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Psychology and Technical Aspects of Risk Decreasing Processes using Artificial Itelect

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Abstract

Artifucial intellect is used for development a risk reduction neural network. Scietific areas of the presented network are in the fields of Natural Disasters, Transport Crashes and Industrial Accidents. Research database with 22 main topics is createdad for the described cases in the articale ivestigation. The above metioned 22 main topics are preseted in Table 1 of the study. A knowledge base is constructed for the preseted Neural Network. Numerical and Experimental examples for topic number 20 of the Table 1 of the study (Turkey and Syria earthquakes February 2023) are presented in the exploration of the article. Cognitive psychology and Techical sets are presened I the study. Two constructive suggestions are made in the exposition of the article for the topic number 20. At first a system for automatic control of dynamic response of the exixting buildings is developed. The existing elevator facilities of the buildigs are upgraded. The system guarantees full protection of buildings in case of any earthquake impact, with any magnitude, frequency spectrum and duration. Secondly, a passive

Control system is offered to automatically manage the dynamic response of the new generation zero mass buildings. The system as well as guarantees full protection of buildings in case of any earthquake impact with any magnitude, frequency spectrum and duration. In such a dynamical systems, the principle: "Sufficient investment with unlimited seismic resistance" is satisfied. Numerical and experimental examples are elaborated by MatLab and SAP 2000 software systems in the Techical University – Sofia.

Keywords: Cognitive experimental psychology system; Neural Networks; Research database; Knowledge base; Engineering constructive suggestions

Introduction

In the report a Cognitive experimental psychology system for management of natural disasters, transport crashes and industrial accidents is developed. Numerical and experimental examples are elaborated by MatLab and SAP 2000 software systems for the topic 20 from (Table 1) of the research.

Gas-phase reactions: Gas-phase reactions involve the chemical transformations of gaseous substances in the atmosphere. These reactions are responsible for the formation and depletion of various compounds. For example, the oxidation of volatile organic compounds (VOCs), emitted by natural and anthropogenic sources, leads to the production of ozone and secondary organic aerosols, which influence both air quality and climate [1]. Additionally, reactions involving nitrogen oxides and sulfur dioxide contribute to the formation of acid rain and particulate matter, which can have detrimental effects on ecosystems and human health.

Aerosol formation: Aero Exploration. The methodology. The research methodology of the study is to create an appropriate neural network. By the position 14 of the Table 1 is shown example in short described by prof. Stanimir Karapetkov in his plenary report in International Conference Days of Mechanics, Varna 2022. By the position 16 of the Table 1 is shown example for INTERVENTION OF AN APPROPRIATE PSYCHOLOGIST Burgas crash 25.08.2023 Yordan Iliev and Atans Gradev tragedy [2]. Positios 14, 16 and 20 of the Table 1 are numerical examples of the study.

From the (Figure 1) and (Figure 2) it follows, that due to the demographic crisis in Bulgaria, the modern population of the country is about 7,000,000 people. They live in about 3,000,000 households. There are about 2,000,000 residential buildings in the country, at least 30% of which are vacant. At the beginning of the 21st century, the earthkuake prediction marked a development [3]. An alternative to these earthquake prediction studies are possibilities to creation of structures with actively controlled dynamic response and seismic isolation. The anti-seismic of its two million homes can most effectively be realized by actively control of the dynamic response of the buildings through the existing elevators. A schematic diagram of such control is shown in (Figure 3).

Dynamic linear systems with constant structure: In the case of linear systems, the most important mathematical description – the frequency transfer function, is obtained as a quotient of the Fourier complex spectrum of the output signal to the Fourier complex spectrum of the input signal of the linear dynamic system under

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Table 1: Research database for the described in the article investigation.

