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Information and Analytical System for Monitoring Gender Equality among university lecturers

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***Abstract*—The authors offer the structure of the information-analytical system (IAS) for monitoring gender equality (MGE) among university staff (lecturers). The proposed architecture of the IAS MGE represents an integrated approach to collecting, analyzing and monitoring personnel data considering gender aspects. An additional criterion for monitoring gender equality in the selection of candidates for vacant positions in universities is proposed, which will reduce the likelihood of prejudiced decisions at the recruitment stage and create a more equitable university environment.**

***Keywords*—digital educational environment; digital footprints; log files; data mining (or intellectual data analysis); algorithm; model**

I. INTRODUCTION

A GREAT deal of previous research into gender equality [1-9] has focused on the aspect that university organizations are trying to stop gender bias. Laws in the European Union (the EU), the USA and many other developed countries prohibit employers from discriminating against applicants or employees based on race, color, religion, gender, national origin, age, disability or genetic information. Many universities in developed countries are making great efforts to attract more women to positions in education through university policies and student organizations [7-9, 24-27].

The amount of information that business, education or any other organizations are faced with is constantly growing in today's world. Effective use of this information becomes the key to success. The Information and Analytical System for Monitoring Gender Equality (hereinafter referred to as IAS MGE) can play an important role in this process, which is what predetermined our interest in research in this area

II. LITERATURE REVIEW

Gender equality in higher education is a global and complex issue not only in developing countries, but also in developed countries. Universities around the world are considered as a gender-neutral world. It seems that men and women should have equal rights and privileges in such a world. However, previous research [8-16] has established that the reality is much more complex. At the structural level in universities, this is especially true in the predominance of men in leadership positions, in spheres with better resources, working conditions and opportunities for career growth.

It should be noted that monitoring of the current situation with respect to gender equality in universities can be carried out quite effectively on the basis of information and analytical systems (hereinafter IAS). Such IAS can function as an independent software product. Or they can be integrated at the level of individual universities into personnel accounting systems (PAS) of university employees. The authors [17] outlined their vision of solving the problem of developing such an IAS for Bologna University. However, they did not take into account the hidden indicators of gender inequality in the hiring of employees. That is why, in the main part of our research, we will focus on the issues of compliance with gender equality in the selection of applicants for vacancies and with the development of a methodology for monitoring the reliability of candidate's questionnaire data with gender tolerance. We consider that this will improve and supplement the methods of monitoring the reliability of applicant's profile data with gender tolerance for applicants' vacancies in academic institutions, that is why the subject of the article is relevant

III. METHODS AND MODELS

A. IAS MGE Architecture

The IAS MGE can provide analytical tools to support decision-making by the university administration. Based on the data collected and analyzed by the IAS MGE, the university can develop and implement strategies to improve MGE among academic staff. It is important that the IAS MGE is integrated with other information systems and technologies used at the university (Figure 1). It enables universities to share data with other systems such as HR systems and learning platforms to provide a holistic picture of gender equality in the university community.

The gender equality monitoring criterion in the applicants' selection for vacancies at the university has a number of appropriate reasons. Let us highlight just two of them. The promotion of gender equality provides equal opportunities for both genders in recruitment. This is important to ensure fair and balanced representation of men and women in the university community.

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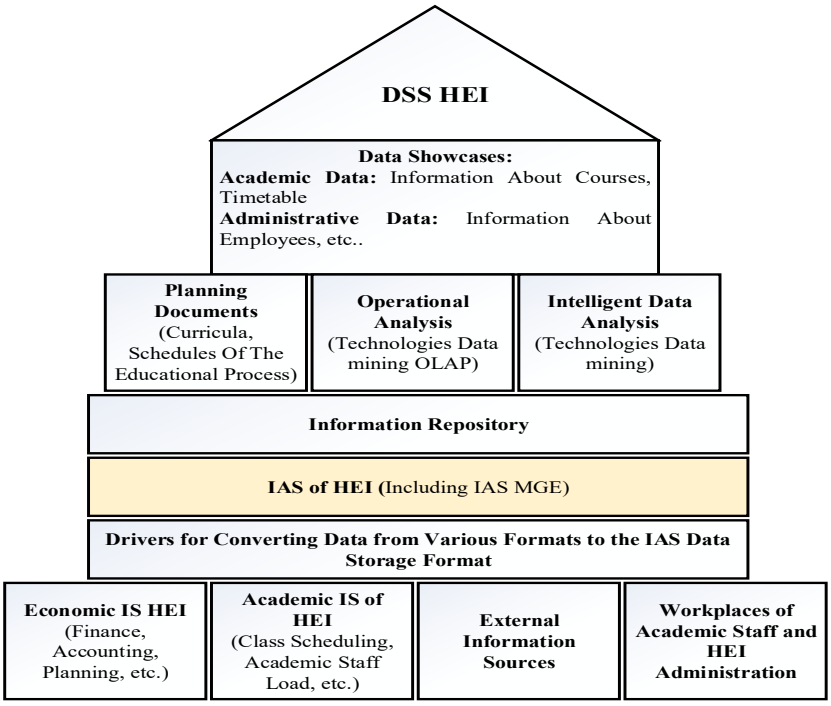

Fig. 1. Functional composition of IAS MGE among university lecturers

A distinctive feature of this algorithm is the recursive execution of stages during the construction of the hierarchy of the analyzed process in the university's Digital Educational Environment (DEE).

