

Preface

The most important elements of intelligent decision making are exhaustive data, information and knowledge collection, extraction, analytics and rational decision making, and its adaptation to the changing micro-, mezzo-, and macro-environments. However, it is becoming difficult to put into practice lately. Decision makers end up having to examine scrupulously somewhat more data, information, and knowledge in the world of today than they ever had to previously or falling into ill-defined situations, which interfere with their compiling an array of alternatives and making appropriate decisions. For example, a real estate crisis is much like a raging hurricane, and there is no way to hide from it. Efforts of many decision makers to change the direction of the storm are futile. A top-notch decision maker will not waste time for no reason or make unnecessary moves. Such a professional will not get excited about something he/she cannot change—for example, the critical mezzo- and macro-economic situations.

Selection of irrational and illogical goals for a project can cause a great many problems in the future. Sometimes it is hard to grasp what the consequences of some pursuit will be. Nevertheless, the result will be more effective to the degree that all the alternatives are analyzed seriously, thoroughly, and realistically by applying intelligent decision support systems and biometrics technologies. The decision maker should react to every change in micro-, mezzo-, and macro-environments like a sensitive radio antenna. There is no sense in achieving good results from a project by severing or damaging relationships with different stakeholders. Support from all stakeholders is necessary over the process of executing a project. Achieving this requires tracking their opinions, moods, and body language regarding the project under execution, i.e., seeing the processes in action through the eyes of the interested parties.

Matters do not always unfold as expected on projects. Actions taken by stakeholders are not always realistic, and certain processes can appear chaotic. An ocean of information hits decision makers everyday in the present world. A person can get lost in its quagmire when trying to analyze it thoroughly. Therefore it is more rational to apply the intelligent decision support systems and biometrics technologies. The design, analysis, and decision making of the process over

the life of the project must be flexible by adapting to the constant changes in the micro-, mezzo-, and macro-environments. Intelligent decision support systems and biometrics technologies can provide comprehensive information in real-time. The substantiated self-confidence of decision makers increases with such information at hand along with the possibility of gaining effective potential results.

This book familiarizes readers with actual research on biometric and intelligent decision making support. It analyzes intelligent decision making support systems, biometric technologies, and their integration.

Scholars have offered various definitions of IDSS. Every one of them accents that an intelligent decision support system is a DSS, which makes extensive use of artificial intelligence techniques.

Artificial intelligence techniques can be utilized in all the components of IDSSs, such as in the database, knowledge base, model base, user interface, and the rest. Therefore this book deliberates the intelligent databases, hardware (sensors, iris camera hardware, hardware for fingerprint biometric identification, etc.), and computer human interfaces (gesture, intelligent user, motion tracking, voice and natural-language interfaces) in intelligent decision support systems. Furthermore, it describes the integration of decision support system modules with artificial intelligence techniques and the like.

Research on body language has revealed that, while interacting eye to eye, unspoken signals have a 60–80 % affect on a party to a conversation, and the sounds of the voice have a 20–30 % affect. Words provide 7–10 % of the remaining affect (Pease 2009). A topic of discussion for ages has been about getting to know body language (movement, position, touch, use of personal space, voice resonance, silences, pauses and tone, the eyes, pupil dilation or constriction, smiles, body temperature, gestures, and the entire image of the person talking along with his/her external sparkle and the like) for better understanding people's needs and actions. A dramaturgic who originated long ago from ancient Greece, Menander (343-about 291 BC), had said that silence can be the greatest accusation. French author Rochefoucauld (1613–1680) wrote, "Saying the right thing at the right time is an art, but it is no less an art to remain silent. Silence is eloquent: at times it is possible to agree or to condemn in such a manner; meanwhile silence is respectable." A Russian writer Gogol (1809–1852) analyzed the meandering of silence, "The tone of listening determines the tone of reply". French writer Rochefoucauld (1613–1680) said, "The resonance of the voice, the eyes and the entire pose of the speaker are no less expressive than the selected words are."

