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Identification of Natural Novelty and Disasters by Ensembles of Intelligent Agents Based on Spectral Measurement

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ABSTRACT: Researchers identify natural science novelty by penetration into a linguistic, mathematical, natural science and natural environment based on available knowledge, skills and aspirations. The combination of interacting vibrations of processes, phenomena and objects, like living information, is the basis for detecting natural science novelty by ensembles of intellectual agents. Spectral measurement of living natural information determines natural science novelty at the level of vibrations. Spectral measurement of living information reveals communicative-associative consistency of vibrations of processes and phenomena. The vibrational associativity of communicative vibrations determines the dynamics of a process or phenomenon. Spectral measurement of living information reveals their vibrational communicative-associative natural dynamics of properties and characteristics. The vibrational communicative-associative coherence ensemble of intelligent agents can be mapped into a spectrogram. The accumulated intellectual technologies and methods in synergy with the spectral measurement of natural science living information and the reflection of vibrational communicative-associative consistency in spectrograms will help the ensemble of intellectual agents determine natural science novelty. Live information has qualitative properties and quantitative characteristics. Based on spectral measurement of properties and characteristics, the ensemble of intelligent agents represents a dynamic vibration pattern in the form of a spectrogram. By qualitative properties and quantitative characteristics, not only natural science novelty is determined, but the risks of approaching disasters. The natural science novelty of the ensemble of intellectual agents is discussed with experts, as is customary in the scientific community.

KEY WORDS: ensemble of intellectual agents, live natural information, spectral measurement, natural science novelty, disasters.

1. INTRODUCTION

Everything that exists vibrates. Matter is a slowly vibrating energy. Spirit, thought, idea - there is energy vibrating at the highest speed. All types of being show vibrations, the frequencies and amplitudes of which are different. According to the spiritual truth of the creation of being, in 6,000 years God created energy information vibration fields and on their basis gave birth to life. According to the physical theory of the explosion, energy information vibration fields arose, from which life arose through self-organization.

The latest discoveries of modern physics confirm this fact. Life is an eternal movement. In the universe, nothing can stop. Differences in the manifestation of matter and energy are explained by the fact that they vibrate in different ways.

According to the definition of modern physics, vibration or oscillation are the processes of radiation of energy at the same intervals. Oscillation is a fundamental form of motion.

To perceive sound, a certain frequency of oscillation is required, for light a higher speed of energy oscillation. The more perfect the energy, the faster it vibrates. Any vibration has the property to propagate and affect the environment and even cause disasters.

A catastrophe is an adverse event (accident, natural disaster, etc.), entailing tragic consequences (destruction, death of people, animals, plant world; shocks causing a sharp fracture in personal or social life; a hopping structural and functional change in the system, leading to a significant violation of its functioning mode or destruction).

Based on the analysis of natural and man-made disasters, the following types can be distinguished: planetary, global, national, regional, municipal, object and local catastrophe. Classification of disasters allows for more focused development of methods and systems for their analysis, forecasting and prevention.

A planetary catastrophe, as a result of which the death of life on Earth is possible. For example, an Earth collision with a large asteroid with a speed of up to 80 km/s; full-scale military operations using modern nuclear, thermonuclear and chemical weapons of mass destruction.

The global catastrophe affects the territories of a number of neighboring countries. The number of victims exceeds 100 thousand people, and economic damage can exceed $100 billion. Such consequences are associated with large-scale man-made disasters at dangerous facilities: a civilian or military nuclear reactor with the melting of the core, a nuclear fuel cycle enterprise, a nuclear warhead, a powerful launch vehicle, a nuclear submarine or surface vessel, a warehouse with chemical weapons, a large chemical enterprise with large reserves. Natural disasters with global consequences include natural disasters - the largest earthquakes, volcanic eruptions, tsunamis.

The national disaster is taking place on the territory of a separate country. The number of victims and victims is at least 10 thousand people, and the economic damage reaches 10 billion dollars. Such disasters can occur when transporting large masses of people and dangerous goods, at intersections of trunk pipeline systems with transport and power lines, in fires at major industrial and civil complexes, in aircraft crashes at potentially dangerous facilities, in the destruction of large dams and dams. Dangerous natural processes with national consequences include earthquakes, hurricanes, floods, forest fires, mudflows, etc.

The regional catastrophe captures the territory of an entire region (republic, region, region, district, state, department). The number of victims and victims in them can exceed 1 thousand people, and economic damage - 1.0 billion dollars. Such disasters are caused by the same causes and lead to the same consequences as national disasters. In addition, they include explosions and fires at facilities with dangerous substances, crashes of trains, ships and aircraft, explosions at metallurgical complexes, elevators, mines. The sources of emergency situations are also dangerous natural processes: collapses, showers, landslides, avalanches, mountain impacts.

A municipal disaster creates damage to a city or district. Hundreds of people are injured in them, and economic damage reaches $100 million. The spectrum of the main causes and sources of local disasters (compared to regional disasters) is supplemented by collapses and fires in industrial and civil structures.

The facility disaster is limited to the territory of the sanitary protection zones of the facility. The number of victims and victims is at the level of dozens, and economic damage is at the level of a million dollars. The most frequent of them are fires, explosions, collisions and crashes of vehicles, collapses, failures.

A local disaster occurs inside the facility and is limited to a separate section of the sanitary protection zone.

Disasters are man-made, natural, environmental, socio-economic, biomedical and military.

A man-made disaster means the emergence and development of an unfavorable and uncontrolled process in the technosphere, which entailed large human casualties, damage to human health, destruction of technosphere objects and significant environmental damage. Man-made disasters occur at facilities of high potential danger and risks - in civil and defense nuclear complexes, in chemical industries, in metallurgy, in transport, in unique hydraulic structures, on trunk oil, gas, and product pipelines. Man-made disasters are initiated by destruction of bearing elements of technical systems, leaks of explosion and fire hazardous substances, errors of operators and personnel, unauthorized and terrorist actions, natural disasters. The main characteristic of a man-made disaster is man-made risks.

A natural catastrophe is characterized by a loss of stability of a natural, natural-anthropogenic or anthropogenic system caused by a change (often unpredictable and very fast) in its structure, internal and (or) external functional characteristics (parameters) under the influence of fast and intense hazardous natural processes. These include major changes in mass energy flows and other natural disasters of both endogenous (earthquakes, volcanic eruptions) and exogenous origin (mudslides, landslides, collapses, washes, unrest, hurricanes, tornadoes, etc.).

An ecological catastrophe is an abrupt structural and functional change in a natural technogenic social system, leading to a significant violation of its functioning, or to the destruction of the system. Such changes can arise both as a result of a sharp (short-term) response of the system to smooth changes in the current parameters of its state, and with a powerful external impact. For example, long-term "routine" pollution of the territory, water area, atmosphere, even with its relatively low intensity, as a result, can lead to the death of the ecosystem. But catastrophic phenomena will also occur in the event of a toxic release, i.e. with a powerful volley of toxic substances into the surrounding space. The integral characteristic of any catastrophe is the concept of risk, which takes into account the probabilistic assessment of the consequences of disasters (realization of danger) through the amount of predicted (potential) damage.

The article proposes an approach to identifying natural novelty and catastrophe risks by ensembles of intelligent agents with professional competencies, pattern recognition and decision-making on spectral measurement of vibration live information [1-2]. The risks of approaching disasters are determined by comparing the spectrograms of current processes and real similar emergency processes.

2. SPECTRAL MEASUREMENT OF VIBRATION LIVE INFORMATION

Spectral measurement of vibration information is a branch of science that measures the properties and characteristics of electromagnetic radiation spectra of associative vibration communications by spectrographic equipment and other methods to obtain information about processes. The most common types of spectroscopy are atomic spectroscopy, infrared spectroscopy, ultraviolet and visible spectroscopy, Raman spectroscopy, and nuclear magnetic resonance. The types of spectroscopy differ in the type of measured energy involved in the interaction. The central theory of spectroscopy is that light consists of different wavelengths and that each wavelength corresponds to a different frequency. The light spectrum described by the frequencies of the light it emits or absorbs appears sequentially in the same part of the electromagnetic spectrum during light diffraction.

