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BIOMETRIC TECHNOLOGIES IN SECURITY SYSTEMS IN THE CONTEXT OF DIGITALIZATION OF SOCIETY

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Abstract

The article deals with the dynamics of social and legal security systems, the conditions of their effectiveness. The article analyzes the possibility of using biometric technologies, risk-based approach, artificial intelligence in the predictive system of security, and the possibility of analyzing big data for integrated monitoring of the safety of activities. The article reveals the essence of the preventive security system using biometric technologies, the role of the human factor in the system of ensuring security. The predictive system of public safety is based on predictive models for analyzing big data in the field of socio-economic security. The main task of predictive analytics is to determine the likelihood of emergencies in a certain place and at a certain time, and to prevent them by proactively responding to public security forces at the right time in the right place. Deep analysis of the Database allows you to identify complex and hidden relationships and get new data, which allows you to build scenarios for the future, increase the speed of response to social incidents and reduce their number. The emergence of biometric technologies in public security systems has made it possible to take the next step in building a preventive security system. The technology for analyzing biometric data (face, iris, fingerprints) allows you to remotely identify both employees of the organization and visitors and unauthorized persons, allow or block access to certain areas of the social complex, assess the psycho-physiological state of a person and identify persons at risk.

Keywords: Artificial intelligence, biometric technologies, preventive security

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1. Introduction

New technologies of social activity management based on information and computer technologies, the rejection of traditional public security systems, does not always have a positive effect on the effectiveness of ensuring social and legal security (Polozhikhina, 2020). The widespread introduction of video analytics to a certain extent reduced the level of physical security of the social complex, due to the rejection of the usual forms of protection. New approaches related to both biometric technologies and a risk-oriented approach were required as the basis for a more effective system of social and legal security, especially in terms of increasing the forecast and accuracy of the risks assessed (ConsultantPlus, 2022b; ConsultantPlus, 2022c).

2. Materials and Methods

In our research, we relied on the methodology of the systematic approach as a conceptual basis for understanding the socio-legal basis of social activity. The works of B. A. Levin, N. P. Tereshina, J.P. Rodrigue served as the basis for modeling the technology of building a digital twin of a preventive system of social and legal security in a virtual environment (Kuprianovsky et al., 2016; Tereshina, 2018; Rodrigue, 2018). Analysis of the degree of protection of social complex objects in non-standard conditions of activity: from regulatory to emergency made it possible to identify the following situations that require response from the security services:

i. Under the regulatory conditions of the activities of social facilities, the public security service monitors compliance with the established rules and regulations;
ii. Deviations from regulatory conditions in the normal operation of potentially dangerous industrial and economic facilities require the determination of the causes of deviations and their elimination, while the consequences are predictable, the protection is sufficient;
iii. Crisis situations involve going beyond the normal regime, the consequences are predictable and acceptable, the protection is partial, security forces withdraw personnel from threatened areas;
iv. Emergencies occur when irreversible damage to critical elements of the production and economic infrastructure and lead to human casualties, large material damage, the degree of protection is insufficient, the tasks of the security service are to ensure order and organization of restoration work;
v. Catastrophic situations are characterized by unpredictability of development, maximum possible damage and numerous victims, the protection is low, production and social facilities are not subject to direct restoration, the tasks of the security service are localization of the zone of a catastrophic situation and organization of rescue operations (Pechatkin, 2020).

Classifying traditional security systems into reactive, proactive and predictive, we proceeded primarily from ways to respond to emerging threats. The traditional security system, which dominates today, belongs to the class of reactive, i.e. focused on eliminating the consequences and causes of emergency incidents that have occurred at the current time.

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The proactive security system is focused on the prevention of socio-economic accidents based on the forecast of the probability of occurrence of emergencies, risk calculation and risk management. The effectiveness of this security system is enhanced by identifying and taking into account real risks and the absence of unnecessary insurance.

The predictive system of public safety is based on the use of artificial intelligence to monitor the activities of the socio-economic complex, to detect people and objects in the wrong places. Continuous and integrated monitoring is carried out when working in cloud services and is aimed at accounting for social and industrial incidents, the effectiveness of the social and legal security system, early detection of deviations in data, forecasting of incidents, risk reduction and proactive response.

Analysis of the flows of heterogeneous and unstructured data received from connected devices, sensors, stationary and mobile monitoring and control stations, digital surveillance systems and other sources arrive at data processing centers. Artificial intelligence, analyzing the information received, transmits the results obtained as a result of analysis and prediction to the following subsystems of social and legal security:

i. For emergency response (reactive actions);
ii. Proactive response to the potential for incidents that violate public safety (proactive actions);
iii. Updating the map of the dangers of the socio-economic situation in real time using intelligent surveillance tools, operational communication and interdepartmental operational interaction.

3. The Results of the Study and their Discussion

The predictive system of public security is based on predictive models of big data analysis in the field of socio-economic security. The main task of predictive analytics is to determine the probability of emergencies in a certain place and at a certain time, to prevent them by proactive response of public security forces at the right time in the right place. A deep analysis of the Database allows you to identify complex and hidden relationships and obtain new data, which allows you to build future scenarios, increases the speed of response to social incidents and reduces their number.

The emergence of biometric technologies in public security systems has made it possible to take the next step in building a preventive security system.

Biometric data analysis technology (face, iris, fingerprints) allows you to remotely identify both employees of the organization and visitors and strangers, allow or block access to certain areas of the social complex, assess the psychophysiological state of a person and identify persons at risk. This also applies to monitoring the condition of employees (in particular, drivers, machinists, pilots) and makes it possible to identify persons with inappropriate behavior. The combination of predictive analytics with biometric technologies creates the basis for the creation of a preventive system of social and legal security and the construction of a digital twin of a social complex.

Digital models of the virtual environment reflect all objects of social infrastructure and accurately reproduce the entire socio-economic process. Each model of the system is responsible for individual social processes. Digital modeling makes it possible to improve the quality of forecasts, reduce the level of risk. The digital twin allows you to simultaneously monitor the current state of public security in real time and simulate changes in the social process under various threats and dangers, promptly respond to

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them, determining the most optimal strategies for the activities of security services and thereby increasing the effectiveness of security services (ConsultantPlus, 2022a).

4. Conclusions

This makes it possible to proceed to the construction of a preventive security system based on the integration of modern information and communication management technologies and intelligent transport systems (Bubnova & Levin, 2017). Integrated security systems focused on both the control of the movement of people, passenger traffic, and the control of movement and travel of personnel are combined with the control of the technical condition of vehicles and transport communications based on the use of technologies of fiber-optic protection systems and perimeter control and communications, the use of nonlinear locators to control the organization of traffic (Larin & Kupriyanovsky, 2018). Biomodal biometric identification allows identifying risk groups at the early stages of their appearance at social infrastructure facilities, predicting and preventing crisis situations. Each element of the security system must be involved in the digital sphere, have a personal identification on the Internet and is controlled by software.

Digitalization of the public security system is the dominant trend of today. It allows real-time monitoring of the movement of people, vehicles, passenger traffic and cargo turnover, ensuring the safety of social and industrial infrastructure facilities, which makes the situation with social security more predictable. At the same time, digitalization is a new source of increased risk, since there is always a risk of software failure and loss of control over security systems.

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