Having examined the recursive algorithm for constructing the hierarchy of the analyzed process of big data processing technology in the university's DEE, including personal data, we investigated the situation with the detection of unaccounted personal data in the DEE networks of the university. This was based on one of the possible ways of obtaining them – studying event registration logs.

Let's consider this case using the Splunk platform, which will help reveal hidden connections between logs and create a "profile of the university DEE user."

For the practical implementation of the set task, we took the log journals of the distance learning system (DLS) courses, containing access and secure logs. Upon examining the content of these files, it was found that among the thousands of lines of registered events, only a portion contains information. By analyzing this information, one can obtain data about the users of a specific DLS course. In our case, by "information," we mean: the time spent on the DLS site, the user's name (user_name), location (IP address), browser, operating system, the device used to view the DLS site pages, the list of links the course user clicked on, and more, as shown in Figure 3.

B. Criterion for monitoring gender equality in the applicants' selection for vacancies at the university

The research objectives are: reducing errors in the applicants' selection for vacancies in universities, while respecting the principle of gender neutrality;

increasing the probability of hiring a suitable applicant for teaching and scientific and teaching positions at the university, taking into account the observance of gender equality (gender neutrality). Such a criterion is part of the criteria for assessing the gender equality index for teaching and scientific and teaching staff of the university and is used as an element in the personnel management system based on an automated method of identifying candidates for a position and presenting the selection task as a task based on the theory of pattern recognition while respecting gender neutrality in recognizing candidates for vacancies. The effectiveness of the system of personnel selection taking into account gender neutrality is determined by the reliability (CR) of the decisions made and the time (T) spent on selection. The parameter (CR) will determine a positive effect in the case if the applicant selection for a vacancy is performed accurately and the principle of gender neutrality is observed. If the selection is wrong, we lose the efficiency of the organization because a mistake was made and therefore the applicant was selected unsuccessfully. The parameter (T) will determine the time that was spent on the applicant selection operation. The objective function (E), which will be a part of the IAS MGE algorithm for a specific task of personnel selection taking into account gender neutrality, is based on the works [18-21] and can be represented as follows:

$$E = T \cdot \lambda \cdot \sum_{i=1}^{N} \Omega \cdot P_i^* \rightarrow \max; \quad t_0 \le t_r; C < C_r, \tag{1}$$

where $T -$ is the time during which the system has been used to select applicants for a vacancy in compliance with the

principle of gender neutrality (gender equality), (week, month, semester, etc.);

$\lambda -$ is dynamics of registration of CVs (documents) of applicants that come to the university IS, for example, when announcing a competition for vacancies, taking into account the principle of gender equality;

$\Omega = \left[e_i \cdot \left(1 - p_i\right) + z_i \cdot p_i\right] -$ are effectiveness indicators of candidates' selection for vacancies at the university while respecting the principle of gender equality;

$e_i -$ is the positive effect that will be revealed by the accurate selection of the applicant $i -$ for the vacancy $\left(i = 1, N\right)$;

$z_i -$ is the negative effect if during the selection process, i.e. the applicant was selected incorrectly, (so she/he does not fulfil his/her duties);

$p_i -$ is the probability of an error that may occur in the process of selecting an applicant for a $i -$ vacancy at the university, e.g. ignoring an applicant's potential. In striving for gender neutrality, the unique qualities and potential of candidates, regardless of their gender identity, may be ignored. For example, a male candidate for a teaching position in the humanities, even if he has the necessary qualifications and experience, or a female candidate for a technical teaching position, may be rejected;

$p_i -$ is the probability that the IAS MGE, which is integrated with the information system (IS) of personnel records, will receive an application (e.g. an applicant's CV) under the competitive selection procedure for a $i -$ vacancy in the university;

$C, C_r -$ are the actual costs related to the selection system, in particular with the development of the IAS module that implements the proposed criterion for monitoring gender equality in the selection of applicants for vacancies at the university, and the planned costs;

$t_0, t_r -$ are the actual and required time spent on the selection procedure, taking into account the use of the gender equality monitoring criterion in the selection of applicants for vacancies at the university.

If we talk about the parameter $\left(\lambda\right)$, we believe that when registering applications from applicants it is necessary to remove from it attributes that do not comply with the principle of gender neutrality.