Using absorption properties and in astronomy emission, spectroscopy can be used to determine certain states of nature. The use of spectroscopy in such different fields and for such different applications has led to the emergence of special scientific directions:

• Study of the spectral emission lines of the Sun and distant galaxies.

• Space exploration.

• Redshift to determine the speed and movement of the remote object.

• Search for physical properties of a distant star or nearby exoplanet, using the relativistic Doppler effect.

Cyclic processes of nature, such as changing seasons, are supported by associatively connected steadily rotating vibration communications. An important aspect of scientific research in the universe is the spectral measurement of association chains of stable vibration communications of observed global processes. Synergistic analysis reveals interactions of different types of energy in heterogeneous media. Spectral measurement and synergistic analysis of the global processes of the Universe will reveal many new, not yet open fields of science.

There are several main methods for analyzing signal spectra: dispersion-time method, interference, digital method of discrete Fourier transform, filtering method. The dispersion-time method is implemented in dispersion spectrum analyzers and is based on the use of signal propagation features in decelerating systems with phase velocity dispersion - dispersion delay lines. Interference method is implemented in re-circulation spectrum analyzers with comb filter for separation of spectral components. Digital analyzers implement a discrete Fourier transform algorithm. The filtering method consists in isolating the spectral components of the signal using a narrow-band filter either in series or in parallel.

The change in spectrum over time is represented by a spectrogram. For its construction, the Fourier window transform is used: the spectrogram is represented by consecutive windows of the spectra, and each of these spectra forms a column in the spectrogram. Time is plotted along the horizontal axis of the spectrogram, frequency is plotted along the vertical axis of the spectrogram, amplitude is displayed by brightness or color.

Biotechnical systems, technologies and methods of measuring optical parameters of biological tissues are used for spectral measurement of human activity [3-5]. Spectral measurement of association chains of energy communications of collective activities will help to identify the risks of social and natural disasters. A collective process of activity supported by positive energies will protect humanity and nature from disasters.

3. RISK AND DISASTER WARNINGS BY SMART SPECTROGRAM AGENT ENSEMBLES

A systematic spectral approach to the study of natural phenomena in all their diversity allows us to assess the risks of approaching disasters. Systemic spectral methods allow us to identify causal relationships that control the development of phenomena and hidden processes behind them [6-7].

The genesis of dangerous gravitational processes, as well as the participation of exogenous components in them, is determined by a systemic spectral approach to considering the conditions for the formation and dynamics of catastrophic and dangerous natural processes using a dynamic spectrogram of recordings of laser deformographs.

The methods of remote sensing of the Earth that currently exist make it possible to monitor objects that differ among themselves in spectral reflectivity in at least one wavelength range and have dimensions comparable to the spatial resolution of the shooting equipment.

The tasks solved by space monitoring include:

- detection of forest, steppe, peat fires, accidents at oil rigs and industrial facilities accompanied by fires;
- detection of the consequences of fires, including forest hares and damage from fires;
- monitoring of flood situation on rivers, control of floods, floods of different origin (rains, snow melting, consequences of earthquakes, accidents at hydroelectric power plants, etc.), ice situation control during flood on rivers;
- detection and emission of pollutants into water bodies and seas;
- emissions of pollutants into the atmosphere of cities and industrial zones, smoke in cities and settlements as a result of forest, steppe and peat fires;
- identification of agricultural zones subject to drought;
- control of logging of forests;
- monitoring the spread of pollutants around industrial areas, at oil fields;
- monitoring of melting of mountain glaciers;
- detection and monitoring of mudflow;
- detection and control of landslides;
- detection of active activity of volcanoes and monitoring of the situation in the zone of their action;
- control of territories located in the zones of sea tides and tides;
- control of territories subjected to earthquakes;
- detection of sand and dust storms, monitoring of their consequences;

- control of desertification of territories (intensive soil degradation) due to soil salinization, wind and plane erosion of soil cover, climate change;

- control of intensive water logging of territories.

