

User Manual

December 23, 2020

1 Introduction

The following is a manual for usage and extension of code for creating a digital town and synthetic population for highly-granular ABM simulations of COVID-19. The details on the model, software, its functionality, and accompanying database can be found in our manuscript and its supplementary material. This manual instead gives a more general overview of the code and its usage. This manual is under development and will be progressively improved for the next couple months. For basic information the user is also referred to the **README.md** file at the root of the repository.

The software is functional on MacOS and Linux, it most likely will not work as is on Windows. It requires Python 3.X. Some testing functionality is written in MATLAB, but those scripts can readily be replaced by Python 3.X, which is planned for the future.

The code is entirely open-source and questions, feedback, as well as collaboration are highly encouraged. To contact, email us or create a new GitHub issue. The email contacts are:

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2 Code structure overview

The code consists of several components, each providing a different type synthetic town: **abm_residential.py** creates households, **abm_public.py** creates schools, retirement homes, general workplaces, and hospitals, and **abm_agents.py** generates the populations. Households and retirement homes can be merged for simulations where there is no distinction between them. The same holds for hospitals and general workplaces.

The **abm_agents.py** creates agents according to the Supporting Information of our manuscript. It generates individuals based on supplied age distribution, household and family structure. It places a portion of older adults in the retirement homes, assigns children to schools, and adults to workplaces.

3 Database

The entire database is available in the **New Rochelle** directory, with building coordinates, location types, and all the used census data. To create another town, one should make sure all this information is present in the exact form.

4 Testing

Testing of the code is part manual, through visual inspection and includes testing for various logical errors (e.g. whether retirement home residents are all above certain age and don't have workplaces assigned), and comparison with census. The latter is also used for verifying algorithm quality. Some of the performed tests are available in `tests` directory, but the rigorous verification of the output used in the ABM is also outlined in the `created_communities/covid_model` directory.

5 Usage

The user is referred to the Examples section until this section is developed.

6 Examples

The code for generating the population for the ABM is a complete example along with verification.

7 Extending the code

The user is encouraged to extend the code, contact us, and/or raise GitHub issues.

7.1 Terminology

The user is referred to our manuscript until this section is developed.

7.2 How to cite

If you find our software useful, kindly cite both the GitHub repository and the manuscript that describes it as: