46
Year	Quarterly chain relations of row levels				Average of quarterly relations for the year
	I	II	III	IV	
2015	-	86,1	112,9	100,6	99,86192183
2016	100	77,8	108,0	97,9	95,96076979
2017	111,0	78,9	114,9	100	101,2192751
2018	114,4	50,5	99,6	94,4	89,77589231
2019	122,5	96,7	111,5	112,4	110,7690557
Average quarterly relations from chain relations for 5 years	111,9	78,0	109,4	101,1	
Median values from chain relations	112,7	86,1	111,5	100	
Converted median average	100	86,1	95,9	95,9	
Converted and corrected median average	100	86,9	97,9	99,0	95,99799024
Seasonal wave	104,2	90,6	102,0	103,1	100

Source: compiled by the author.

Figure 2 shows the constructed seasonal wave of supply in the labor market of Belarus.

The trend line of the constructed seasonal wave is represented by a polynomial of the third degree: $Y = -5,8922x^3 + 47,846x^2 - 115,84x + 178,05$.
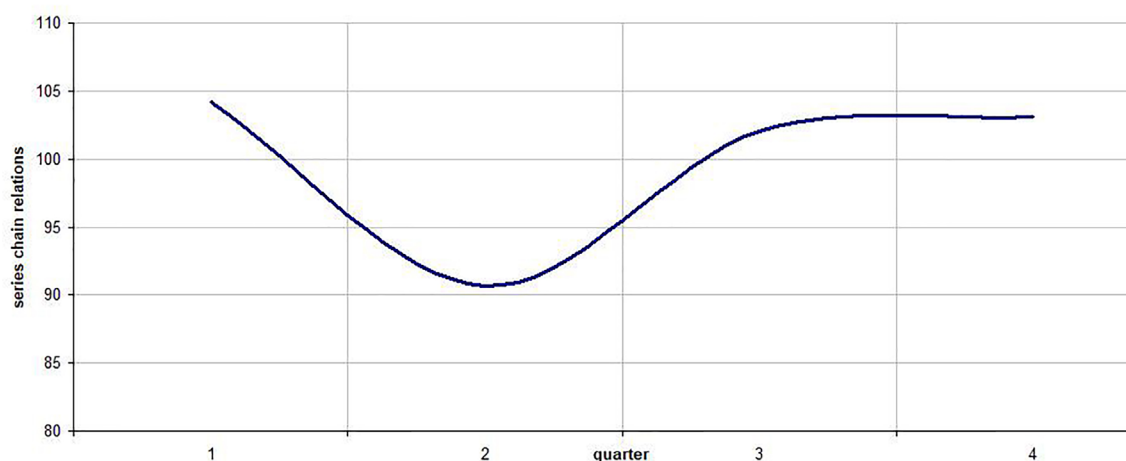
Figure 2 – Seasonal wave of supply in the labor market of Belarus

Source: compiled by the author.

Conclusions:

1. It is recommended to collect data on the labor market and prepare them for further analysis by methods of scraping, SpaCy and machine training.

2. When conducting a labor market analysis of Belarus there is seasonality.

3. According to the chart (Fig. 2), there is a sharp decline in the number of submitted resumes from the beginning of the first quarter to the first half of the second quarter and a revival until the last week of the third quarter. Decrease in activity of job seekers is explained by the fact that the employees who found a job at the end of the year are on test and training period. Furthermore, the revival is connected with the search for seasonal work and the first job by graduates of educational institutions.

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