RW778: Implementation and Application of Automata, 2006
Week 3 Lecture 1

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Graphics Modelling with Cellular Automata

References:

1. Handout (ca.html)
2. Druon, Crosnier and Brigandat: Efficient Cellular Automata for 2D/3D Free-form Modelling.
3. Arata, Takai, Takai, Yamamoto: Free-form Shape Modelling by 3D Cellular Automata.

Graphics Modelling with Cellular Automata

Many applications of CA in graphics modelling:

- Cluster shape modelling
- Texture generation
- Virtual clay modelling
- Erosion of the bones
- Parallel particle systems
- Artificial life

Cellular Automata
Virtual Clay Model (Arata)

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- Repartition excess clay according to formula:

Cellular Automata
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For each block
    For each cell c over threshold
        $dm_k \leftarrow m_k * \alpha$
        $m_k \leftarrow m_k - dm_k$
    For each cell j under threshold
        $m_j \leftarrow m_j + (dm_1 + \ldots + dm_r)/n$

α: distribution rate (0.3)
dm_k: excess clay in cell k
r, n: number of cell over/under threshold

Cellular Automata: Examples
Virtual Clay Model (Arata)

Figure 4.1: Results obtained with repartition law 1

Figure 4.2: The density in the object is now homogeneous

Figure: Clay deformation with Druon's extensions: rule 1

Cellular Automata
Homework

Homework: Adapt your implementation of CA to implement 2D shape modelling (based on 2D CA). Generate a 2D graphical output representing the transformation. Bonus: Extend to 3D.