Pandemic Information System Model

SYSTEMS AND METHODS FOR BIG AND UNSTRUCTURED DATA

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FIRST DELIVERY
NEO4J PROJECT

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add personal codes

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Todo list

1 Introduction

1.1 Problem Specification

We represented a population of XXX people in the USA.

fill with population size

The database receives data coming from tracing applications that use sensor in smartphones, wearable objects or other devices to understand whether two people had a contact; data includes date and time of the contact.
Some places, like restaurants, theaters and hospitals, collect date and name of visiting people.
The idea is to use this database so that, if a person gets positive, we can understand who are all people who had a contact with him/her. Contacts are of different types: in family (since people from the same family are always in contact), in a location (if someone is positive, we alert people who were in the same location on the same day) or are given by an application using sensors. Data are recorded from 02/2020 and can be used for analytical purposes.

1.2 Hypoteses

Vaccine date, date of the last contagion, date of the last negative test fields, healing date are optional fields: a person is positive if the contagion date is after the date of the last negative test; people can do tests without being infected; people can decide not to get the vaccine; vaccinated people can get infected; people who healed from covid can do tests after healing.
We also assumed that people can get covid at most once (realistic if we consider antibodies); in this way we can use data to build statistics.
Members of a family are all the people who live together, relatives who see each other very often or roommates. Obviously, all members of a family live in the same city.
When adding data about people going to places, we do not consider distances between the city where they live in and the location they go to. So, they can reach different places in different cities during the same day, assuming they do this in different moments.
Regarding places we have: people who got covid after 18/10 went to places from 18/09 to 17/10, since we assume that later they are in quarantine; all the others went to visit locations from 18/09/2021 to 17/11/2021. We don't retain previous data since it is useless for the queries. Moreover, if a person becomes positive, we alert all people who were in the same location in a span of time going from one hour earlier to two hours later than when the person went there. We assumed that hospitals also record people who are hospitalized for covid reasons and people can go to hospitals to make a visit (this is different from hospitalization). For simplicity, for people who are in hospital date of hospitalization and contagion coincide; we also assume they leave the hospital on the healing date.
If a person becomes positive, we alert all people who were in the same location in a span of time going from one hour earlier to two hours later than when the person went there. In this way we alert: the ones who went there one hour earlier but may still be there and the ones who arrived after the infected and may have met him/her.

In order to populate the database, we imposed that every person visits from 6 to 10 locations.

2 Database

2.1 ER Diagram

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2.2 Dataset description

We used three types of nodes: Person, Location and City. People are characterized by their name and surname, birthdate, city, email, social security number, vaccine date, date of the last contagion, date of the last negative test and healing date. People can be linked by family relationships. Locations have a name and a type (restaurant, theater, hospital); type is used so that the dataset can be easily expanded with new types of location. Possible relationships are:

- `WENT_TO` to track people who visited a location at a certain time;
- `IN_FAMILY` for family relationships;
- `IS_IN` between locations and cities;
- `LIVES_IN` to link people to the city they live in;
- `HAS_MET` to indicate contacts between people using tracing app or devices;
- `IS_HOSPITALIZED_IN` to indicate people who are/were hospitalized for covid reasons.

2.3 Queries

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2.4 Commands

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3 Application

3.1 Description

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3.2 User Guide

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4 References and sources

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