Complex Adaptive Systems

Exercise

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Exercise 0.1 (individually)

Flipped classroom task on Mon 8.5.2023

Prepare a 10-15 minute talk on Chapter you chose from the James Gleick's book Chaos.

You may use slides + material beyond the book to explain the main leaning from your chapter. The idea of this task is to give everyone in the class an overview of the features on this new science of unpredictability.

After presentations we have a brief talk how and what features you find most relevant for planners to digest and what features would be nice to test out in a model.

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J. Gleick – CHAOS CHAPTERS

- The Butterfly Effect
- Revolution
- Life's Ups and Downs
- A Geometry of Nature
- Strange Attractors
- Universality
- The Experimenter
- Images of Chaos
- The Dynamical Systems Collective
- Inner Rhythms
- Chaos and Beyond

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Exercise 0.2 (individually or in pairs)

In the course exercise we will utilize Gama modeling platform (https://gama-platform.github.io/) to create a model of a dynamic urban phenomenon.

(1) **Learn GAMA** | Go Gama platform website to download and install Gama. You can get started by reading the tutorial and description of predator-prey model. The tutorial can be find on Gama platform Github website and models described in tutorial in Gama model library. In the tutorial building an agent-based model in Gama is described step by step.

(2) **Invent Your Urban Model** | Then select one of the models, tutorials or toy models, you are interested in and think about how to create your own model by applying it to some current urban phenomenon/issue in Finland. The idea is to create a working agent-based model during the course that simulates some 'bottom up' dynamics of the urban environment the group finds interesting.

(3) **Present your idea** | Present your initial findings on 10.5.2023.

(1)Learn GAMA - Suggested steps

- Get familiar with graphical user interface (GUI)

  https://github.com/gama-platform/gama/wiki/NavigatingWorkspace
- Test interesting tutorials, toy models etc.
- Learn step by step
  - Model organization (i.e. procedure structure)

    https://github.com/gama-platform/gama/wiki/ModelOrganization
  - Basic programming concepts (i.e. inside procedures)
    - Basic variables
    - Operators
    - Looping & Branching

    https://github.com/gama-platform/gama/wiki/BasicProgrammingConceptsInGAML

Find details from the Reference

https://github.com/gama-platform/gama/wiki/GamlReference

Tweak existing models and observe behavior!!!

(2) Invent Your Urban Model

You can start by:

- exploring the toy models of Gama library and select what interest you
- to think about which area would be suitable for you
- checking how to get GIS data if needed for the model
- thinking if there’s a behavior or other features in the model you would like to change
- at first stage keep it simple and add features to model later if needed