System modelling and simulation

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https://github.com/ddworak/formin

formin

The algorithm

Configuration

1. **FSE** - foraminifera start energy; FSE ∈ [0,1] && FSE ∈ R.
2. **FRC** - foraminifera reproduction cost; FRC ∈ [0,1] && FRC ∈ R.
3. **FRT** - foraminifera reproduction threshold; FRT ∈ [0,1] && FRT ∈ R.
4. **FLAC** - foraminifera life activities(vegetation and movement) cost; FLAC ∈ [0,1] && FLAC ∈ R.
5. **ARF** - algae reproduction frequency; ARF ∈ N.
6. **AEC** - algae energetic capacity**;** AEC ∈ [0,1] && AEC ∈ R.
7. **SSR** - signal speed ratio; SSR ∈ N. Foraminifera speed is 1.
8. ~~**DFF** - diffraction factor; DFF ∈ [0,1] && DFF ∈ R.~~
9. **SPF** - global suppression factor of the signal; SPF ∈ [0,1] && SPF ∈ R.
10. **GS** - grid size**;** GS ∈ N, where map size is GSxGS.
11. **SC** - spawn chance, SC ∈ [0,1] && SC ∈ R.

12. **FSC** - foraminifera spawn chance; FSC ∈ [0,1] && FSC ∈ R.
13. **FSSV** - foraminifera start signal value; FSSV ∈ [-1,0] && FSSV ∈ R.
14. **ASSV** - algae start signal value; ASSV ∈ [0,1] && ASSV ∈ R.

Algorithm

Initialization

```
For X from 1 to IterationsNumber :
    If X==1 Initiate grid :
        Foreach Cell in Grid :
            R1 = RandomDouble_1
            R2 = RandomDouble_2
            If R1 < SC :
                If R2 < FSC : Cell = NewForaminiferaCell
                Else : Cell = NewAlgaeCell
            Else : NewEmptyCell
    Do Propagate Signal SSR times :
        Foreach SubCell in Grid :
            SubCell = CountSignalInSubCell()
```

Cell action

```
    Foreach Cell in Grid :
        If Cell==Obstacle : Cell = Cell
        If Cell==AlgaeCell :
            If X mod ARF == 0 :
                PickedCell = RandomEmptyCellFromSurroundings
                If PickedCell : EmptyCell = NewAlgaeCell
```

```
            Cell = Cell
If Cell = ForaminiferaCell :
            If Cell.Energy < FLAC :
                        Cell = NewEmptyCell
            If Cell.Energy > FRT :
                        Cell.Energy -= FRC
                        PickedCell = RandomEmptyOrAlgaeCellFromSurroundings
                        PickedCell = NewForaminiferaCell
                        If PickedCell==Algae :
                                    PickedCell.Energy += AEC
            Else :
                        Cell.Energy -= FLAC
                        PickedCell = RandomEmptyOrAlgaeCellFromSurroundings
                        If PickedCell :
                                    If PickedCell==AlgaeCell :
                                                Cell.Energy += AEC
                                    PickedCell  = Cell
                                    OldCellCoordinates = NewEmptyCell
```