If we talk about the parameter $\left(e_i\right)$, then an accurate selection of applicants for university vacancies in compliance with the principle of gender neutrality will ensure: fair and equal treatment of all candidates, regardless of their gender, taking into account only their qualifications, experience and skills; due to the principle of gender neutrality, the IS in the HR department and its DB, as TDB, providing information support of personnel selection of applicants for vacancies will contribute to the formation of a diverse and inclusive team, in which each employee has equal opportunities for career growth and development; priority will be given to the professional qualities and competences of applicants, thus facilitating the selection of the most suitable applicants for a particular vacancy on the basis of their abilities and potential.

If we talk about the parameter $\left(z_i\right)$ in the context of this project, during the selection process for an university vacancy an applicant is incorrectly selected and does not fulfil the duties, it may have a number of negative effects, e.g. deterioration of productivity and quality of work, because an unsuitable candidate may negatively affect the productivity and quality of work at the university. He or she may not fulfil the requirements of the position, may not have the necessary skills or experience, resulting in inefficient performance of tasks and projects. In addition, there may be a loss of time and resources, as hiring an unsuitable employee will require additional time and money for his/her training, adaptation and possible replacement, which may result in a loss of time and resources of the university that could have been directed to other important tasks and projects. A negative experience with an unsuitable member of staff may affect the university's reputation as an employer. It may result in a loss of trust from students, parents, colleagues and other stakeholders. An unsuitable member of staff may also cause potential legal problems for the university, such as claims for failure of duties, violation of organizational rules and policies, or gender discrimination.

It is not difficult to notice that in expression (1), the criterion for assessing the quality of personnel selection, taking into account the use of the gender equality monitoring criterion in the selection of candidates for vacant positions at the university, will be the reliability of decision-making. And the value of this reliability will largely depend on the errors that are possible when recognizing an applicant, i.e. from $\left(p_i\right)$.

Two similar concepts "principle of gender neutrality" and "principle of gender equality" were used in the description of dependence (1), as they have significant similarities, i.e. both terms in the model of the criterion for monitoring gender equality in the selection of applicants for vacancies at the university are aimed at ensuring equality of opportunity and respect for the rights of all people, regardless of their gender identity.

The selection of candidates for vacancies, taking into account the use of the gender equality monitoring criterion in the selection of candidates, will be made on the basis of a set of attributes (requirements).

The mathematical model for solving the problem of personnel selection based on the use of gender equality monitoring criterion can be described as a local problem of pattern recognition. From the point of view of recognition theory, the image of an applicant for a vacancy is a set of attributes that describe his/her qualities, skills, experience and other characteristics that are important for this position. These attributes can be either quantitative (e.g. years of experience) or qualitative (e.g. certain skills). Mathematically, this can be represented using vectors of attributes, where each element of the vector corresponds to a particular attribute. For example, if we have a candidate for a position of an associated professor in a department, we can describe him/her with a vector of attributes including parameters such as years of experience, academic degree, experience in teaching certain subjects, etc. Below is an

example of Python code to represent the candidate's image as a vector of attributes:

```
candidate_features = {
'experience_years': 5,
'degree': 'PhD',
'teaching_subjects': ['Mathematics', 'Physics'],
'publications': 10,
'leadership_experience': True,  # leadership experience
'international_experience': False  # international experience }
```

Here, each key in the candidate_features dictionary corresponds to a specific candidate attribute (work experience, degree, teaching subjects, number of publications), and the values represent the corresponding numeric or categorical data. This approach allows formalizing the candidate image and using mathematical methods to analyze and compare applicants for a vacancy. It is possible to include parameters in the feature vector that are independent of the candidate's gender or that do not include information about gender. For example, instead of using a gender-specific attribute, one can use attributes that describe qualities related to job skills or work experience that are independent of the candidate's gender. We can also avoid using gender-specific terms or descriptions in traits. In the example above, we have used attributes that reflect the candidate's professional qualities, such as leadership experience and international experience, which are independent of gender. In this way, gender neutrality is taken into account when analyzing the candidate image.

The inputs of the detailed problem include $Q = \{q_1,...,q_n\}$ – a set that describes all classes of jobs at the university; $S = \{s_1,...,s_m\}$ – a set of informative attributes used to select candidates for vacancies.

The set Q of all university job classes includes various positions and specializations that may be represented in academic institutions. The following are basic examples of university job classes:

Lecturers. The vacancy image includes professors, associated professors, assistant professors, etc., working in various fields of knowledge and disciplines.

Research staff include postgraduate students, postdoctoral students, researchers, etc., engaged in research work at the university and conducting research activities in various fields.

Administrative staff include positions related to the administration of the university, such as rector, vice-rector, deans, department heads, personnel managers, secretaries and other administrative positions.

Technical staff include engineers, technicians, system administrators, information technology specialists and other specialists who ensure the operation of the university's technical infrastructure.

