Research Grants for PhD students from the China Scholarship Council

Information Form (please read the guidelines carefully on the website www-csc.utt.fr)

Supervisor's name : HAJJAM EL HASSANI   Given names : AMIR

Status (prof., assistant prof., …) : Maître de Conférences HDR

Laboratory : SINERGIES   Website address :

Institution : UTBM   Website address : www.utbm.fr

Scientific competence of the supervisor:

Amir Hajjam El Hassani is a researcher specializing in operational research, AI, and healthcare informatics. His work focuses on decision-support systems, predictive modeling, and optimization to improve medical decision-making and resource allocation. With expertise in mathematical modeling, algorithm design, and data-driven optimization, he has led numerous projects bridging theory and practice. His contributions to medical predictive analytics and intelligent healthcare systems have advanced patient care and hospital efficiency. As a supervisor, he promotes methodological rigor and interdisciplinary innovation.

Two major publications in the field proposed for the PhD :

1. w. liu & al. "Solving a multi-period home health care routing and scheduling problem using an efficient matheuristic." Computers&Industrial Engineering, https://doi.org/10.1016/j.cie.2021.107721 - IF 7,18 - Q1

2. j. decerle et al. "A hybrid memetic-ant colony optimization algorithm for the home health care problem with time window, synchronization and working time balancing.", Swarm and Evolut. Comput., IF 10,267 - Q1

Website address of the personal page : https://scholar.google.fr/citations?user=09DjYfAAAAAJ&hl=fr

Supervisor's email : amir.hajjam@utbm.fr

Description of the research work proposed for a PhD   **Topic # (see list) :** I-1, III-13

Title : Optimization of Caregiver Assignment in Rehabilitation Hospitals: An Integrated Approach Using Operational Research and Artificial Intelligence

Subject :

Rehabilitation hospitals, such as the CHU de Strasbourg in France or the Shanghai No. 3 Rehabilitation Hospital, play a crucial role in the functional recovery of patients after illness, injury, or surgery. These institutions must manage hundreds, or even thousands, of patients while ensuring optimal allocation of caregivers (doctors and nurses) based on their skills, working hours, patient priorities, and the time required per patient. Currently, this allocation is often done manually or semi-automatically, leading to inefficiencies, work overload, and prolonged waiting times. The aging population, with increasing life expectancy and the rise of chronic diseases, exacerbates this issue, necessitating innovative solutions to optimize the organization of human resources.

This thesis aims to design, implement, and validate an optimization system for caregiver allocation in rehabilitation hospitals. The objectives include modeling the allocation problem, designing efficient optimization algorithms, integrating artificial intelligence techniques for real-time adaptation, and validating the system using real-world data from institutions such as the CHU de Strasbourg or the Shanghai No. 3 Rehabilitation Hospital. An operational tool will also be developed to help managers plan and visualize allocations dynamically, thereby improving care efficiency and the satisfaction of both patients and staff.

Keywords :

Artificial intelligence in healthcare, Operational research, Metaheuristics, Machine learning applications, Decision support systems, Caregiver scheduling, Healthcare optimization, Aging population, Efficiency in healthcare,

Expected collaborations :

In France : CHU Strabourg and CHU Besançon
In China : Shanghai No. 3 Rehabilitation Hospital

Background required from the applicant :

Knowledge of optimization techniques
Knowledge of prediction and classification methods
Proficiency in programming languages such as Python (for modeling and data analysis) or Java/C++ (for high-performance algorithms).

Existence of a PDF file detailing the proposal ("yes" or "no") : yes

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