поверхні тіла людини з метою визначення розташування патологічного вогнища називається термографією. Прилад для термографії називається тепловізором.

Метод термографії немає протипоказань. Він є об'єктивним, простим і абсолютно нешкідливим, дає досить точну топічну діагностику вогнищ запалення, новоутворень, некрозів та інших локальних проявів різних захворювань; мінімальний реєстрований градієнт температури між двома точками на відстані 1 мм становить 0.1с. Розроблено методи термографії в інфрачервоному (ІЧ), міліметровому (мм) і дециметровому (дм) діапазонах довжин хвиль.

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NEW METHOD OF SOLVING THE CLASSIFICATION PROBLEM

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In machine learning and statistics, classification - is a problem of identification. New observations' set values for identification are divided into classes in terms of the information about the training sample, class of the members of which is known.

In machine learning and statistics, classification is the problem of identification to which of a set of categories (sub-populations) a new observation belongs, on the basis of a training set of data containing observations (or instances) whose category membership is known. In the terminology of machine learning, classification is considered an instance of supervised learning, i.e. learning where a training set of correctly identified observations is available. The corresponding procedure of uncontrolled allocation is known as clustering and consists in grouping data into categories on the basis of its extent of similarity.

We suggest a new approach for solving the classification problem, which is based on the using ε-nets theory. In it is showed that for ε-separating of two sets one can use their ε-nets in the range space w.r.t. halfspaces, which considerably reduce the complexity of the separating algorithm for large sets' sizes. The necessary and sufficient conditions of ε-separability of two sets are proved in.

Consider the separation space which contains the possible values of ε for ε-nets of both sets. The separation space is quasi-convex in general case.

Lemma 1. Let two random variables ξ, η exponentially distributed with parameters μ_ξ, μ_η then function $y(x)$, which separates separation space and its complement is convex.

Lemma 2. Let two random variables ξ, η uniformly distributed with parameters a_ξ, b_ξ and a_η, b_η, then function $y(x)$, which separates separation space and its complement is linear decreasing function.

To check the necessary and sufficient conditions of ε-separability of two sets one can solve the optimisation problem, using the separation space as constraints. If the solution of the optimisation problem does not satisfy the condition

$$\varepsilon_A n_A + \varepsilon_A n_A < \varepsilon(n_A + n_B),$$

then the sets A and B are not ε-separable. The lower bound of the separation space is convex for the exponential distribution and linear for the uniform distribution. So, we have convex and linear optimisation problems in these cases.

According to the theorem 2, one can use the theoretical separation space as constraints for the optimisation problem in particular case.

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THE RESONANT FREQUENCY OF BIOLOGICAL OBJECTS

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The aim of the thesis is the study of organism vibration frequencies depending on human condition, and frequency range of the cardiovascular system of the human body, on detection the vibration frequency data connection with normal and pathological conditions of the system.

Research objectives: to establish the diagnostic values of the cardiovascular system frequency in Hz, using general resonant frequency.

We know that the main form of movement is oscillatory process that is periodic movement in time. Tiny particles and galaxies are in motion, they are all fluctuating. Analysis of the processes occurring in interplanetary space, seismic phenomena in the earth's crust, magnetic phenomena in the atmosphere, and changes in the functional state of living organisms led to the conclusion that all natural objects form a single interacting system of oscillations. Cyclical motion of harmonic oscillations generates rhythm.

In biological objects there are physiological and ecological (adaptive) rhythms. The physiological rhythm is one of the main forms of life observed in all living organisms and at all levels of organization of living matter – from subcellular structures to the whole organism. Biological rhythms that match on the multiplicity with geophysical rhythms are called adaptive or ecological rhythms. Adaptive and physiological rhythms elaborated in the evolution as an adaptation form of organisms to cyclically changing environmental conditions. At the same time, physiological rhythms interact with the rhythms of environment. Even Pythagoras asserted: "The world is united. Unity is created by rhythms and rhythms are determined by the number."

Cumulative frequency of human vibrations depends on many factors: the state of the body, the quality of life; bad habits due to the environment, climate, time of year; sensations and other factors. If a person feels comfortable – he is in equilibrium, the body and all endocrine glands work harmoniously together with subordinate organs, tissues and cells. Human negative feelings, such as fear, jealousy, anger, greed etc. lower the vibration frequency of human body.

Table 1

Frequency bands of vibrations depending on the human feelings

Negative feelings	Vibrations, Hz	Positive feelings	Vibrations, Hz
grief	0,1-2	joy	38
fear	0,2-2,2	generosity	95
resentment	0,6-3,3	appreciation	140 and above
irritability	0,9-3,8	unity	144 and above
regret	3	compassion	150 and above
anger	1,4	love	205 and above

The table shows that negative feelings have low vibration frequency, but positive feelings have high vibration frequency.

The most profitable form of harmonious vibrations interaction is resonance which is vibration frequencies coordination. Resonance connects all natural objects in a unified system where the only source of natural rhythms is electromagnetic radiation of stimulated atomic hydrogen with a frequency of 1420 MHz. Through successive division 1420 MHz to 2 n-th degree one can receive the system of resonance interconnected frequencies covering biological, geophysical and space periodic processes. In this system, there are series of harmonic frequencies: 43.33; 21.67; 10.83; 5.42; 2.71 and 1.36 Hz, which are equal to the middle of frequency ranges gamma-, beta-, alpha-, theta- and delta-rhythms.

Let's consider the lower limit of the range of delta-rhythm 1.763 Hz, which is in a resonance relationship with the radiation of atomic hydrogen. Applying the principle of multiplicity that is consistently dividing by 2 n times, we get the following frequency bands for the cardiovascular system, Table 2.

Table 2

The range for frequency of heart beats (FHB) in Hz.

Uncomfortable conditions, low FHB	Comfortable conditions, normal FHB	Uncomfortable conditions, high FHB
0,44-0,88 Гц	0,88-1,76 Гц	1,76-3,53 Гц

Transferring to the usual form of presentation for FHB per minute, we get the following ranges, Table 3.

Table 3

The range for frequency of heart beats (FHB) per minute.

Uncomfortable conditions, low FHB	Comfortable conditions, normal FHB	Uncomfortable conditions, high FHB
26,5-52,8	52,9-105,8	105,9-211,8

Life is impossible outside these boundary frequencies.

From this perspective, the authors explain the uncomfortable conditions by activities and states of a healthy person, such as heart palpitations occur during the running when heart rate approaching 158.9 beats per minute, due to the acceleration of heart rate frequency.

In return, these "uncomfortable conditions" can be explained by human disease and at low FHB bradycardia can be diagnosed, at high FHB tachycardia can be diagnosed, provided that the person is in a comfortable environment and rest.

Thereby the diagnostic value of the cardiovascular system frequency in Hz, using general resonant frequency of radiation from stimulated hydrogen atom was established.

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CASE STUDY OF THE EFFECT PRODUCED BY PHYSICAL EXERCISES ON BLOOD PRESSURE

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Prescription of regular physical exercises as a remedy for hypertension is considered to be common among cardiologists. The effectiveness of this therapy can be evaluated on the basis of the overall health condition of the patient, his ECG, as well as on the results of the laboratory tests of blood and urine. The purpose of this study was to quantitatively assess the effect obtained by the intensive physical exercises on the blood pressure of the 53-year old male. The preliminary diagnosis showed the stage I hypertension in our patient. The weight of the patient was 100 kg and the height was 187 cm. On the advice of a cardiologist, the patient exercised once a week within two months. The