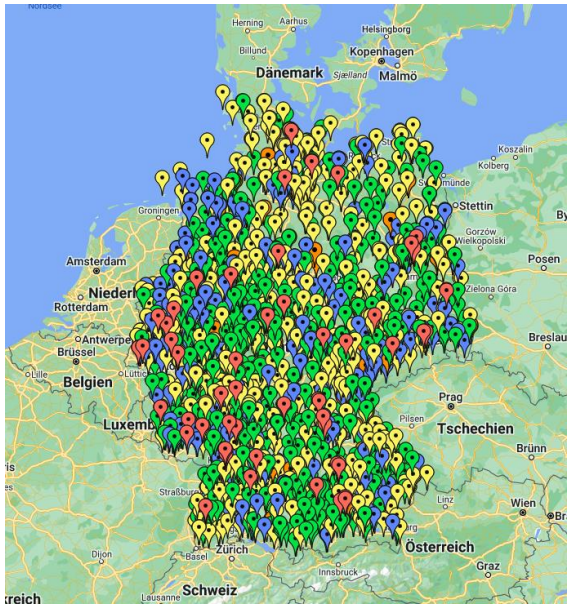
Topic 3: Agentic AI - Demand-Driven Simulation & Planning

Goal: *Agentic AI for Demand-Driven Hospital Planning in Germany*

Project Description:

Patients in Germany can freely choose hospitals regardless of their home region, and there are currently no formal criteria for when or where hospital visits occur. However, hospital supply (both geographically and in terms of specialization) strongly influences patient flow. This project proposes an **agentic AI system** that simulates a demand-driven hospital landscape by modeling regional demand from historical and forecasted medical data (e.g., DRGs, population forecasts), and **recommends optimal hospital placements and specializations** to meet future needs. The AI agent iteratively plans and adapts its decisions based on constraints such as location demand, medical specialization requirements, and demographic shifts.



Research Questions:

- What would an **optimized, demand-driven hospital infrastructure** look like for the coming years?
- Which regions and specializations are under- or over-supplied, based on current and projected demand?
- How can an **agentic AI system** autonomously propose hospital locations and services under various population and demand scenarios?

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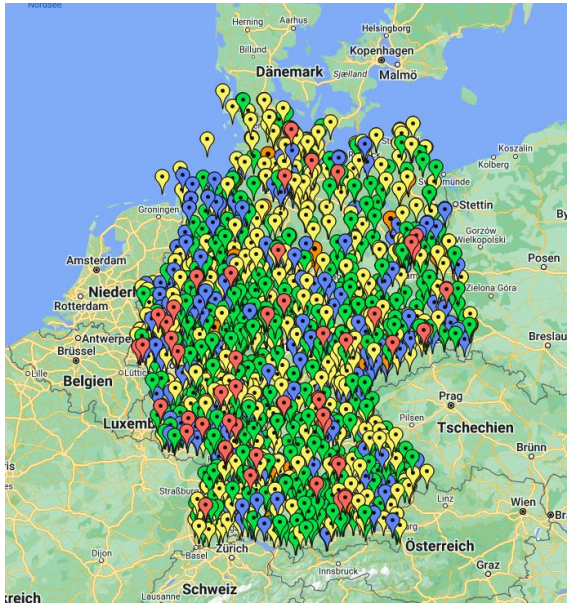
Tasks:

- Integrate DRG data, population forecasts, and service specialization clusters by region.
- Analyze historical patient flow patterns and regional utilization trends.
- Design a planning agent that allocates hospitals and specializations based on simulated regional demand.
- Incorporate constraints such as population growth, service type distribution, and hospital capacity.
- Simulate different planning scenarios (e.g., aging population, regional imbalance, demand spikes).
- Build an interactive prototype or dashboard that visualizes AI-driven hospital planning suggestions.



Expected Outcome:

- An **agentic simulation model** that autonomously generates demand-based hospital and specialization recommendations.
- A **geospatial planning prototype** mapping proposed hospital locations and service offerings.
- A **web interface dashboard** scenario simulations showcasing how the system adapts to changes in regional demand.

Data:

- DRG (Diagnosis-Related Group) data for all inpatient cases in Germany, broken down by region (2011–2023) using standardized regional codes.
- Mapping of DRGs to service clusters (e.g., orthopedics, neurology).
- Destatis forecast of population by age group and region through 2025.