N	Rescue Operations and the	Altitude of the peaks in m,	Assessment of the psychology situation (history and of the rescue operation)	Technical assessment (of the situation and of the rescue operation)	Rescue
	assessments	Persons,			Operation
		Year			Result
1	Vitosha	Black Top 2290	Negative	Negative	Fatal
		(Skoparnika)			
		Todor Bojinov			
		15.02.1992			
2	Vitosha	Black Top 2290	Negative	Negative	Fatal
		Marieta Rajnova			
		31.12.1884			
3	Rila	Kalinite 2667	Negative	Negative	Fatal
		Michail Munzov			
		18.07.1999			
4	Rila	Mussala 2925	Negative	Negative	Fatal
		Dimitar Zlatarev			
		16.02.2005			
5	Pirin	Todorka 2746	Satisfactory	Positive	Fatal
		Two boys snowboarders			
		11.01.2019			
6	Vitosha 	Black Top 2290	Satisfactory	Satisfactory	Happy
		Dog Roko			
		20.04.2019			
7	The Balkans	Botev 2376	Satisfactory	Positive	Fatal
		Atanas and			
		AdrianPenchevy			
		05.02.2020			
8	Pirin	Todorka 2746	Satisfactory	Positive	Fatal
		Borislav Garibov			
		24.01.2021			
9	The Balkans	Botev 2376	Negative	Satisfactory	Fatal
		Todor Jeliazkov			
		02.01.2021			
10	The Balkans	Botev 2376	Satisfactory	Positive	Happy
		Yang man			
		10.02.2021			
11	Rila	Kartala	Negative	Negative	Fatal
		Yang man			
		21.03.2021			
12	Pirin	Todorka 2746	Positive	Positive	Happy
		Vladimir Carolev			
		10.05.2021			
13	Rila	Djano 2700	No data	Positive	Fatal
		Irena Gancheva			20.10.2021
14	AM Struma	AM Struma	No data	No data	Fatal
	[17,18]	46 Victims			
		23.11.2021			
15	Sofia-Georgy Semerdjiev	Sofia	Negative	Negative	Fatal
	Blv.Black Top-	Two Yang Girls			
	Arsenalsky	05.08.2022			
16	Burgas	Burgas	Negative	Negative	Fatal

	Trapezica	Yordan Iliev			
	[17,18]	Atans Gradev			
		25.08.2023			
17	Turkey	Turkey	Negative	Negative	Fatal
	Boundary	Boundary			
		Peter Buchvarov			
		08.11.2022			
18	Pirin	Vihren 2914	Negative	Negative	Fatal
		Plamen Hristov			
		Dragan Glisich			
		26.12.2022			
19	Rila	Mussala 2925	Satisfactory	Satisfactory	Fatal
	Paraplaner	Toma Stojichkov			
		08.01.2023			
20	Turkey	Earthquakes	Negative	Negative	Fatal
	Syria	M 7.9 6.02.2023			More than
	A huge amount of Radon gas	M 7.6 7.02.2023			50 000 victims
		M 6.4;5.8;5.2;5,2			
		20.02.2023			
21	Larissa, Grecee 	Railway accident	Negative	Negativs	Fatal
	Description: Пътническият влак с около 350 души е пътувал от Атина за Солун, втория по големина град в Гърция, когато се сблъска с товарния влак.				57 victims
	[17,18]				
22	Lesnovo	Lesnovo 8.01.2023	Negative	Negative	Fatal
	Description: D:\8_April_2023_Sofia_20_H\01_01_4640456598515958808_big.jpg	Georgy Vlaykov			
	Aircraft [17,18]				

Figure 1: Police patrol automobile with pneumatic cover.

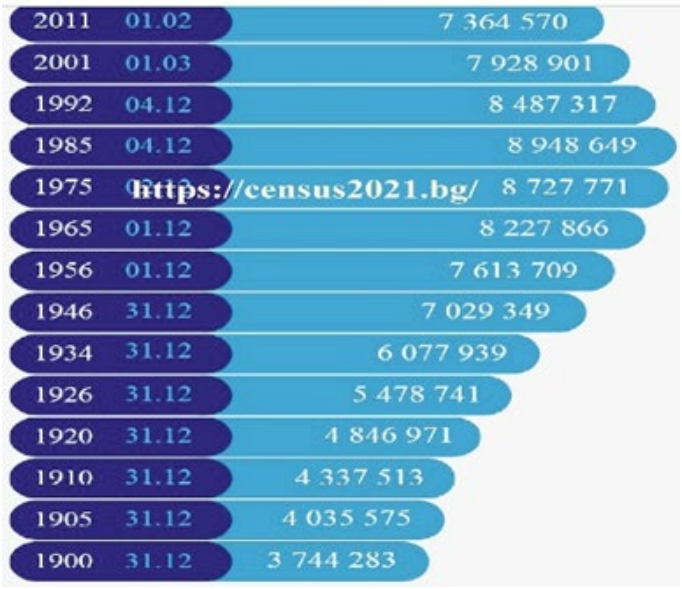

Figure 2: Population of Bulgaria.

investigation. This frequency response function is invariant over time. In an earthquake, the initial conditions of the process are assumed to be zero [4]. The structure of the system is unchanged. The natural frequencies are the roots of the polynomial in the denominator of the frequency transfer function. If the system has viscous type damping, the roots of the polynomial in the numerator of the frequency transfer function are the corresponding damping coefficients.

