HealthDashboard: A Urban Public Health Geospatial Visualization Platform

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Motivation

- Smart Cities
  - Use of technology to achieve efficient usage of urban resources
    - Urban information
    - Evidence-based policymaking
- InterSCity project
  - A collaborative research project from the National Science and Technology Institute (INCT) of the Future Internet for Smart Cities
Context

- Significant growth in healthcare data from health facilities
  - Information helpful to public managers

- Large collections of heterogeneous data
  - Hard to analyze without proper visualization tools

- Collaboration with a Municipal Health Secretariat to develop a large-scale data visualization platform
- Brazilian National Health System (SUS): ~190 million users
- Hospital Information System (SIH-SUS) (hospitalization dataset)
- Covers around 70% of hospitalizations in Brazil
  - 285 million since its creation
- SIH-SUS contains:
  - Administrative information
  - Patient information (age, gender, race, residence, ...)
  - Health facility where the patient was admitted
  - Health logs about the hospitalization (specialty, diagnosis, duration, ...)
Initial Testing Dataset

- 1-year SIH-SUS dataset from the city of São Paulo
  - Over 500K hospitalization records
  - Dataset enriched with geolocation
  - Uses the census tract for the patient residency, **not the exact patient address** (for geo-anonymization)
  - Census tract enable us to get sociodemographic data from the census
Development Approach

- **Government-Academia** collaboration
  - Practices from **Open Source Software** communities and **Agile Methods**

- Partnership based on constant feedback
  - Requirement specifications and discussions via Gitlab Issue Tracker
  - Frequent meetings
  - Health officials’ validation in a homologation environment
Technical Overview

- Web application
  - Advanced Geo-Search
  - General Data
- Built using Ruby on Rails framework
  - Model-View-Controller architecture
- PostgreSQL database
  - Using Redis as a cache server
Acute Myocardial Infarction
Distance Traveled > 20km
Distance Travelled > 20km
Dengue (Winter)
Dengue (Summer)
# Database

**Source:** Sistema de Internações Hospitalares SUS - SMS/SP  
**Total records:** 554202  
**Territory/Unit of analysis:** Município de São Paulo  

### Selected Data (based on filters)

**Total records:** 788  
**Main diagnosis (ICD-10):** I21 - Infarto agudo do miocárdio  
**Travelled Distance (Km) between:** 20 - 84.5
Future Work

- Update 2015 dataset to **2018 and 2019**
  - 1,142,966 hospitalization records
- Benchmarks and performance oriented improvements
- Official release and wide publicity to public health managers
  - More feedback to evolve the platform
- Spread to other Brazilian cities
  - e.g. Rio de Janeiro
  - Uniform open data format across the country helps
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https://interscity.org/software/healthdashboard