Support staff include university facilities maintenance and upkeep staff, librarians, and other professionals.

We give only a small list of job classes in a university. Depending on the size, organizational structure and specialization of the university, there may be other classes of vacancies as well as specific positions.

When selecting candidates for a gender-equitable vacancy, various informative attributes can be used for a set of S which will help the IAS MGE to assess the candidate's compliance with the requirements of the vacancy and the principles of gender neutrality. A small number of examples are also provided below to understand the concept of gender equality monitoring criteria in the selection of candidates for vacancies in the university.

Professional skills and work experience. An assessment of the candidate's professional skills and work experience in the context of the job requirements includes knowledge of specialized technical skills, e.g. knowledge of specialized software packages such as, GNS3, Cisco Packet Tracer, EVE-NG etc., education, work experience in an academic area etc. may be required to read Computer Networking discipline.

Education and qualifications include candidate's level of education and qualifications, academic degrees, certificates and diplomas, compliance with license requirements and other vacancy conditions.

Professional achievements and publications include evaluation of the candidate's professional achievements, his/her scientific research, publications, participation in conferences and scientific projects.

Communication skills include assessment of the candidate's communication skills, his/her ability to communicate effectively with colleagues, students and other members of the university community.

Personal qualities include analyzing the candidate's personal qualities such as tolerance, adaptability, empathy and others that may be important for working in a university environment.

Interview results and recommendations include assessment of the candidate's interview results, motivation, values and references from previous employers or educational institutions.

Professional goals and plans include an examination of the candidate's professional aims and plans, readiness and ability to develop and grow in a university environment.

It is important to recognize that candidates should be assessed on the basis of their competencies and abilities and not on their gender. However, it is also crucial to recognize and respect the principles of gender equality in order to ensure equal opportunities for all candidates.

We consider that each of the attributes $\{s_1,...,s_m\}$ can be represented in a certain range of dimensions: $(d_{ij}, i = 1,n;\ j = 1,m)$ from the set of ranges of attributes for each attribute i.e. we have the following set $D = \{d_{ij}, i = 1,n;\ j = 1,m\}$. For example, we have a candidate for an IT teaching position at a university. We can represent his/her professional skills and work experience using the following scale:

work experience can be represented as the number of years the candidate has worked in the IT field, e.g. a candidate has 7 years of experience in the IT field;

level of education can be represented in the form of education categories such as Bachelor's degree, Master's degree, PhD. For example, the candidate has a Master's degree in Information Technology;

specialized skills can be represented as a list of specific skills and technologies that the candidate possesses. For example, the candidate is proficient in Python, Java programming languages and is familiar with MySQL, MS SQL, Oracle, PostgreSQL, Interbase, etc. databases;

training courses and certificates can be represented as a list of training courses and certificates that the candidate has successfully completed. For example, the candidate has taken courses in web application development and obtained a certificate in network administration.

Thus, a candidate's professional skills and work experience can be presented using different categories or rating scales that reflect their level of training and qualifications in a particular field.

We consider that there is a set of candidates for a vacancy (q^x) and a set of standards (images of vacancies) Q. For each candidate it is necessary to determine the degree to which he/she meets the requirements of the vacancy.

Conditions: each candidate feature (q^x) has a range of acceptable values, given by minimum $(d_{\min})$ and maximum $(d_{\max})$ thresholds and discreteness of variation.

From the point of view of pattern recognition theory, the principle of gender neutrality to the candidate should be carried out in the university personnel accounting system (integrated with the IAS MGE) by developing and applying algorithms and analysis methods that ensure an objective and fair assessment of candidates, regardless of their gender identity. For example, it is possible to use objective evaluation criteria that are independent of a candidate's gender identity. For example, instead of "good communication skills for a man" or "good communication skills for a woman", the criterion "ability to express oneself in a clear and accessible manner" could be used.

It is necessary to minimize the influence of stereotypes and bias on the process from the point of view of pattern recognition theory, which can be achieved through conscious work with HR experts. The effectiveness of using the gender equality monitoring criterion in the selection of candidates will also increase if the selection algorithm includes equal consideration of all attributes. For example, all significant attributes of a candidate when assessing his/her qualifications and potential should not be applied to gender stereotypes. That is, when analyzing professional skills and work experience, their relevance for a particular vacancy should be taken into account rather than the candidate's gender.

Thus, in the theory of pattern recognition, the principle of gender neutrality should be taken into account through the development and application of objective evaluation methods and algorithms that do not discriminate candidates based on their gender.

We consider that the estimates of probabilities of distribution of trait values in the ranges are known or set, and the constraints (1) are set.

