Propoasl for COVID-19 call

Application for the maximization of the effectiveness of control and monitoring actions anti COVID-19
(C. Gentile, F. Furini, G. Stecca)

The proposed application aim to support the organization of control and detection actions taken during phases 2 and 3 of the COVID-19 emergency.

The underlying hypothesis is that the national healthcare system will need to manage data received from tracking and monitoring systems and, facing a time-limited capacity of delivery of COVID-19 tests, it must decide a temporal sequence and in particular for a timeperiod, a subset of potential infected persons to which delivery the test.

More in detail, the scenario consider the existence of a number of persons recognized as infected, associated with a red tag. By using contact and social interaction analysis, a number N of potential infected persons are identified and associated with a yellow tag. Some of these persons may recorded more contacts then others and in particular they entered in contact with other people, not infected, identified with a green tag. The application, considering a limited number K of tests, lower than N, will assign the avaliable tests in the time period to the subset of persons associated with yellow tag in order to maximize the number of persons with green tag will turn to yellow if the test will result positive (because in this case the yellow card will turn red).

In this way it will be possible to minimize the number of persons that, because their high number of contacts in the considered time period, could spread the more the infection during the leadtime from the acknowledgment of potential infection and when all the tests are delivered. In other terms, the application consider the risk of infection and maximize the effect of clearing of this risk in a scenario of time limited resources.

The Figures 1 and 2 schematizes the contact network.

The proposal is based on the extension of already published works, and in particular on the following paper: Cordeau J-F., Furini F., Ljubić I. (2019). Benders decomposition for very large scale partial set covering and maximal covering location problems, *European Journal of Operational Research*, 275:3, pp 882-896.

For the application, the proposal aim at modify and customize the code already released and available at https://github.com/fabiofurini/LocationCovering

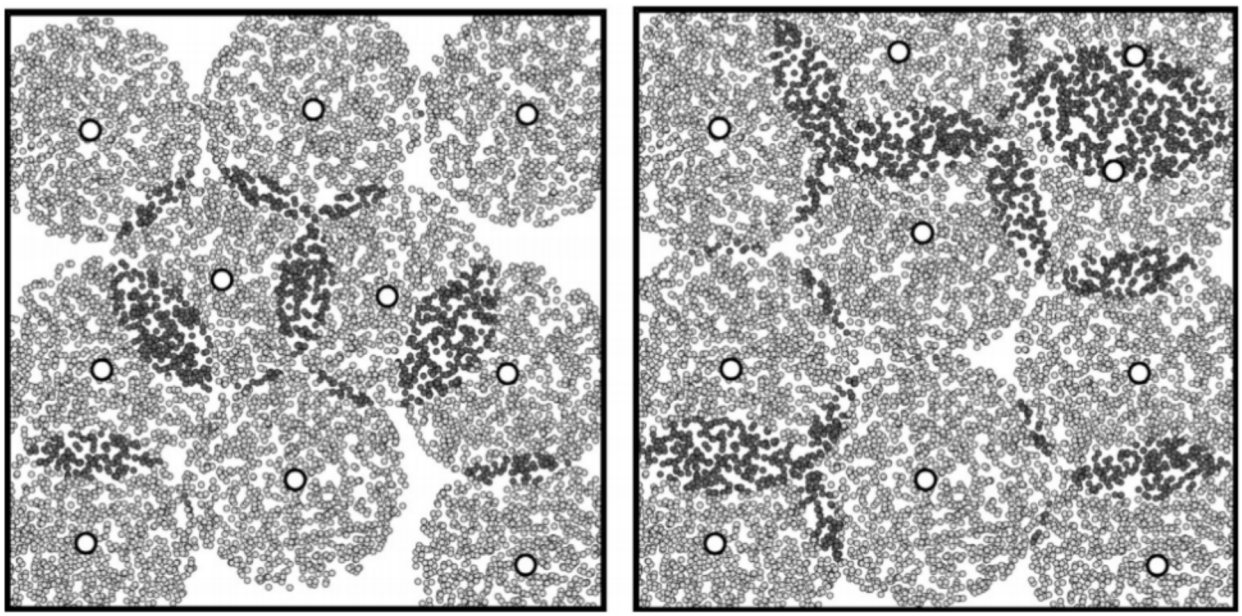

Figure 1: The white circles represent the potential infected (yellow tags) which are selected by the application, while the grey circles represent the not infected (green tags) which entered in contact with the potential infected (yellow tags).

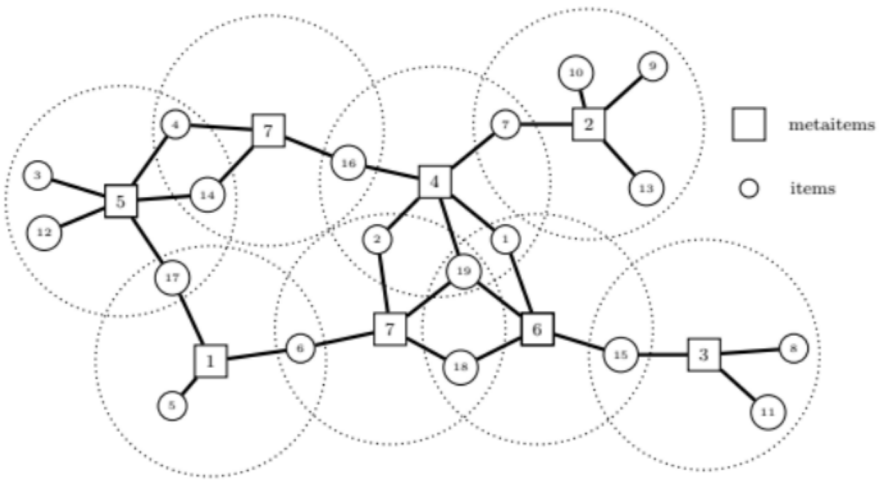

Figura 2: The squared nodes named “metaitems” represent potential infected (yellow tags) while the circled nodes, named “items” identify green tags entered in contact with yellow tags.