

SECTION 22. PSYCHOLOGY AND PSYCHIATRY

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EMOTIONAL INTELLIGENCE: PSYCHOGRAPHY, QUANTUM GENETIC ALGORITHM OF DIAGNOSIS, GRAPH NEURAL NETWORKS

***Annotation.** Our modified methodology of emotional intelligence diagnosis by psychography, quantum genetic algorithm, graph neural networks are present in this publication.*

Introduction

Some our publications are devoted to modified methodologies of psychographics by qualitative and quantitative analysis of drawings as personal, social and emotional data [1]. The purpose of this study was to determine principles of psychography, quantum genetic algorithm, graph neural networks using for emotional intelligence diagnosis.

Methods

Our modified methodology for studying emotional intelligence in sick and healthy people was based on drawing human figures and faces with such emotions as happiness and sadness; surprise and disgust; anger (anger, rage) and fear (anxiety) [1,2] by triangle, circle and square [1,2]. Index of the ratio of the division of the sum of triangles and squares to the number of circles; the ratio of the division of the number of triangles to circles; index of the ratio of the division of the number of squares to circles [1,2] were studied for the human figure and face [1,2]. Determining the characteristics of emotional intelligence of persons dependent on psychological types was reduced to comparing the formulas for the predominance of semantics of geometric shapes with classical TiGeR and our results on modified emotional TiGeR [1,2].

Some standards for psychological research by the Geometric Human Figure Drawing Test (TiGeR) [2] were used. The TiGeR is to draw human figures, including faces, in triangles, circles and squares; to interpret of psychological projections on the inner world of man [2] by considering semantic preferences. The drawing formula (DF) is a sequential record of the triangles, circles, and squares number. The determination of types and subtypes by the formula reduced to the predominance of the semantics of geometric shapes [2]. The formula of the first human figure indicates the main subtype that defines a person belonging to a certain psychological type [2]. The leading subtype determines the stable or dominant state. The formula of the second figure is a relevant subtype that provides an opportunity to assess the current state [2]. The formula of the third figure indicates the subtype that characterizes the conscious or unconscious desire to change, the direction of change of the undesirable state to the desired [2]. The formula of the fourth drawing, which is performed without limiting the number of elements of the human image, does not describe the type or subtype, but emphasizes the predominant tendency of self-perception and perception of others. The formula of this image used to compare and analyze the three main formulas to determine the depth features [2]. The formula of the fifth image (face image) [2] does not characterize the type or subtype, but allows to identify the features of self-perception and projection on social relations [2], to assess social intelligence. Thus, personal intelligence is

reflected in the 1st and 2nd drawings with clarifications of its features - for the 3rd, 4th and 5th images [2], social - for the 5th [2].

The basis of the study was the use of conceptual spaces [3]. In particular, it is known that the theory of conceptual spaces includes the concepts of the idea of human cognition, similarity and prototype [3]. Typical conceptual spaces have been provided [3] according to some principles [3]:

- Information sorted by quality indicators, by domains;
- Domains have a specific topology or metric;
- Similarity is a distance in a certain conceptual space.

We have proposed a concept for assessing emotional intelligence in some domains (regions):

Domain 1. Quantitative and qualitative characteristics of emotional intelligence: happiness and sadness;

Domain 2. Quantitative and qualitative characteristics of emotional intelligence: surprise and disgust;

Domain 3. Quantitative and qualitative characteristics of emotional intelligence: anger (rage) and fear (anxiety);

The quantum genetic algorithm of healthy and sick person's emotional intelligence by some qubit chromosomes:

$$|q\rangle = \alpha_1|0\rangle + \alpha_2|1\rangle$$

$$|q_1\rangle = \alpha_1 (\text{drawing of happiness})|0\rangle + \alpha_2 (\text{drawing of sadness}) |1\rangle$$

$$|q_2\rangle = \alpha_1 (\text{drawing of surprise})|0\rangle + \alpha_2 (\text{drawing of disgust}) |1\rangle$$

$$|q_3\rangle = \alpha_1 (\text{drawing of anger or rage})|0\rangle + \alpha_2 (\text{drawing of fear or anxiety}) |1\rangle$$

The quantum genetic algorithm psychographic methodologies of healthy and sick persons by some qubit chromosomes [1]:

Domain 1. Qualitative characteristics of classical TiGeR results by analyzing semantic preferences from triangles, circles and squares;

Domain 2. Quantitative characteristics of the proportion used in the figure of three geometric figures;

Domain 3. Features of the analysis of the human image (assessment of the primitive content of the image in different scales and general frameworks);

Domain 4. Definition of types and subtypes by the formula of semantics of advantages of geometric forms;

Domain 5. Qualitative characteristics of the study of emotional intelligence by analyzing semantic preferences from triangles, circles and squares;