Facial expressions have also been a topic of analysis worldwide. One example is the smile ("I have never seen a smiling face that is unattractive" [unknown author]); others can be gestures, actions and the external sparkle of a speaker. Humes (2008) analyzes Bill Clinton as a person, who is excellent at developing and performing body language. His arsenal of gestures includes biting down on the lip to show sorrow, staring up at the ceiling to show serious consideration of an issue, clenching jawbones tightly to indicate determination and pounding on a table with the fist to express anger. His mood can switch from a broad smile to tears in a matter of seconds. Clinton makes contact with his listeners not with

words but physically—attentively looking straight into their eyes, nodding his head and moving his hands and shoulders (Humes 2008). This book presents different methods for analyzing the body language described above, including biometric data gathering and reading (face analysis [eyes, eyebrows, nose, lips, chin, etc.], voice analysis, gestures analysis [movement of the hands, face, trunk, arms, hands, etc.], retina scan, iris scan, fingerprint identification, hand geometry biometrics, and signature). Biometric systems are also presented.

A great deal of attention was paid to an act by Nikita Khrushchev, the Russian colleague of Eisenhower, who was in power during the cold war. As Henry Cabot Lodge, the United States representative to the United Nations began to read a very long list of human rights infractions in that country, the Soviet premier took off his shoe and began beating on the table with it. British Prime Minister Harold McMillan asked coldly, “Could you translate that?” (Humes 2008). Behavioral biometry is able to analyze people’s walking, talking, and other sorts of behavioral parameters. As one example, the July 7th London bombings would reveal biometric technology images from over 200,000 video surveillance cameras, which are the key weapons against terrorists. What makes these biometric cameras so extraordinary is that these cameras have a 360-spherical lens, called a fisheye, to follow someone’s movements, and the camera’s computers can be programmed to identify particular faces from a database (Osborn 2005). Similarly, surveillance cameras can analyze people’s body languages in crowds by using physiological and behavioral measurements and thus prevent crimes. Cave (2006) holds the opinion that the biometric may also convey information about the subject’s health status, stress level, and veracity. Layered Voice Analysis (LVA) technology, designed by Nemesysco, enables a better understanding of a person’s mental state and emotional makeup at some given moment by detecting the emotional cues in his/her speech. LVA technology identifies various types of stress levels, cognitive processes, and emotional reactions that are reflected by different properties of the voice. These and other studies described in this book indicate that sufficiently much data, information, and knowledge can be gained by utilizing biometric technologies.

This is the first, wide-ranging book that is devoted completely to the area of intelligent decision support systems, biometrics technologies, and their integrations.

The book contains seven chapters: Introduction to Intelligent Decision Support Systems, Intelligent Decision Support Systems, Passive House and Housing Crisis Thermometer IDSSs and Practical Integration of IDSS with biometric technologies (Chaps. 4–7).

Initially, the first chapter presents descriptions of intelligent decision support systems (IDSSs) and analyzes the technology and AI methods, which serve as bases of the IDSS.

The Chap. 2 discusses about the latest IDSSs, such as text analytics and mining-based DSSs; ambient intelligence and the Internet of things-based DSSs; biometrics-based DSSs; recommender, advisory and expert systems; data mining, data analytics, neural networks, remote sensing, and their integration with decision

support systems and other IDSSs. These other IDSSs include GA-based DSS; fuzzy sets DSS; rough sets-based DSS; intelligent agent-assisted DSS; process mining integration to decision support, adaptive DSS; computer vision-based DSS; sensory DSS and robotic DSS.

The Chap. 3 broadly discusses the Passive House IDSS developed by the author in conjunction with colleagues (J. Rute, E.K. Zavadskas, A. Daniunas, V. Pruskus).

Chapters 4–7 submit an illustration of the integration of IDSS with biometric technologies employing an example of systems developed by the author with colleagues (E.K. Zavadskas, M. Seniut, G. Dzemyda, R. Gudauskas, V. Gribniak, V. Pruskus, A. Juozapaitis, V. Stankevic, C. Simkevičius, T. Stankevic, S. Ivanikovas, V. Raudonis, L. Bartkiene, I. Jackute, G. Kaklauskas, A. Matuliauskaite, R. Paliskiene, S. Rimkuvienė, L. Zemeckyte, A. Vlasenko). There are also deliberations about the Biometric and Intelligent Self-Assessment of Student Progress System, Recommender System to Analyze Student's Academic Performance, Student Progress Assessment with the Help of an Intelligent Pupil Analysis System and Web-based Biometric Computer Mouse Advisory System to Analyze a User's Emotions and Work Productivity.

This book is designated for scholars, practitioners, and doctoral and master's degree students in various areas and those who are interested in the latest biometric and intelligent decision making support problems and means for their resolutions, biometric and intelligent decision making support systems, and the theory and practice of their integration and the opportunities for the practical use of biometric and intelligent decision making support. The author thanks Ms. Vijole Arbas for her help in translating and editing the text of this book.

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