```
;;Cap 9

globals [
  gini-index-reserve
  lorenz-points
]

turtles-own [
  sugar          ;; the amount of sugar this turtle has
         ;; the amount of sugar that each turtles loses each tick
         ;; the distance that this turtle can see in the horizontal and vertical directions
  visione-points   ;; the points that this turtle can see in relative to it's current position (based on visione)
  age            ;; the current age of this turtle (in ticks)
  max-age        ;; the age at which this turtle will die of natural causes
]

patches-own [
  psugar          ;; the amount of sugar on this patch
  max-psugar      ;; the maximum amount of sugar that can be on this patch
]
;;
;; Setup Procedures
;;

to setup
  if dotazione-massima-zucchero <= dotazione-minima-zucchero [
    user-message "Oops: the dotazione-massima-zucchero must be larger than the dotazione- minima-
zucchero"
    stop
  ]
  clear-all
  create-turtles popolazione-iniziale [ turtle-setup ]
  setup-patches
  update-lorenz-and-gini
  reset-ticks
end

to turtle-setup ;; turtle procedure
  set color red
  set shape "circle"
  move-to one-of patches with [not any? other turtles-here]
  set sugar random-in-range dotazione-minima-zucchero dotazione-massima-zucchero

  set max-age random-in-range 60 100
  set age 0
;; turtles can look horizontally and vertically up to visione patches
  ;; but cannot look diagonally at all
  set visione-points []
  foreach (range 1 (visione + 1)) [ n ->
    set visione-points sentence visione-points (list (list 0 n) (list n 0) (list 0 (- n)) (list (- n) 0))
  ]
```

```
  run visualization
end
to setup-patches
  file-open "sugar-map.txt"
  foreach sort patches [ p ->
    ask p [
      set max-psugar file-read
      set psugar max-psugar
      patch-recolor
    ]
  ]
  file-close
end

;;
;; Runtime Procedures
;;

to go
  if not any? turtles [
    stop
  ]
  ask patches [
    patch-growback
    patch-recolor
  ]
  ask turtles [
    turtle-move
    turtle-eat
    set age (age + 1)
    if sugar <= 0 or age > max-age [
      hatch 1 [ turtle-setup ]
      die
    ]
    run visualization
  ]
  update-lorenz-and-gini
  tick
end

to turtle-move ;; turtle procedure
  ;; consider moving to unoccupied patches in our visione, as well as staying at the current patch
  let move-candidates (patch-set patch-here (patches at-points visione-points) with [not any? turtles-here])
  let possible-winners move-candidates with-max [psugar]
  if any? possible-winners [
    ;; if there are any such patches move to one of the patches that is closest
    move-to min-one-of possible-winners [distance myself]
  ]
End
to turtle-eat ;; turtle procedure
  ;; metabolize some sugar, and eat all the sugar on the current patch
  set sugar (sugar - metabolismo + psugar)
```

```
  set psugar 0
end

to patch-recolor ;; patch procedure
  ;; color patches based on the amount of sugar they have
  set pcolor (yellow + 4.9 - psugar)
end
to patch-growback ;; patch procedure
  ;; gradually grow back all of the sugar for the patch
  set psugar min (list max-psugar (psugar + 1))
end

to update-lorenz-and-gini
  let num-people count turtles
  let sorted-wealths sort [sugar] of turtles
  let total-wealth sum sorted-wealths
  let wealth-sum-so-far 0
  let index 0
  set gini-index-reserve 0
  set lorenz-points []
  repeat num-people [
    set wealth-sum-so-far (wealth-sum-so-far + item index sorted-wealths)
    set lorenz-points lput ((wealth-sum-so-far / total-wealth) * 100) lorenz-points
    set index (index + 1)
    set gini-index-reserve
      gini-index-reserve +
      (index / num-people) -
      (wealth-sum-so-far / total-wealth)
  ]
end
;;
;; Utilities
;;
to-report random-in-range [low high]
  report low + random (high - low + 1)
end
;;
;; Visualization Procedures
;;
to no-visualization ;; turtle procedure
  set color red
end

to color-agents-by-visione ;; turtle procedure
  set color red - (visione - 3.5)
end

to color-agents-by-metabolismo ;; turtle procedure
  set color red + (metabolismo - 2.5)
end
```

Nota. Il file va riportato in netlogo

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;Modificato in parte da Massimo Campioni