USING INFORMATION TECHNOLOGY TO SOLVE
PROBLEMS OF REDUCING UNEMPLOYMENT IN THE REGIONS

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Summary. The article is devoted to current issues of reducing unemployment by improving the efficiency of public employment centers. The main step in solving the abovementioned problems is to use the models of artificial intelligence, namely, as the decision tree induction method, implemented by Data Mining Technologies in the environment Deductor Lite.

Key words: unemployed, information, the system of support decision making, decision trees, Data Mining, Deductor Lite.

INTRODUCTION

For the success of economic reforms is to maintain special general principles of functioning of the different markets throughout the country. Thus attention should be paid to issues of the labor market managing. At the current period of growing unemployment is the issue of finding alternative ways to overcome this problem. There are two main reasons for the emergence of unemployment. One reason is that the presence of free labor in the labor market is no vacancies at all. In this situation, to eliminate unemployment, it is necessary to create more jobs. Another reason is related to the fact that if vacancies occur acute shortage of labor in specific occupations. In this case there is a need to provide assistance for retraining unemployed according to their socio-psychological characteristics and needs of the market. As regards, help in choosing a profession, retraining if necessary, the selection of appropriate vacancies in the light of psycho-physical characteristics of the unemployed, their abilities and inclinations obtained before training is an important task of employment centers [5].

Factors that allow dealing with career issues effectively and re unemployed may be made by modern means of business – analytics realized with the help of information technologies, which are used in decision-making support systems (SSMD)[Titorenko T. ,2003]. It gives just a guideline, highlights the main trends, and the man adopts a decision. That is why the introduction of computer technologies in the employment field

provides quality operational support to the unemployed citizens and eliminates subjectivity in the decision making process.

RESEARCH OBJECT

The Luhansk regional center of employment comes forward with the research object (hereinafter – the Center), a local government employment service, and conforms to the State Employment Center of the Ministry of Labor and Social Policy of Ukraine, regional state administrations and Regional Council. The center provides comprehensive solution to the employment regulation, vocational guidance, vocational training and retraining, employment and social support for temporarily unemployed citizens in the jurisdiction of the territory.

To improve the services provided by public employment [5], Regional center introduced new technologies in the provision social services to employees and employers. These technologies are implemented using a single information system "Employment Service" (SIAS) [Marshavin Y., 2000], based on DBMS Access, which allows each district to have operational information needs of workers, labor supply and training in Ukraine; transferred from the base at the regional level the formation of statistical reports, assessments and the payment of all types of financial security and be able to create instruments of support and information management solutions to provide services, financial flows, personnel and documentation of the employment service.

Professional training, retraining or increasing training of citizens is one of the types of social services aimed at ensuring effective employment policy, improving the competitiveness of individuals in the labor market. Professional training of unemployed is subject to the labor market requirements, prospects of the region, including the business activities subject to appropriate arrangements between the entity and a regional center for employment.

Every unemployed, which is registered in the center, fill out a personal card, which information is entered into the database. Personal card consists of 9 main sections:
1. Professional experience and education that person considers a suitable basis for the search and other work.
2. Additional information for the job (and personal characteristics of individual requirements for the work).
3. Information about the last place of work.
4. Work or another activity.
5. Relation to Employment.
6. Quota.
7. Benefits.
8. Additional information (pre-registration employment, the number of registered unemployed in the family, etc.).
9. Employment (filled by the specialist of the employment service if unemployed).

Also contains information on personal customer data (name, date of birth, nationality, etc.). In addition, each unemployed has to go through the special psycho Gnostic testing results are also entered in the database.

In general, there are five underlined types of professions: the man-nature, the man-tech, the man-art image, the man-symbolic system, and the man-man. Everyone under their socio-psychological characteristics necessarily relates to one of these types. Table 1 provides information about activities of each of the occupations types is examples of professions.

Table 1. **Classification of occupations**

Type of profession	Activity	Examples of occupations
Man-nature	Study, research, cultivation, care, disease prevention, etc.	Geologist, chemist, agronomist, breeder, gardener, animal husbandry, zoologist, forester, fish-farmer, birder, oceanologist, biologist, geophysicist, veterinarian, trainer of wild animals.
Man-tech	Creating, editing, writing, management, operation, maintenance, etc.	An electrician, driver, turner, electrician, miner, millwright, miller, gas welder, weaver, metallurgy, spinster, machinist, builder, etc.
Man-art image	Artistic reflection of reality, creating characters, playing, designing, modeling etc.	Architect, artist, sculptor, painter, restorer, writer, film director, designer, modeler, jeweler, painter, embroiders, hairdresser, cook, photographer, etc.
Man-symbolic system	Calculating, calculations, compilation, collection, analysis and storage, the drawings, translations of texts, etc.	Accountant, economist, planner, operator, designer, telegraph, translator, interpreter, surveyor, mathematician, programmer, printer, librarian, etc.
Man-man	Education, teaching, training, management, home, news, health, legal services, etc.	Teacher, doctor, policeman, lawyer, waiter, hostess, guide, administrator, correspondent, sell, coach, etc.

