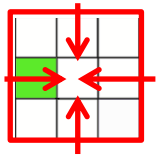
AGH University of Science and Technology

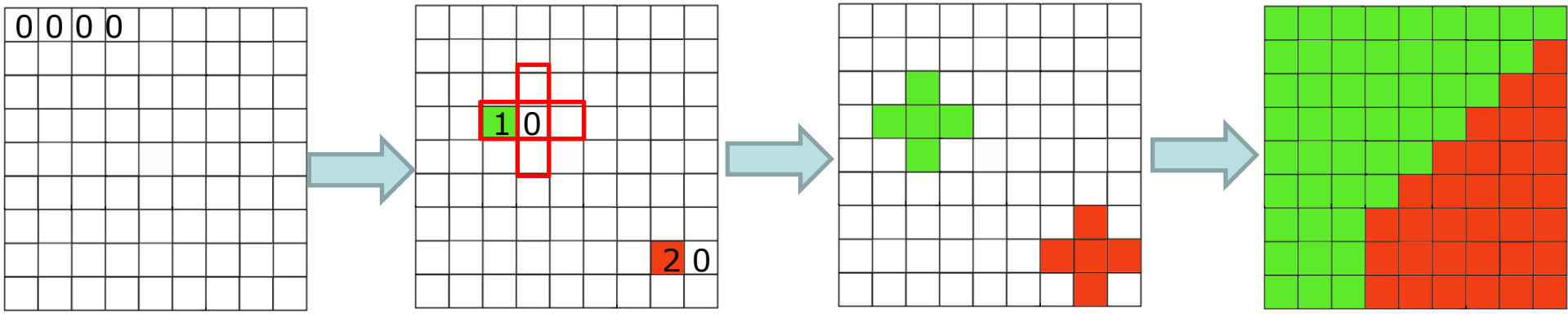
Multiscale Modelling

Faculty of Metals Engineering and Industrial Computer Science
Department of Applied Computer Science and Modelling

Simple grain growth algorithm (CA)