Let's take the following notations: $q^x -$ is an image (candidate for a vacancy); $s_i -$ is a value of $i -$ the attribute that was registered in the IAS MGE and the university personnel selection system; $\langle S^x \rangle -$ is a vector of attribute values (q^x) that were registered in the IAS MGE and the university personnel selection system; $W\{q^x, Q_j\} -$ is a measure of proximity between (q^x) and $j -$ image of Q, $j = 1,2,...,n$; $v\{s_i, d_{ij}\} -$ is a measure of belonging (s_i) to the range of the $i -$ attribute that was registered in the IAS MGE and the university personnel selection system for the $j -$ image; $D_j -$ is a vector of ranges in which the values for the image Q, $j = 1,2,...,n$ change; $\Phi\{\langle S^x \rangle, D_j\} -$ is a functionality that is necessary to calculate the proximity measures $W\{q^x, Q_j\}$.

As shown in [18, 22, 23] proximity measures, can be calculated by using different methods and models, e.g., pairwise correlation coefficient; probabilistic estimation based on Bayesian method; Hemming proximity measure.

Then, in generalized form, the image recognition model (of a candidate for a vacancy) will be the following:

$$W\{q^x, Q_j\} = \Phi\{\langle S^x \rangle, D_j\}, \quad j = 1, n; \tag{2}$$

$$q^x \in Q^* : \Phi\{\langle S^x \rangle, D_j\} \equiv \max \Phi\{\langle S^x \rangle, D_j\}; \quad Q^* \in Q;\ D_j \in D;\ j = 1, n; \tag{3}$$

$$q^x \notin Q : \Phi\{\langle S^x \rangle, D^*\} < / > \lim \Phi\{\langle S^x \rangle, D_j\}; \quad D_j \in D;\ j = 1, n. \tag{4}$$

The functionality $\Phi\{\langle S^x \rangle, D_j\}$ described in (2) will be the separating (discriminant) function in the selection model. Accordingly, expressions (3) and (4) will describe the discriminant rule that is used to assign an applicant (q^x) to one of the classes of job images Q^*. Applicants selection is based on the maximum value of the proximity measure of the functional $\Phi\{\langle S^x \rangle, D_j\}$, according to expression 3. The decision that a job seeker does not match any image to the standard from the database is made if the value of the functional is less than (or greater than) a given threshold $\lim \Phi\{\langle S^x \rangle, D_j\}; D_j \in D;\ j = 1, n.$

To account for gender neutrality in a database (DB) of candidate image standards, a special attribute or field can be used to indicate that a given record is gender-neutral. Below is an example of SQL code for creating such a database and comments to it.

```
CREATE TABLE Candidates (
    CandidateID INT PRIMARY KEY,
    Name VARCHAR(50),
    GenderNeutral BIT, -- Поле для указания гендерной нейтральности кандидата
    Skills VARCHAR(100),
    ExperienceYears INT
```

In the example above, we create a Candidates table that contains information about candidates for vacancies. The GenderNeutral field uses the BIT data type, which can take the values 0 or 1 (false or true). If the value is 1, it means that the candidate is considered gender neutral.

Here is an example of adding a candidate record to the database:

```
INSERT INTO Candidates (CandidateID, Name, GenderNeutral, Skills, ExperienceYears)
VALUES (1, 'Serhii', 0, 'Java, SQL, Project Management', 5);
```

Here we add a record of a candidate with the name ‘Serhii’. The GenderNeutral field is set to 0, which means that this candidate is not gender neutral when considering candidacy.

Thus, the addition of a special GenderNeutral field to the database will make it possible to take into account gender neutrality of candidates for vacancies when storing and processing them, which is important when integrating the IAS MGE and the IS used in the HR department, in particular for the tasks of automatic analysis of CVs of applicants.

Quality of pattern recognition, including the effectiveness of gender-neutral personnel selection, largely depends on the choice of functionality $\Phi\left\{\left\langle S^x\right\rangle, D_j\right\}$ and partitioning rule.

The selection $\Phi\left\{\left\langle S^x\right\rangle, D_j\right\}$ usually occurs simultaneously with the selection of informative attributes and decision rules about the job applicant.

The associative type function was chosen as the basis for the personnel selection task, as it is well established in pattern recognition tasks.

$$\Phi\left\{\left\langle S^x\right\rangle, D_j\right\} = \sum_{i=1}^{m} v\left\{s_i, d_{ij}\right\}; \tag{5}$$

$$v\left\{s_i, d_{ij}\right\} = \begin{cases} 1, if\ s_i \in d_{ij}; \\ 0, if\ s_i \notin d_{ij}. \end{cases} \tag{6}$$

$$V = \begin{Bmatrix} v_{11} & \dots & v_{1j} & v_{1m} \\ v_{21} & \dots & v_{2j} & v_{2m} \\ \dots & \dots & \dots & \dots \\ v_{n1} & \dots & v_{nj} & v_{nm} \end{Bmatrix}. \tag{7}$$

The matrix (7) (V) contains information on the correspondence of the values of the candidate’s attributes $\left(q^x\right)$ to the ranges specified for the vacancy. It is obtained by checking each attribute $\left(q^x\right)$ for compliance with the vacancy range, taking into account the principle of gender neutrality during the candidate consideration.