In order to properly choose a profession, it's not enough only to know about education, previous employment of the unemployed, age, etc. It is also important to determine psycho Gnostic using modern techniques, which is of five types of jobs best suited to mastering it by the specific person. Only after defining the scope of work activity should consider possible ways of professional training.

RESULTS OF EXPERIMENTAL RESEARCH

The work to improve decision-making process is proposed to create a mechanism for data analysis, which is examining the existing set of statistical data for the past periods that will allow for some features include a new object to one or another type of

professional training are predefined: primary job training, retraining workers, training specialists, training workers and specialists with higher education, probation.

This issue goes to the solution of the classification. Classification – a systematic distribution of objects, phenomena, and processes for generations, types, types for some significant signs for the convenience of their research. To solve problems of classification use the following methods:

- Classification using decision tree;
- Baiyesivska (available) classification;
- Classification using artificial neural nets;
- Classification method of support vectors;
- Statistical methods, including linear regression;
- Classification using nearest neighbor method and others.

The above methods are implemented with the help of Data Mining, which is designed to search large amounts of data obvious, objective and useful in practice patterns necessary for decision making in various spheres of human activity.

Evaluation methods should be based on the following characteristics: speed, work ability, the ability to interpretation, reliability.

To solve the task was chosen the method of induction of the decision-making trees. The main advantages of the method are:

1.   Common sense according the decision-making trees. Classification model, presented as the decision-making tree is intuitive and simplifies the understanding of current task. The result of the decision-making tree construction algorithms, unlike, for example, the user easily interprets neural nets that are «black boxes». This particularity of the decision-making trees is an important not only in attributing to a new class of object, but also to interpret the classification models in general. The decision-making tree allows you to understand and explain why a particular object belongs to one or another class.

2.   The ability to interpretation. Trees provide an ability to extract rules from a database on natural language.

3.   The decision-making trees allow creating classification models in those fields where quite difficult to formalize analysis in knowledge.

4.   Algorithm for constructing the decision-making tree does not require the user to select the input attributes. At the entrance to the algorithm can apply all the existing attributes, the algorithm itself selects the most significant among them, and they only be used for constructing the tree. Comparably, for example, to neural nets, which greatly facilitate the user, as the choice of the number of input attributes in the neural nets significantly affects the training.

5.   The accuracy of models created using the decision-making trees is sufficiently large comparably with other methods of classification models.

6.   Developed number of replicable algorithms that can be used to build decision-making trees for very large databases. In this case, the reproduction means that a growing number of examples or database records time spent on studying, e.g. the construction of decision-making trees, grows linearly.

7.   Speed the learning process. To build classification models by constructing the decision-making trees algorithms need much less time than, for example, to learn the neural nets.

8.   Majority of the algorithms for constructing decision-making trees are able to special treatment of missed indexes.

9.   Many classical statistical methods by which solved the task of classification, can work only with numeric data, while the decision-making trees are both numeric and categorical types of data.

10. Many statistical methods are parametric, and user should have some advance information, for example, know the type of model, a hypothesis about the type of relationship between variables, and suggests what species distribution data are. The decision-making trees, unlike those methods build nonparametric models. Thus, decision-making trees are able to solve such problem of analysis where is no a priori information about the type of relationship between the research data.

Among the existing tools of Data Mining technologies can be identified such as: SPSS, Deductor Lite, Microsoft SQL and others.

Due to the fact that data analysis is carried out at the local workplace, as the tool was selected Deductor Lite [1], featuring compact size and portability, makes it possible to import data from different sources.

All information necessary for decision-making placed in the table "Unemployed", imported in Deductor Lite. Determine the separation of the initial data on the diversity of edifying, test and validation, parameters of early stop and parameters amputation sites and trees, is the process of the decision-making tree building.

The result obtained is the decision-making tree (Figure 1), rules of the decision-making tree (Figure 2) and also analysis of built model on the principle of "What-if" (Figure 3).
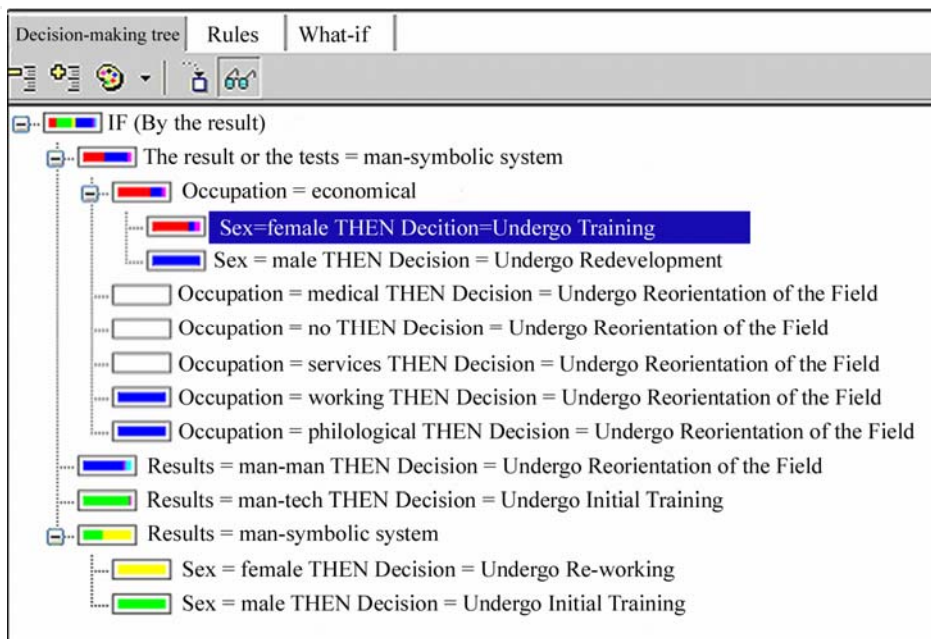