Dynamic non-linear systems with variable structure: For nonlinear systems, the mathematical description is more complicated. The dynamic system has a variable structure and it is not possible to introduce the concept of frequency response to relate the complex Fourier spectra of the input and output signal. These complex Fourier spectra are related by a function that is non-linear and time-varying. This property of non-linear systems can be used to create structures that, in an earthquake, dampen the dangerous oscillations that would destroy the structure [5]. For this purpose, special building structures are created that automatically change their frequency properties at the

Figure 3: Population, Households, Housing 4f Bulgaria.

first second of an earthquake. Special devices are provided that turn off or on the contrary turns on additional structural connections, depending on the frequency properties of the input signal. If the impact is low-frequency, additional connections are included, which immediately stiffen the structure several times. It immediately exits the low frequency region of the input signal and system oscillations are almost zero. On the contrary. If the impact is high-frequency, available connections are turned off, which immediately softens the structure several times. It immediately exits the high frequency region of the input signal and system oscillations are almost zero. This process can be realized several times automatically until the earthquake finally stops. During all this time, the structure barely moves and exhibits highly non-linear characteristics. The structure of the dynamical system is highly variable [6].

These systems do not use external sources of energy to isolate the earthquake. Their cost is not high, they are easy to design and implement. A certain difficulty is the preliminary study of the expected earthquake signals in the area. The setup of such passive systems with a variable joint structure requires high qualification in the design and is science-intensive [7].

Systems with automatically controlled dynamic response: In the most vulnerable buildings in an earthquake (facilities from 3 to 16 floors), in which there are elevator facilities, with not much effort and funds, actively automatic controlled systems can be implemented. They use external sources of energy - for example, electricity and/or diesel generators. In the existing elevator shafts, for example, on the top floor, special inertial devices are installed. With special sensors, the parameters of an earthquake impact that has just begun are measured in real time [8]. The computer of the elevator equipment calculates the necessary control effect. It is realized through special inertial devices installed on the last floor - working bodies that create exactly the same inertial forces as the earthquake impact just measured, but with the opposite sign. The Rainforced Concrete Elevator Shafts – 1 and 2 [9]. In the same figure is shown the Inertial Actuator Equipment, mounted in the top of the reinforced concrete elevator shafts – 1 and 2. In this way, the construction facility remains at rest during random earthquakes of arbitrary magnitude, frequency spectrum and duration. A known disadvantage of these automatic control systems is the need for external energy - for example, electricity and/or diesel generators. If during an earthquake the electricity supply stops, it is necessary to provide an autonomous electrical supply - for example, from backup lithium-ion batteries in the ground floor of the building and/or diesel generators. These systems protect facilities in the event of a random earthquake [10]. The value of this innovative solution is approximately the same as the value of the existing elevator in the building.

Conclusions

The usage of the neural networks greatly reduces the risk of natural disasters, transport crashes and industrial accidents. This can be seen very clearly if the systems with actively control the dynamic response of structures are used in practice. If such systems are used in the elevator shafts of buildings structures, during an arbitrary in strength and duration earthquake, the structures remain in dynamic equilibrium and do not move. The earthquake is not felt. There will be no destruction, damage and SACRIFICE of people and animals. This is ensured by the application of an automatic dynamic response control system driven by electrical energy. Lithium-ion batteries and diesel generators are used in case the country's electric power supply fails.

The aid and the military operation in Turkey and Syria from February 6, 2023 are briefly presented in topic 20 Table 1 of the study. This operatio led by the former Vice Prime Minister Ivan Demerdzhiev.

The author's theam proposes to develop an anti-seismic program for neglecting the seismic risk in Bulgarian towns Sofia and Plovdiv. These are the two most earthquake-prone cities in Bulgaria. The implementation of such a program could lead to the merger of the two cities. Thus, a new capital of Bulgaria, Sofia – Plovdiv (Ulpia Serdica - Philippoulis), can be created. The earthquake hazard may change the political map of Bulgaria.

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