Here we present some MATLAB code accompanying the paper “Nash Social Distancing Games with Equity Constraints: How Inequality Aversion Affects the Spread of Epidemics”.

Functions and Scripts

Initialization: Defines the parameters of the model

Nash\_eq: Finds the unconstrained Nash equilibria

script\_1: Computes the values of J1 and J2 on a grid of points. Computes also the partial derivatives of J\_1,J\_2 with respect to u\_1 and u\_2

equ\_comp: Finds the set of pairs of points (u\_1,u\_2) that satisfy the conditions of Proposition 4.(iv)

gk\_computation: Computs function g^K\_{j\mu\_1,mu\_2)(u)

gL\_computation: Computs function g^L\_{j\mu\_1,mu\_2)(u)

find\_eq\_V\_C: Finds a set of GNE under the constraint V<=C, given C

plotting\_costs\_wrt\_C: Finds a set of GNE under the constraint V<=C, for several C

drawVfields: Draws the vector fields (see Example 3)

ode\_F\_randomizing: The right-hand side of the differential equation of Section 3 (players randomize between u\_m and u\_M

odefcn: The right-hand side of the differential equation where all players use deterministic strategies (u\_1,u\_2)

odefcn1: The right-hand side of the differential equation where all players use deterministic strategies (u\_1,u\_2), except some who deviate. It represent the coupled differential equation with the linearized system and the DE of the deviators.

To run an example, begin with *Initialization.m*, giving the desired parameters. This will provide also the Nash equilibrium of the unconstrained game. Then, run script\_1.m and *equ\_comp.m* to find the points where condition (iv) of Proposition 4 is satisfied. For given C, run *find\_eq\_V\_C.m* to find the set of GNE. Finally, run *plotting\_costs\_wrt\_C.m* to find the GNE, for several C. This script also computes the optimal GNE, for each given C and the bargaining solution.