Fig. 1. The decision-making tree

N	Condition	Corollary (Decision)	Approval		Authenticity	
			%	Quantity	%	Quantity
1	Results = man-symbolic system **And** Occupation = economical **And** Sex = female	Training	20,69	18	77,78	14
2	Results = man-symbolic system **And** Occupation = economical **And** Sex = male	Reorientation of the Field	3,45	3	100,00	3
3	Results = man-symbolic system **And** Occupation = medical	Reorientation of the Field	0,00	0	0,00	0
4	Results = man-symbolic system **And** Occupation = no	Reorientation of the Field	0,00	0	0,00	0
5	Results = man-symbolic system **And** Occupation = services	Reorientation of the Field	0,00	0	0,00	0
6	Results = man-symbolic system **And** Occupation = working	Reorientation of the Field	11,49	10	100,00	10
7	Results = man-symbolic system **And** Occupation = philological	Reorientation of the Field	2,30	2	100,00	2
8	Results = man-man	Reorientation of the Field	21,84	19	84,21	16
9	Results = man-tech	Initial Training	28,74	25	96,00	24
10	Results = man-symbolic system **And** Sex = female	Re-working	6,90	6	100,00	6
11	Results = man-symbolic system **And** Sex = male	Initial Training	4,60	4	100,00	4

Fig. 2. Rules constructed decision-making tree

As shown in Figure 2, which depicts the rules of the decision-making tree, the largest support (28.74% support) has a rule №9: if the tests unemployed was attributed to the type of "man-tech", he should undergo initial training (with 96% certainty). With the current set of data corresponds to this rule 24 people. Also great support (21, 84%) has a rule №8: if the tests were attributed to the unemployed such as "man-man", he should be sent to the reorientation of the field (with the authenticity of 84, 21%).

Among the most significant are the following rules:

№ 1 (20.69% support): If the tests unemployed was attributed to the type of "man-symbolic system", he has an economic occupation and this is a woman, she should undergo training (with 77.78% certainty).

№ 6 (11.49% support): If the tests unemployed was attributed to the type of "man-symbolic system" and working in his specialty, he should undergo redevelopment (with 100% certainty).

№ 10 (6.9% support): If the tests unemployed was attributed to the type of "man-art image" and this is a woman, she should undergo re-working (with 100% certainty).

№ 11 (4.6% support): If the tests unemployed was attributed to the type of "man-art image" and this is a man, he should undergo initial training (with 100% certainty).

№ 2 (3.45% support): If the tests unemployed was attributed to the type of "man-symbolic system, it is the economic profession and this is a man, he should undergo reorientation of the field (with 100% certainty).

№ 7 (2.3% support): If the tests unemployed was attributed to the type of "man-symbolic system," he has a philological profession, he should undergo reorientation of the field (with 100% certainty).

Figure 3 shows the analysis of the built model on the principle of "What-if".

If the initial indexes shown in Figure 3, change in some way, such as female sex change and test results for "man-symbolic system, then the decision will be – reorientation of the field, as shown in Figure 4.

Fig. 3. Analysis of the built model on the principle of "What-if"

Fig. 4. Result of changes in initial indexes

Thus, asking certain input indexes/values, we observe the change results in a specific unemployed.

CONCLUSION

On the acquired rules when entering with a specific set of the unemployed characteristics you can determine the best solution to the issue of cooperation with him automatically. Namely: the best career option as unemployed by the labor market, and given his personal characteristics. This model is approved ball expert career guidance. Existing small error can be explained by the not enough amounts of data in the instructive plural. To construct the more accuracy of the rules is necessary to increase the volume of statistical data for past periods.

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ИСПОЛЬЗОВАНИЕ ИНФОРМАЦИОННЫХ ТЕХНОЛОГИЙ В РЕШЕНИИ ПРОБЛЕМ СНИЖЕНИЯ УРОВНЯ БЕЗРАБОТИЦЫ В РЕГИОНАХ

Рязанцева Н. О.

Аннотация. Статья посвящена актуальным вопросам снижения уровня безработицы за счет повышения эффективности работы государственных центров занятости. Главным участком в решении вышеупомянутой проблемы с использованием моделей искуственного интеллекта является метод индукции дерева решений, который реализуется с помощью технологий Data Mining в среде Deductor Lite.

Ключевые слова: безработный, информационная система, поддержка решений, утверждение решений, дерево решений, Data Mining, Deductor Lite.