These and many other problems are solved using various types of shooting equipment operating in different spectral fields.

The fall of meteorites is one of the dangerous natural phenomena. On the other hand, meteorites are the most important source of information about the early stages of the formation and evolution of the solar system, therefore, complex spectral diagnostics of their elemental and phase compositions and structural features is of scientific interest. The most common class of meteorites are common chondrites. Complex diagnosis of chondrites is carried out on the basis of Mössbauer spectroscopy, X-ray spectroscopy, as well as infrared spectroscopy [8].

Contamination of the atmospheric layer is determined by measuring the spectral transmittance of the laser radiation.

A spectral wave model is used to determine the extreme wind wave at sea. It allows you to calculate wave parameters, significant wave height, period, direction and speed of wave propagation, spatial distributions of wave heights, wind wave power, frequency-directed spectra of wind wave, periods of maximum spectrum.

Smart agent ensembles using neural network models are currently the most promising method for predicting emergencies. These models solve the problem of describing the change in the state of an object under various conditions: normal (standard), resource constraints and under conditions of uncertainty. They allow you to receive a forecast of changes in the state of the object in real time, that is, almost instantly. For effective management in emergency situations, this factor is of key importance [9].

On the basis of system synergistic analysis, the degrees of interaction of various types of energy in heterogeneous environments are revealed. In synergetics, the joint action of many subsystems is investigated, as a result of which structure and corresponding functioning arise at the macroscopic level. Spectral prediction is carried out on the basis of a complex analysis of the dynamics of change and interactions of observed physical fields and prediction by cognitive intellectual modeling methods. Integration of the results of spectral, synergistic and cognitive intellectual methods will increase the quality of catastrophe forecasting to an acceptable level.

Intelligent diagnostics of industrial equipment wear risks is carried out by ensembles of intelligent agents. With the help of spectral measurement, ensembles of intelligent agents take a spectrogram and on the basis of its analysis it is possible to detect defects, both in the mechanical and electrical parts. Intelligent agents are configured to automatically send alerts about identified hardware problems. They determine the life of the equipment when the defect reaches a critical level. In the event of a problem, the defect is confirmed by specialists using a portable vibration diagnostics system. Magnet sensors determine in which assembly the defect has occurred. Experts will find out how much time he has before the equipment is put out for repair.

Smart agent ensembles using spectral analysis methods investigate the qualitative and quantitative composition of contaminated water and warn of the risks of infection. Qualitative composition refers to the definition of types of heavy metal pollutants in industrial effluents. The quantitative composition determines the concentration of types of pollutants. Infrared and ultraviolet spectroscopy, X-ray fluorescence spectroscopy, laser methods and others allow you to determine many micro-impurities in water. These methods are based on the selective absorption of radiation of a particular wavelength by certain atoms and molecules or the excitation of atoms in order to obtain their characteristic of radiation. The luminescent method for determining impurities is based on excitation of the atoms of the controlled solutions by X-ray or laser irradiation and measurements of the wavelength emitted by the excited components.

Fire risks are a set of subjective indicators of fire hazard analysis. Accordingly, the fire risk assessment involves the study of the frequency characteristics of the fire occurrence by spectral analyzers to measure and display the energy distribution spectrum.

Spectral measurement of energy plays an important role in the formation of an economy with an energy economic equivalent [10-15].

4. CONCLUSION

An important achievement of spectral vibrational dynamic measurement of living information of processes and phenomena will be the ability to proactively identify risks of human activity leading to disasters.

Ensembles of intelligent agents with a technological singularity, as the ability, based on the analysis of large amounts of spectral measurement information, to warn of emerging risks in various areas of activity, will help humanity cope with disasters.

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