Domain 6. Quantitative characteristics of the proportion used in the drawings of three geometric figures of the study of emotional intelligence;

The quantum genetic algorithm of psychographic peculiarities of healthy and sick persons by some qubit chromosomes:

$$|q\rangle = \alpha_1|0\rangle + \alpha_2|1\rangle$$

$$|q_1\rangle = \alpha_1 (\text{drawing1})|0\rangle + \alpha_2 (\text{drawing2}) |1\rangle$$

$$|q_2\rangle = \alpha_1 (\text{drawing1})|0\rangle + \alpha_2 (\text{drawing3}) |1\rangle$$

$$|q_3\rangle = \alpha_1 (\text{drawing1})|0\rangle + \alpha_2 (\text{drawing4}) |1\rangle$$

$$|q_4\rangle = \alpha_1 (\text{drawing1})|0\rangle + \alpha_2 (\text{drawing5}) |1\rangle$$

$$|q_5\rangle = \alpha_1 (\text{drawing2})|0\rangle + \alpha_2 (\text{drawing3}) |1\rangle$$

$$|q_6\rangle = \alpha_1 (\text{drawing2})|0\rangle + \alpha_2 (\text{drawing4}) |1\rangle$$

$$|q_7\rangle = \alpha_1 (\text{drawing2})|0\rangle + \alpha_2 (\text{drawing5}) |1\rangle$$

$$|q_8\rangle = \alpha_1 (\text{drawing3})|0\rangle + \alpha_2 (\text{drawing4}) |1\rangle$$

$$|q_9\rangle = \alpha_1 (\text{drawing3})|0\rangle + \alpha_2 (\text{drawing5}) |1\rangle$$

$$|q_{10}\rangle = \alpha_1 (\text{drawing4})|0\rangle + \alpha_2 (\text{drawing5}) |1\rangle$$

Results

Implementation of our emotional intelligence diagnosis presented by some examples.

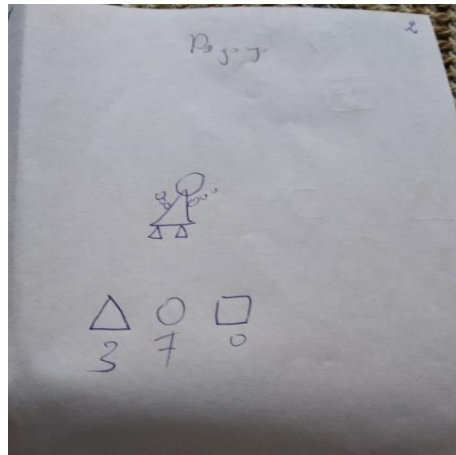


Illustration O., healthy male, figures of joyfulness [4]

