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Design of a Hospital Simulation Software for Nursing Education

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Abstract. This work aims to describe the inception and design for a hospital simulator based on data and cases provided by teachers and other randomized data. The main goal is to develop a computer software tool that simulates a hospital as a tool for nursing student. The system is based on a multi-agent model and multi threaded parallel processing. Other parts includes the interfaces for teacher and student, reports and fixed constraints like Laws and other rules. This is a work in progress project and will be released as open source software after the final validation.

Keywords. Nursing, Hospital, Simulator, Learning tool, Software, Design.

1. Introduction

People management on a hospital may be all things but simple, the main distribution of a hospital nurses depends on the rules of each country. In some cases, like in the United States, it can be divided in two main categories: Registered Nurses (RN) with associate degree and Licensed Practical Nurses (LPN) with a post-secondary non-degree award, the last one works under the direction of RN and Physicians [1].

This project aims to create a computer software that simulates the workflow at a model hospital, based on common cases (inpatients, illness types, employees jobs, etc.) and serving as a tool for nurse teachers and students, proposing situations from the simple normal operations to the challenging ones, like work overload or other non-normal circumstances.

2. Methods

The construction of the simulator is based on a multi-agent system (MAS) [3] [4] over a running timeline. At presentation level, the HTML5 standards was chosen for the deployment easiness. At backend level, the Python programming language [5] was chosen because this is the most known language by the developer at research team. For persistence, the PostgreSQL [6] database server was chosen for the same reason.

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3. Results

At this point, two user interface was defined: student and teacher. The student interface module permits all interactions between the simulator and the student. The teacher interface permits administrative tasks like reports, case insertions and students monitoring. The student module provides access to students interface where they may interact with the inpatients, staffand the hospital equipment.

Inside the main kernel, all processes works together handling the databases connections, events and communications with other modules like the interfaces and intelligent agents.

4. Discussion

This model aims to mimic the real situations encountered in a common hospital, where each patient are different from others and may request assistance at any time, in unpredictable order [2].

One of the challenging situations is that, depending on patient request, the service performed by some professional will lock the worker in that job for the time necessary to do the job (programmed by the teacher). Other important factor to student manage is the complexity of the procedure requested by the patient, the student must allocate the correct professional/time to the duty. In more critical situations the physician must be called to attend the patient [1].

Once that all simulations are performed with a teacher supervision, the validation will be executed in a determined period in the pre-release phase by the teachers itself in partnership with the project.

5. Acknowledgments

This project is a work-in-progress and aims to produce a most real possible simulation of the challenges encountered by nurses at a common hospital, although it's not fully concluded, the main structure will be released in open source model to attract other programmers focused in nursing technology.

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