Fuzzy Control Model to Determine the Score in Virtual Reality-Based Appendectomy Practices

Alieski Véliz Vega[1](✉), Omar Correa Madrigal[2], and Vlada Kugurakova[3]

[1] Universidad de Las Ciencias Informáticas, Carretera a San Antonio de los Baños Km 2 ½, Havana, Cuba
veliz@uci.cu

[2] Universidad de Las Ciencias Informáticas, Carretera a San Antonio de los Baños Km 2 ½, Havana, Cuba
ocorrea@uci.cu

[3] Kazan Federal University, Kremlyovskaya St, 18, 420008 Kazan, Tatarstan Republic, Russian Federation

Abstract. Virtual Reality simulators allow surgical training in a safe and controlled environment. Through simulation, procedures can be repeated until a certain level of skill is acquired. This paper presents a fuzzy logic model implemented separately from the Virtual Reality simulator so that it can be used from other simulators. Multiple linear regression is applied for training using a Python library. The model is part of a self-adaptive model for a Virtual Reality-based surgery simulator.

Keywords: Appendectomy · Fuzzy logic · Surgery · Virtual reality

1 Introduction

Virtual Reality (VR) simulators are an important resource for skills training, especially if the practice of the real activity is costly and risky. The use of VR simulators offers the advantage of repeating procedures in a safe and less costly environment. VR technologies share the common characteristics of "immersion, perception and interaction with the environment" [1, 2]. Immersive environments provide a multisensory, playful, multimedia and interactive stimulus, and allows to control the stimulation conditions and repeat actions as in the real world.

VR has proven its effectiveness, particularly with the development of immersive simulators for training in areas such as medicine, rehabilitation, biotechnology, military industry, among others [3–7]. Medical training and especially in surgery has been an area that has explored the advantages of simulation. The need for surgical simulation stems from the advantages of safety and repeatability of procedures and its advantages over the traditional training.

The traditional paradigm of surgical training is based on the performance of procedures supervised by experts and based on the principle of observing, assist and operate.

R. Silhavy et al. (Eds.): CoMeSySo 2021, LNNS 232, pp. 899–906, 2021.
https://doi.org/10.1007/978-3-030-90318-3_70