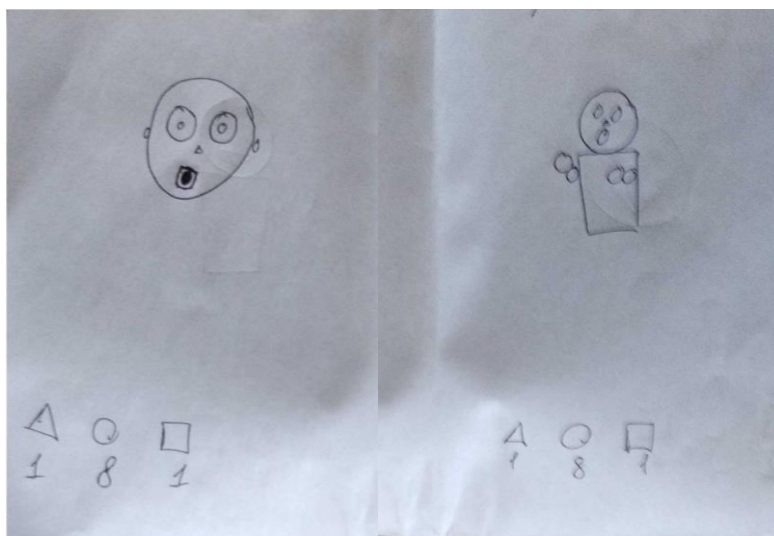


Illustration A. , healthy female, 22 y.o., figures of fear

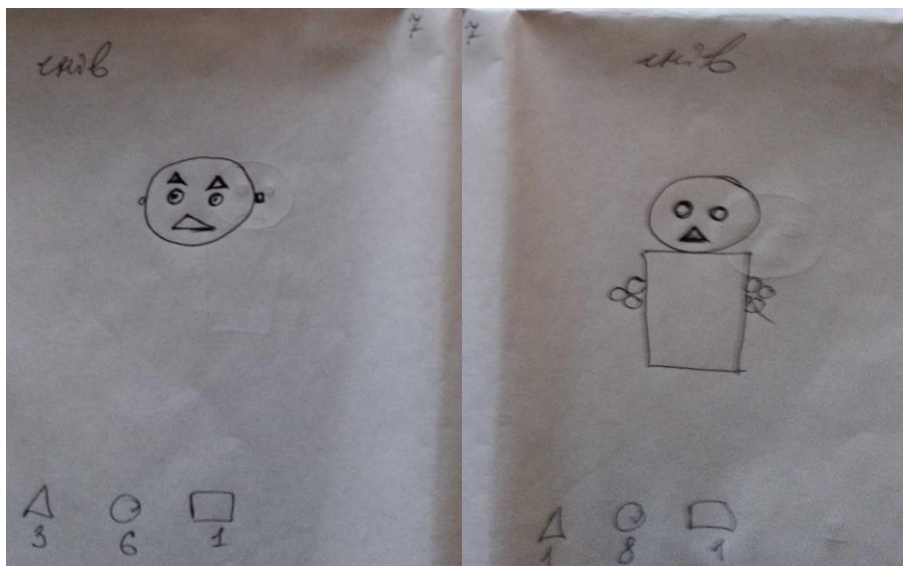


Illustration A., healthy female, 22 y.o., figures of anger

Drawings of negative emotions by healthy female, 22 y.o., was accompanied by the absence of legs in the human figure, which may be result of the instability of the position occupied in life, the lack of opportunities for learning new things and further advancement in her life



Illustration V., healthy male, figures of sadness [4]

Graph neural network [5,6] using for making decisions by emotional intelligence diagnosis presented lower (fig.1,2).

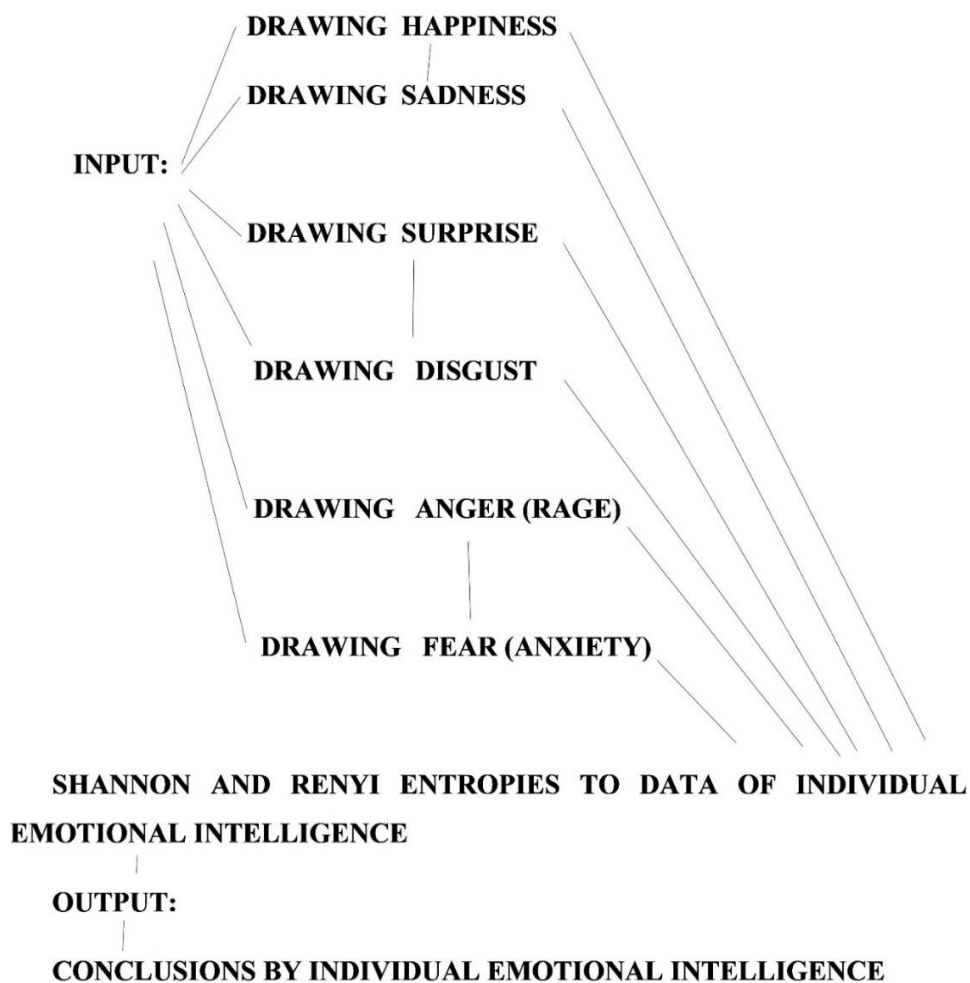


Fig. 1. Graph neural network using for making decisions by emotional intelligence diagnosis

