# PANDE AZIZI 2023-B291-12779

# AI Coursework 1

#### ****Suitable Search Strategy and Justification****

A suitable search strategy for this problem is A\* Search.

**Justification for A\* Search.**

**Informed Search & Efficiency:** The problem has a clear goal (specific emergency location and hospital). Unlike BFS or DFS which blindly search, A\* uses a heuristic function to guide the search towards the goal, making it far more efficient for a large search space like a city map.

**Optimality:** A\* is **optimal** (finds the best path) if the heuristic function is **admissible** (never overestimates the cost to the goal). This is essential for an ambulance dispatch system where finding the quickest route can be a matter of life and death.

**Effective Heuristic:** An excellent admissible heuristic for this problem is the **straight-line distance** (Euclidean distance) from the current node to the goal node (either the emergency location or the hospital).

When going to the emergency: h(n) = straight\_line\_distance(n, emergency\_location)

When going to the hospital: h(n) = straight\_line\_distance(n, hospital\_location)

Straight-line distance is always less than or equal to the actual road distance (or time), satisfying the admissibility condition.

**Real-World Applicability:** A\* is the foundational algorithm behind most modern mapping and navigation systems (like Google Maps). It efficiently finds the minimum-cost path in a graph, which directly translates to the shortest or fastest route in a road network.