Structure (V): the columns of the matrix (V) correspond to vacancies and the rows correspond to the attributes of the candidate image. In fact, the values of the matrix elements (V) are estimates of the correspondence of the feature value $\left(q^x\right)$ to the vacancy range.

IV. Implementation of the IAS MGE

The main modules of the IAS MGE were implemented in the Python language. The results of some modules of the IAS are presented below.

Figure 2 shows the results of a similar regression analysis. The graph in Figure 2 shows the distribution of workload between men and women for a notional dataset of employees. We did not use the actual dataset because the information may depend on other factors that are not initially considered. In particular, in the context of russia’s large-scale invasion, men in many universities have been mobilized for military service, which cannot affect the objectivity of such an analysis, since a priori there are fewer men in universities compared to 2021.

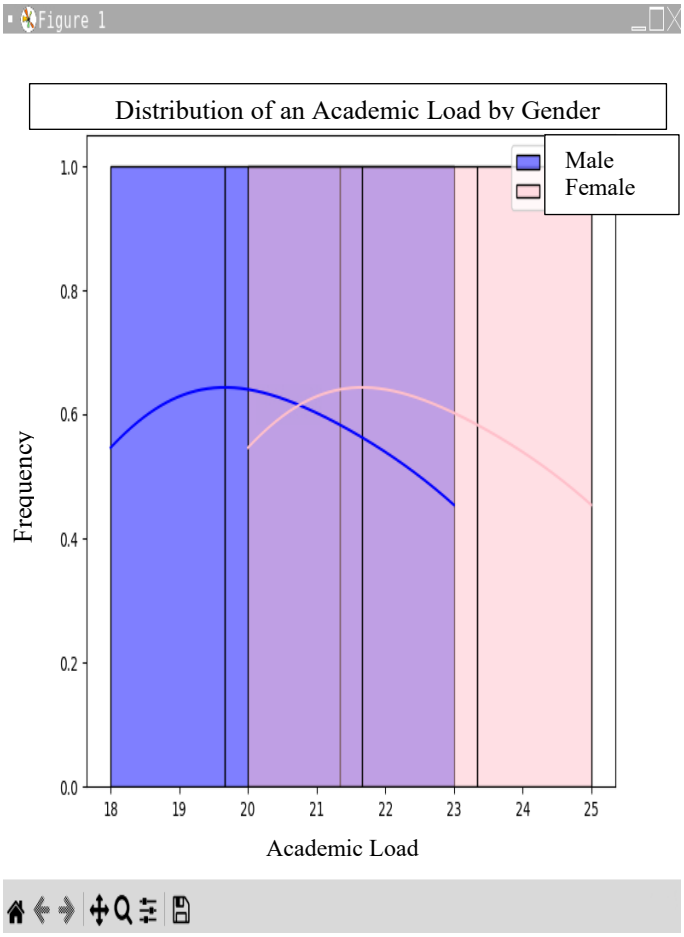

Fig. 1. Example of visualization of regression analysis results for the task of identifying the influence of employee’s gender (male or female) on his/her academic load

Figure 3 shows the results of visualization of the subsystem module of the formation of associative attributes of the candidate at hiring with observance of the principle of gender neutrality.

The histograms shown in Figure 3 will allow the decision maker to assess quickly the characteristics of each candidate and compare them.

