Development of an Image Edition Module of the Interactive Training System

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Abstract. In this work we introduce the results of the development of the edition module of images of the projected system for the interactive training in the security area. Basically, the system of computational control is constituted of three parts: *2D-film exhibition control unit*, *control module*, and *edition module*. The *edition module* is responsible for identifying which regions of the subject who appear in the scene in each frame of 2D film will be considered fatal or not.

1 Introduction

The training systems currently used by companies of security and by civil and military police-officers do not allow for much interactivity. The security professionals are placed in situations where the targets are immovable or fixed, and therefore do not transmit the sensation of reality that the professionals will really have at the moment they will be doing their services. Therefore, a system where the user interacts with a virtual reality similar to the real life, was idealized by advanced techniques in the area of interactive interfaces, images processing and analysis, and computational intelligence.

To generate this interactivity, the system will show, in a canvas, a 2D-film with real situations of professional daily life, such as assaults, kidnappings, invasions, etc., using a projection which will generate subjects in real size (1:1). Using these images and sounds, we want to create a sensation of physical presence in the environment at the moment the situation is occurring. With a real weapon with silica ammunition, the user would have to take decisions, such as to decide the precise moment to draw the weapon and shoot. The film will react in accordance with the result of the shot. That is, after the shot, the system will be responsible for defining new sequence of images should be shown in the screen, depending on the user's shot performance.

The system is being developed by Linux.

2 Computational control system

The computer control system is composed for 3 main parts: *2D-Film Exhibition Control Unit*, *Control Module* and *Edition Module*.

The *2D-film exhibition control unit* is a player of films in MPEG or AVI formats (responsible for the sound and image). It will show the scenes of film and will be synchronized with the acquisition module informing the exact scene of the film at the moment of the bullet impact on the canvas. This scene is stored and later transferred to the *control module*.

The *control module* is responsible for the image analysis received from the *2D-film exhibition control unit* from the information of the position (x, y) received from the Module of acquisition. The objective is identifying the object inside the scene hit for the bullet (hit some subject? If it so, which one was it? outlaw or victim, and which part of the body) then will make some decision about the next scene to continue the 2D-film. For example, if the user has hit the outlaw in the region of the head or chest, the next sequence will show the outlaw being dead; if the bullet hit the target, in a non-fatal part of the body, the sequence will be shown where the outlaw was wounded. All the results of the user in the training system are analyzed by this module and later a performance evaluation report is generated.

The *edition module* that is jointed on the *control module* is responsible for identifying which regions in each picture of the 2D-film will be considered fatal or not (fatal is head and chest of the subject that appears in the scene). This module is available only to the authorized person for manipulation of the images. He/she can construct masks that identify the "keys" positions in the scenes of each 2D-film. The process of masks construction is realized manually. The parts of the image that will correspond to the fatal and wound levels are shown for each scene.