Presentation – AI1 – Check1

**Definition of the game or optimization problem to be solved**

Title: Patient Allocation in Hospitals Using Metaheuristics

Objective: Develop an optimization system for assigning patients to hospital beds, respecting capacity, specialty needs, and patient constraints.

Main Methods: Genetic Algorithms (GA), Simulated Annealing (SA), and Tabu Search (TS).

Motivation: Traditional or exact methods often fail to find feasible solutions quickly for large hospital instances; metaheuristics can handle complexity and provide near-optimal allocations in reasonable time.

**Related work with references to works found in a bibliographic search**

Previous Studies:

- Demeester et al. used Tabu Search for patient admission scheduling, ensuring feasible solutions quickly [].

- Arguello et al. applied a Greedy + Tabu approach, achieving ~6% near-optimal solutions faster than exact methods [].

- Hybrid GA + SA used for bed assignment, improving solution quality over pure SA [].

- Multi-objective GA for ICU bed allocation saved up to 10% more beds vs. other heuristics [].

Conclusion: Metaheuristics are robust for large-scale patient allocation, balancing capacity, costs, and patient needs.

**Formulation of the problem as a optimization problem (solution representation, neighborhood/mutation and crossover functions, hard constraints, evaluation functions)**