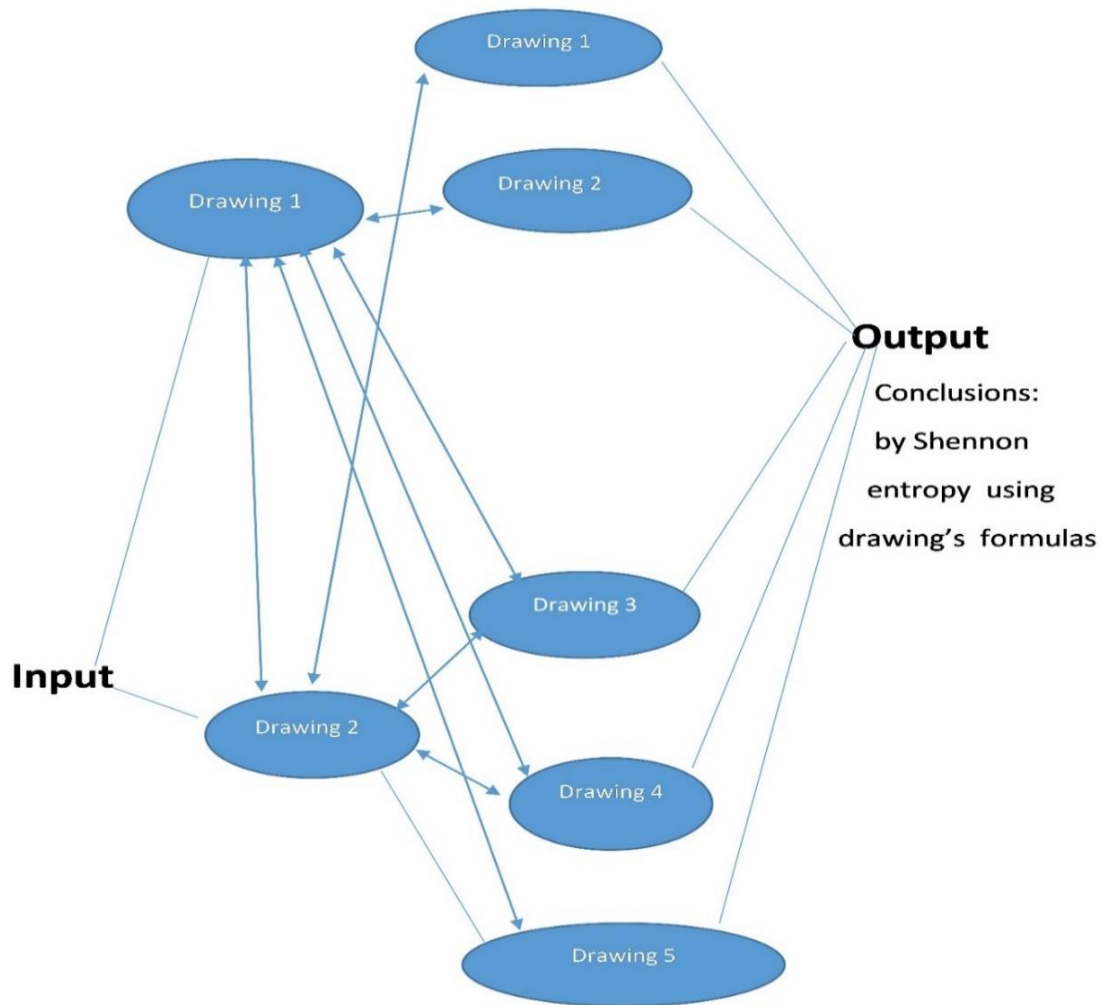


Fig. 2. Graph neural network using for making decisions by social, personal and emotional characteristics [7]

The quantum genetic algorithm, domains of conceptual spaces were basis for graph neural networks using for making decisions, emotional intelligence conclusions by psychography of healthy and sick persons. We used Shannon and Renyi entropy [8,9,10,11] for making decisions, conclusions on psychographic data by emotional intelligence.

Discussion

Our principles of quantum genetic algorithm, graph neural networks using for emotional intelligence analysis for healthy and sick persons and correspond to modern research on the creation of personal processes' modeling. Shannon entropy data helped us for making emotional intelligence decisions similar to psycho-neurological disturbances investigations by other authors [6].

Conclusion

1. Quantum genetic algorithm, graph neural networks using for making emotional intelligence decisions by psychography of healthy and sick persons presented in this investigation.
2. Shannon entropy of drawings formulas was one from the basis for graph neural networks building.

3. It is necessary to build additional neuronets by others criteria of drawings emotional intelligence estimation.

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