CovidSim PHASE II

The extent here is to provide fundamental capabilities to make the program as it stands an engine for the simulation of different populations of different characteristics that interact with one another. For example, Population 1 might be a Long Term Care Unit, and Population 2 might represent Office work, and Population 3 retail low-touch workers.

The Turing Tape

The first capability is to enter an instruction stream to the program that resets parameters at time T(x1), and stops at time T(x2).

With this automation function, we can program multiple inputs for times T1, T2, T3 etc. We need to find ways to capture the states at these times, so a review can take place later of the trial.

CHECKPOINT and RESTART

This ancient concept is needed if we don’t run CovidSim either as pure code on multiple data sets simultaneously, or as virtual processes.

Rather we can store the complete state at a specific time T(x) and later restart CovidSim by restoring the state and proceeding. If this work is not too difficult, compared to the effort of running multi-processor CovidSim or going into Linux, we will proceed in this direction, as it offers the more general solution.

The MULTIVERSE

When we can run the same code with different data, we have the ability to model interconnected spaces which have different susceptibility and risk profiles.

We would need a control structure above CovidSim which would be able to define specific populations with their size, rules and risk profiles.

The abstraction of different populations would permit us to have a multiverse of:

WORK PLACES, HOMES, RECREATION AREAS or

ACUTE CARE, DAY CLINICS, EMERGENCY ROOMS, LONG TERM CARE, DETOX CENTERS, COMMUNITY AT LARGE, SINGLE UNIT HOUSING, APARTMENT BUILDINGS.

The ground truths of the flow of persons between different abstract populations is often known, and this can then form a probability distribution that can be used when a population-data set is restarted to add new infected persons,

GENETIC ALGORITHMS – ADAPTIVE ALGORITHMS

The notion of a genetic algorithm is that of a random change to a parameter, the result of which drives the system either to extinction or closer to a goal state.

Even a simple model like CovidSim has enough parameter states that from a given start configuration, a goal state can conceivably be reached in minimum steps through possibly different combinations of parameters.

However, if we add a cost function to the reduction of parameters, the possibility of finding solutions to the goal state within the constraints (Time Intervals, Cost boundaries) may be zero, so that some relaxation of constraints may be needed as well.

Thus we come to the concept of ADAPTIVE ALGORITHMS that attempt to reach a goal state, either with or without cost parameters.

INTERVENTIONS

We come to the point of the multiverse simulation of different spaces – that different configurations and susceptibilities may need different interventions in order to maintain or reach a goal state. Thus, an entity such as a health authority might find that the clinics and facilities have various susceptibilities and risks that call for different strategies for intervention (maybe even at best cost tradeoffs).

These concepts can be extended in different ways to larger contexts…..cities and villages, metropolitan areas and rural areas, states and countries, at different granularities of detail.

Another approach within an abstract universe is to locate any internal clusters, and apply constraints just to that region, to localize the imposition of constraints. In the same way, one might model the multiverse as a collection of postal codes, and consider a fine granularity of interventions, such as more testing and contact tracing within that zone, or restricting more travel, or stricter lockdown and monitoring (such as Korea and Taiwan).