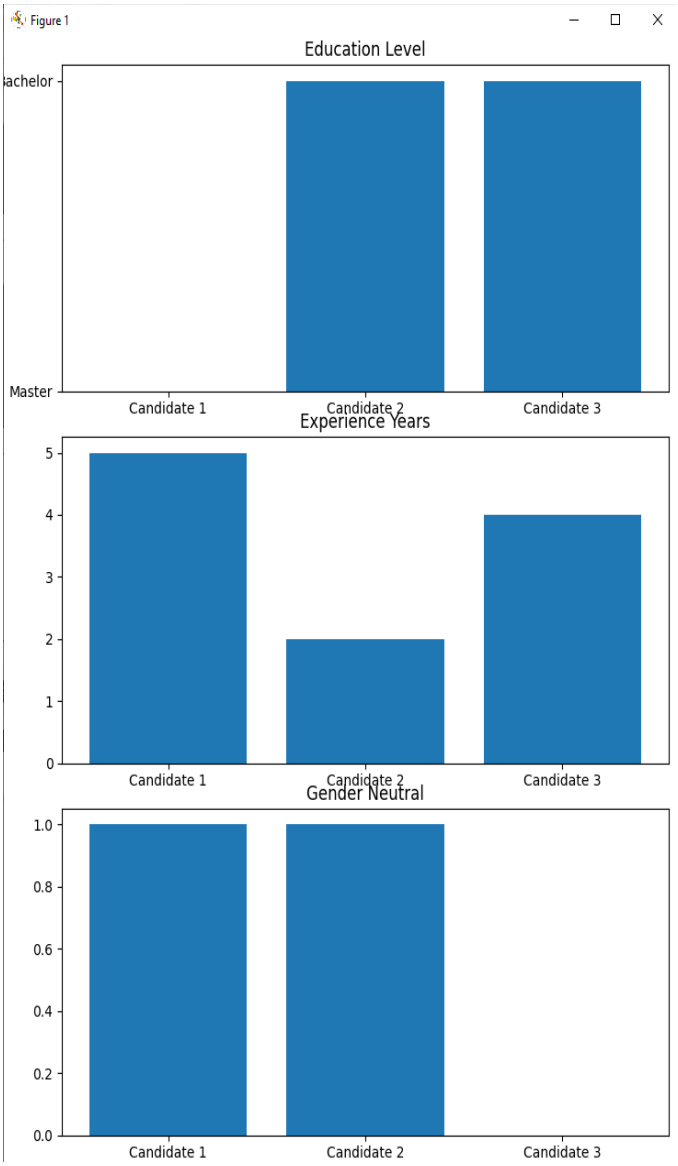

Fig. 3. Results of the subsystem of formation of associative attributes of the candidate with observance of the principle of gender neutrality

V. DISCUSSION OF RESULTS

In the graph (Figure 2), the X-axis is “Academic Load”. The parameter shows the number of hours of academic load, for example in this case per week. The Y-axis is “Frequency”, which shows how many times a certain load value occurs among the load of the employees of the department under consideration. The histogram in Figure 3 has two groups of columns shown in different colors. The men are shown in blue color. They have different workload values which can be from 18 to 23 hours. Women’s load values are shown in pink color. Their overload values are also distributed from 20 to 25 hours per week. From this graph, we can see that the load distribution between men and women is similar but with some differences. For example, women have a higher load value around 20 hours, while men have a higher value around 23 hours. We have tried to focus on the potential of the computer technologies used in the synthesis of the IAS MGE, without going into the analysis of specific figures and real datasets.

Each of the three histograms shown in Figure 3 is a bar chart, where the X-axis shows candidates for vacant positions at the university, and the Y-axis shows the values of the corresponding attributes. For the example, we used such attributes (the list of such attributes can be extended upon request and in agreement with the customer):

1) Attribute - Education Level:

Candidate 1 has an education level “Master”.

Candidate 2 has an education level “Bachelor”.

Candidate 3 also has an education level “Bachelor”.

2) Attribute - Experience Years:

Candidate 1 has 5 years of experience.

Candidate 2 has 2 years of experience.

Candidate 3 has 4 years of experience.

3) Attribute - Gender Neutral:

Candidates 1 and 2 conform to the principle of Gender Neutrality as both have a value of ‘True’.

Candidate 3 does not comply with the principle of gender neutrality as it has a value of ‘False’.

VI. CONCLUSION

An information-analytical system (IAS) architecture for monitoring gender equality (MGE) among university staff has been proposed. The architecture of the IAS MGE is an integrated approach to collecting, analyzing and monitoring staff data with gender aspects.

A new criterion for monitoring gender equality in the selection of candidates for vacancies is proposed, which is an innovative and promising approach to personnel management at the university.

It has been found that an important aspect of the developed IAS MGE is compliance with the principle of gender neutrality in analyzing the image of a candidate for a vacancy. This allows to reduce the probability of biased decisions at the stage of recruitment and create a fairer environment in the university.

The results indicate that the use of the mathematical apparatus of the recognition theory to describe the database of distributions of informative attributes in the selection of candidates for vacancies demonstrates a high level of probability of successful selection of a candidate for a vacancy taking into account gender neutrality in the selection procedure, which, in our opinion, will have a positive impact on the methodology for determining the gender equality index.

REFERENCES

[1] Subrahmanian, R. (2005). Gender equality in education: Definitions and measurements. International Journal of Educational Development, 25(4), 395-407.

[2] Unterhalter, E., & Aikman, S. (Eds.). (2007). Practising gender equality in education. Oxfam.

[3] Fiske, E. B. (2012). World atlas of gender equality in education. Unesco.

[4] Ramachandran, V. (2009). Towards gender equality in education. New Delhi: National University of Educational Planning and Administration.

[5] Aragonés-González, M., Rosser-Limiñana, A., & Gil-González, D. (2020). Coeducation and gender equality in education systems: A scoping review. Children and youth services review, 111, 104837.

[6] Psaki, S. R., McCarthy, K. J., & Mensch, B. S. (2018). Measuring gender equality in education: Lessons from trends in 43 countries. Population and Development Review, 44(1), 117-142.

[7] Unterhalter, E. (2005). Global inequality, capabilities, social justice: The millennium development goal for gender equality in education. International journal of educational development, 25(2), 111-122.

