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Procedia Economics and Finance 18 (2014) 908 – 915

Procedia Economics and Finance

www.elsevier.com/locate/procedia

4th International Conference on Building Resilience, Building Resilience 2014, 8-10 September 2014, Salford Quays, United kingdom

Biometric Advisory System to Analyze a User's Post-Disaster Stress Management

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Abstract

This article describes in detail the developed Biometric Advisory System to Analyze a User's Post-Disaster Stress Management. The system is based on algorithms developed by the authors. The system was developed and fine-tuned in the course of the Android project. The authors based their Advisory System on the presumption that, by assigning a user post-disaster stress self-assessment and then looking for the interdependency with the user's biometric parameters (heart rate, blood pressure, pupil, skin conductance and humidity; body, forehead, nose, left and right cheek, chin, left palm and left middle finger temperatures, etc.) recorded at that time, it is possible to determine the link rather accurately. In other words, a user internally senses the actual rating of his/her personal post-disaster stress. Their existing experiences and intuition give users a rather accurate indication about their post-disaster stress. A sufficient number of studies have been performed worldwide and quite many systems have been developed that apply biometric technologies to establish different human states of stress. The global innovative aspects of the Biometric Advisory System, developed by the authors, are primarily that it determines the level and symptoms of the post-disaster stress, carrying out multivariant design of a disaster stress management life cycle (emergency response, recovery, prevention/mitigation and preparedness/readiness) and alternative recommendations applicable to a specific user (on ways to reduce post-disaster stress), performs a multiple criteria analysis of it and selects the ten most rational ones (disaster stress management life cycle and tips) for that user. The Impact of Event Scale-Revised (IES-R) is used as a self-assessment instrument to determine the symptoms of post-disaster stress stress and to draw up recommendations. Also, the users were assessed with the IES-R in order to define the significance of posttraumatic stress symptoms.

Selection and/or peer-reviewed under responsibility of the Centre for Disaster Resilience, School of the Built Environment, University of Salford.

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doi:10.1016/S2212-5671(14)01017-X

Keywords: Post-disaster, Stress management, Impact of Event Scale-Revised, Biometrics, Decision making, Advisory System

1. Introduction

Based on the analysis of existing neural networks (Liu et al. 2014, Eisenbies et al. 2007, Kong-A-Siou et al. 2013), early warning (Van Veen 2014, Krzhizhanovskaya et al. 2011, Alfieri et al. 2012, Borga et al. 2014), fuzzy (Royston et al. 2013) expert (Kou et al. 2014, Karnib et al. 2002) and decision support (Hubbard et al. 2014) systems, Impact of Event Scale (Arnberg et al. 2014, Shooshtary et al. 2008, Dancause et al. 2011, Keskinen-Rosenqvist et al. 2011, Heir et al. 2010, Chen et al. 2011), as well as on the long experience of the article's authors (Kaklauskas et al. 1999, 2010, 2011a,b, 2013, etc.) and in order to determine most efficient tips of stress resilience a Biometric Advisory System to Analyze a User's Post-Disaster Stress Management consisting of an equipment subsystem, database, database management system, model-base, model-base management system and user interface was developed (see Figure 1). The Biometric Advisory System was developed and fine-tuned in the course of the Android (Academic Network for Disaster Resilience to Optimise educational Development) project. Android project is being carried out with the financial assistance of the EU Life Long Learning programme, under the Erasmus networks action. ANDROID is concerned with what resilience is, what it means to society, and how society might achieve greater resilience in the face of increasing threats from natural and human induced hazards.

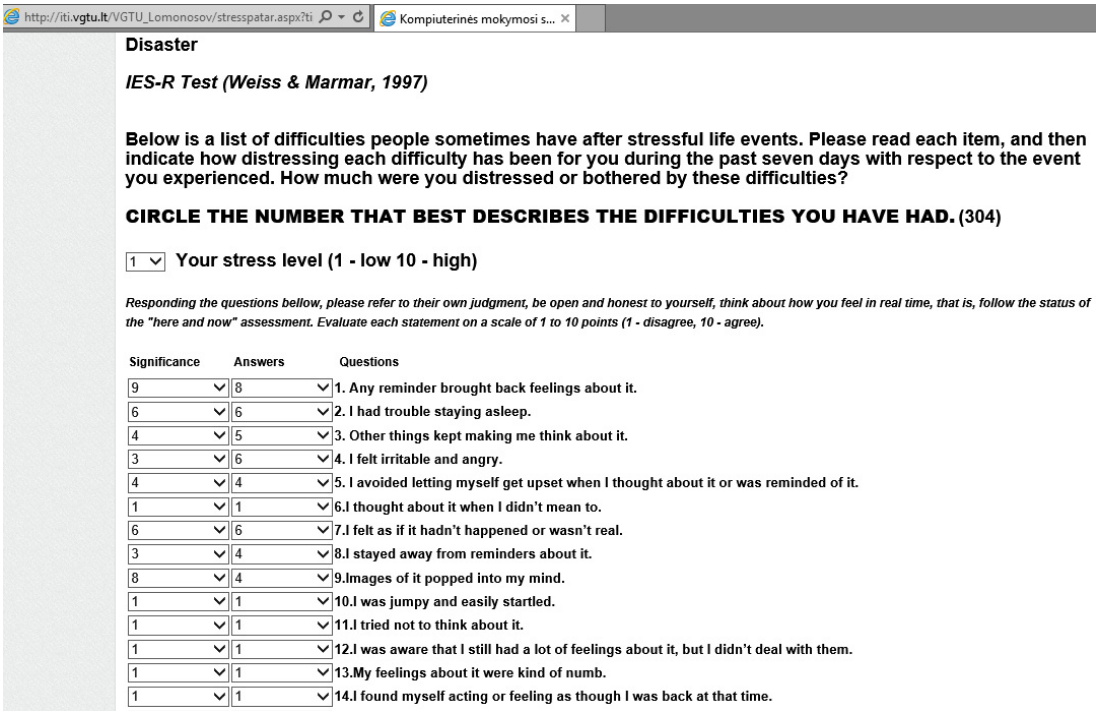

Figure 1. Fragment of Biometric Advisory System to Analyze a User's Post-Disaster Stress Management

Some examples of these worldwide systems will be briefly described below.

Traditional empirical correlations and models have found insufficient to predict the flooding velocity accurately mainly because there are many kinds of random packings which exhibit different characteristics (Liu et al. 2014). Liu et al. (2014) propose a novel data-driven modeling method, i.e. ensemble least squares support vector regression (ELSSVR), to construct a unified correlation for prediction of the flooding velocity for packed towers with random packings. The flooding data are first clustered into several classes by the fuzzy c-means clustering algorithm. Then,