[8] Jacobs, J. A. (1996). Gender inequality and higher education. Annual review of sociology, 22(1), 153-185.

[9] Peterson, H. (2011). The gender mix policy–addressing gender inequality in higher education management. Journal of Higher Education Policy and Management, 33(6), 619-628.
[10] Miryala, R., & Chiluka, N. (2012). Work-life balance amongst teachers. The IUP Journal of Organizational Behavior, 11(1), 37-50.
[11] Punia, V., & Kamboj, M. (2013). Quality of work-life balance among teachers in higher education institutions. Learning Community-An International Journal of Educational and Social Development, 4(3), 197-208.
[12] Silva, J. P. D., & Fischer, F. M. (2020). Understudied school teachers' work/life balance and everyday life typologies. Chronobiology International, 37(9-10), 1513-1515.
[13] Johari, J., Tan, F. Y., & Zulkarnain, Z. I. T. (2018). Autonomy, workload, work-life balance and job performance among teachers. International Journal of Educational Management, 32(1), 107-120.
[14] Hafeez, U., & Akbar, W. (2015). Impact of work-life balance on job satisfaction among school teachers of 21st century. Australian Journal of Business and Management Research, 4(11), 25-37.
[15] Nayeem, M. A., & Tripathy, M. R. (2012). Work-life balance among teachers of technical institutions. Indian Journal of Industrial Relations, 724-736.
[16] Yıldırım, B. (2017). The Relationship Between Principles' Leadership Practices and Teachers' Work-Life Balance. International Online Journal of Educational Sciences, 9(3), 755-767.
[17] Mignoli, G. P., Siboni, B., Rignanese, P., Valentini, C., & Toschi, T. G. (2018). UGII–university gender inequality index. a proposal from the university of Bologna.
[18] Karsak, E. E. (2000, October). A fuzzy multiple objective programming approach for personnel selection. In Smc 2000 conference proceedings. 2000 ieee international conference on systems, man and cybernetics.'cybernetics evolving to systems, humans, organizations, and their complex interactions'(cat. no. 0 (Vol. 3, pp. 2007-2012). IEEE.
[19] Cetin, E. I., & Icigen, E. T. (2017). Personnel selection based on step-wise weight assessment ratio analysis and multi-objective optimization on the basis of ratio analysis methods. International Journal of Economics and Management Engineering, 11(11), 2718-2722.
[20] Holling, H. (1998). Utility analysis of personnel selection an overview and empirical study based on objective performance measures. Methods of Psychological Research, 3(1), 5-24.
[21] Md Saad, R., Ahmad, M. Z., Abu, M. S., & Jusoh, M. S. (2014). Hamming distance method with subjective and objective weights for personnel selection. The Scientific World Journal, 2014.
[22] Lakhno, V., Blozva, A., Kryvoruchko, O., Desiatko, A., & Semidotska, V. (2020). Development strategy model of the informational management logistic system of a commercial enterprise by neural network apparatus. In CEUR Workshop Proceedings (pp. 87-98).
[23] Beketova, G. S., Akhmetov, B. S., Korchenko, A. G., & Lakhno, A. V. (2017). Optimization backup model for critical important information systems. Bulletin of the national academy of sciences of the republic of Kazakhstan, (5), 37-44.
[24] Minyaylo, V., Bezverkhyi, K., Gotsulyak, V., & Minyaylo, O. (2023). Gender analysis of the labor force in the field of financial and insurance activities in Ukraine. Financial and Credit Activity Problems of Theory and Practice, 1(48), 388-398. https://doi.org/10.55643/fcaptp.1.48.2023.3853
[25] Desyatko A.M., Chubaievskyi V.I. Website data collection and analysis for universities'information and analytical systems monitoring gender equality. "Science and Technology Today (Series "Pedagogy", Series "Law", Series "Economics", Series "Physical and Mathematical Sciences", Series "Technology")": journal. 2024. № 6(34) 2024. Pp. 676-688. https://doi.org/10.52058/2786-6025-2024-6(34)-676-688
[26] Kryvoruchko O.V. Information and analytical systems monitoring gender equality in university faculty candidate selection. "Science and Technology Today (Series "Pedagogy", Series "Law", Series "Economics", Series "Physical and Mathematical Sciences", Series "Technology")": journal. 2024. № 6(34) 2024. Ст. 704-716 https://doi.org/10.52058/2786-6025-2024-6(34)-704-716
[27] Kryvoruchko O.V., Chubaievskyi V.I., Desyatko A.M. Cybernetic support and intellectual data analysis for overcoming gender stereotypes and forming an individual educational trajectory. "Science and Technology Today (Series "Pedagogy", Series "Law", Series "Economics", Series "Physical and Mathematical Sciences", Series "Technology")": journal. 2024. Ст. 920-932 https://doi.org/10.52058/2786-6025-2024-6(34)-920-932