2 grains
Von Neumann neighborhood





Initial space

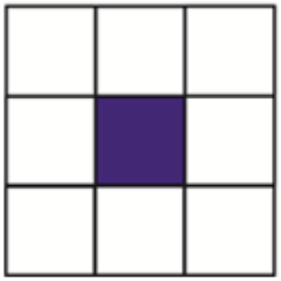
1st step

2nd step

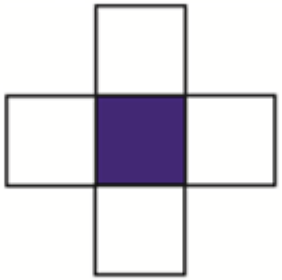
last step

Grain boundary shape control

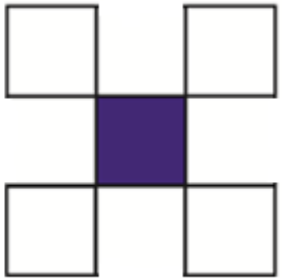
Moore

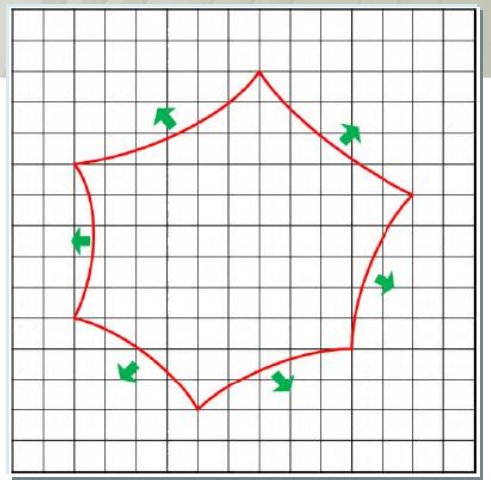


Nearest Moore

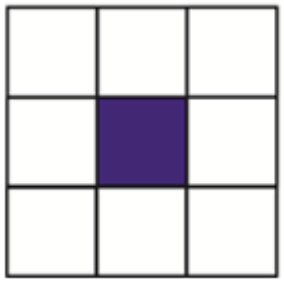


Further Moore

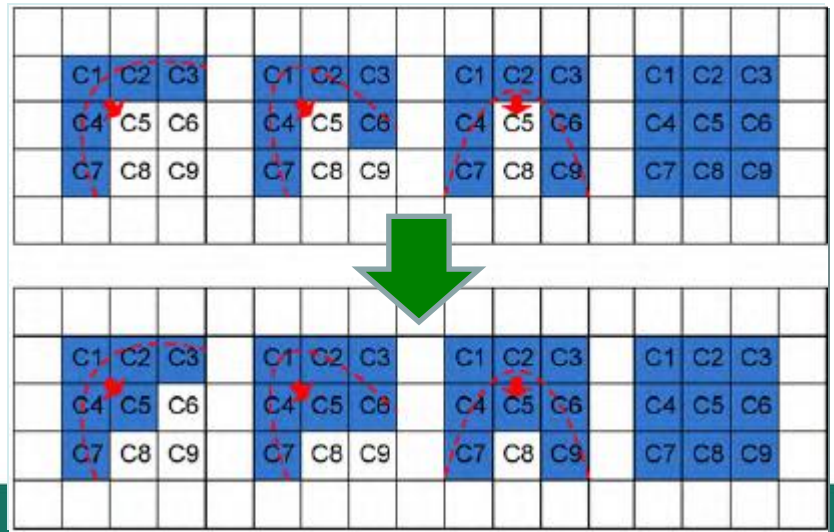




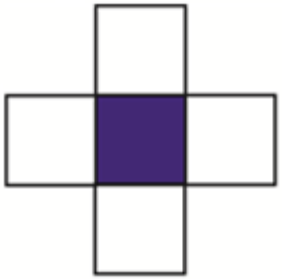
Rule 1:



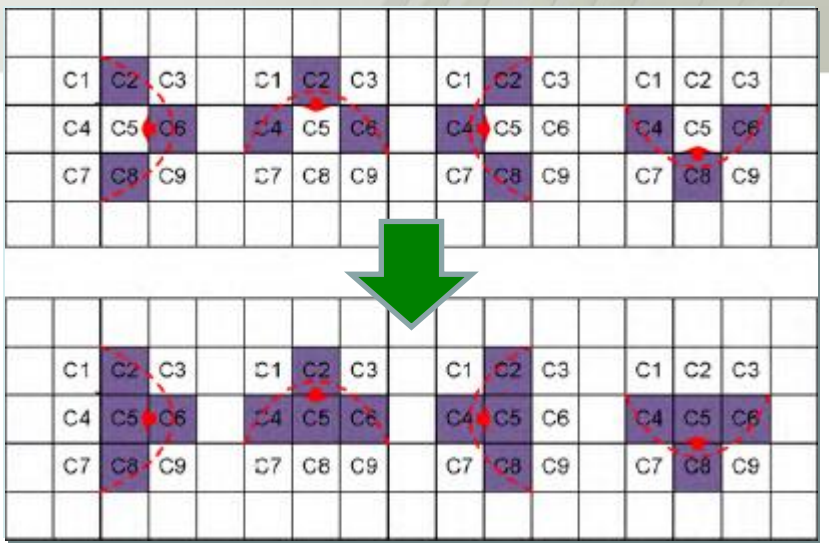
The id of particular cell depends on its all neighbors. If five to eight of the cells neighbors id's is equal to S, then cell transforms to the state S



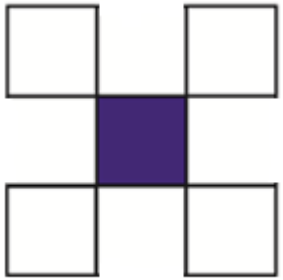
Rule 2:



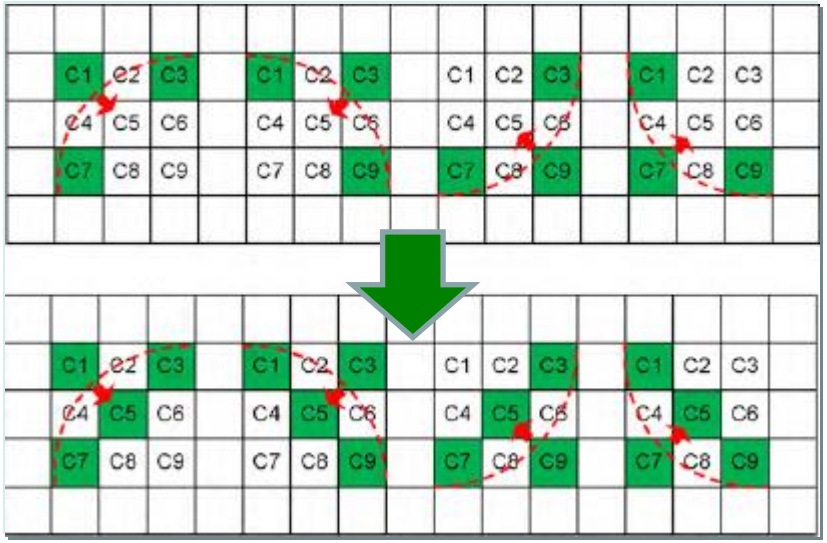
The id of particular cell depends on its nearest neighbors. If at least three of the cells neighbors id's is equal to S, then cell transforms to the state S



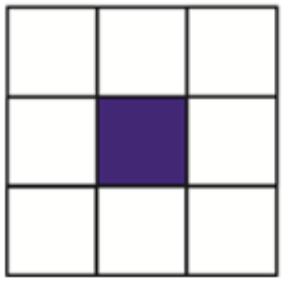
Rule 3:



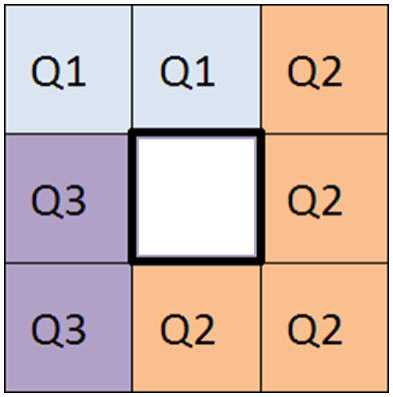
The id of particular cell depends on its further neighbors. If at least three of the cells neighbors id's is equal to S, then cell transforms to the state S



Rule 4:



The id of particular cell depends on its all neighbors, and has X % probability chance to change.

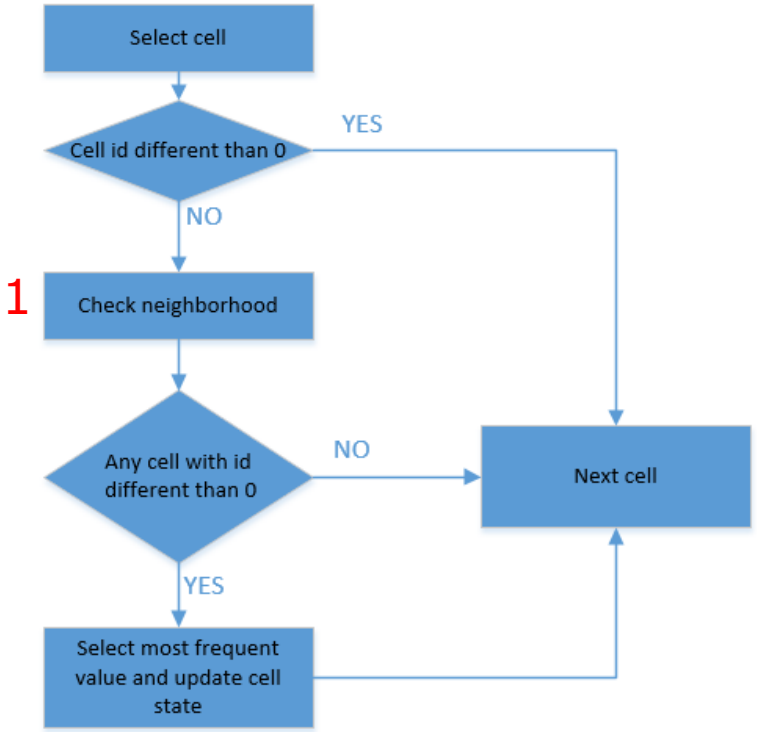


If random

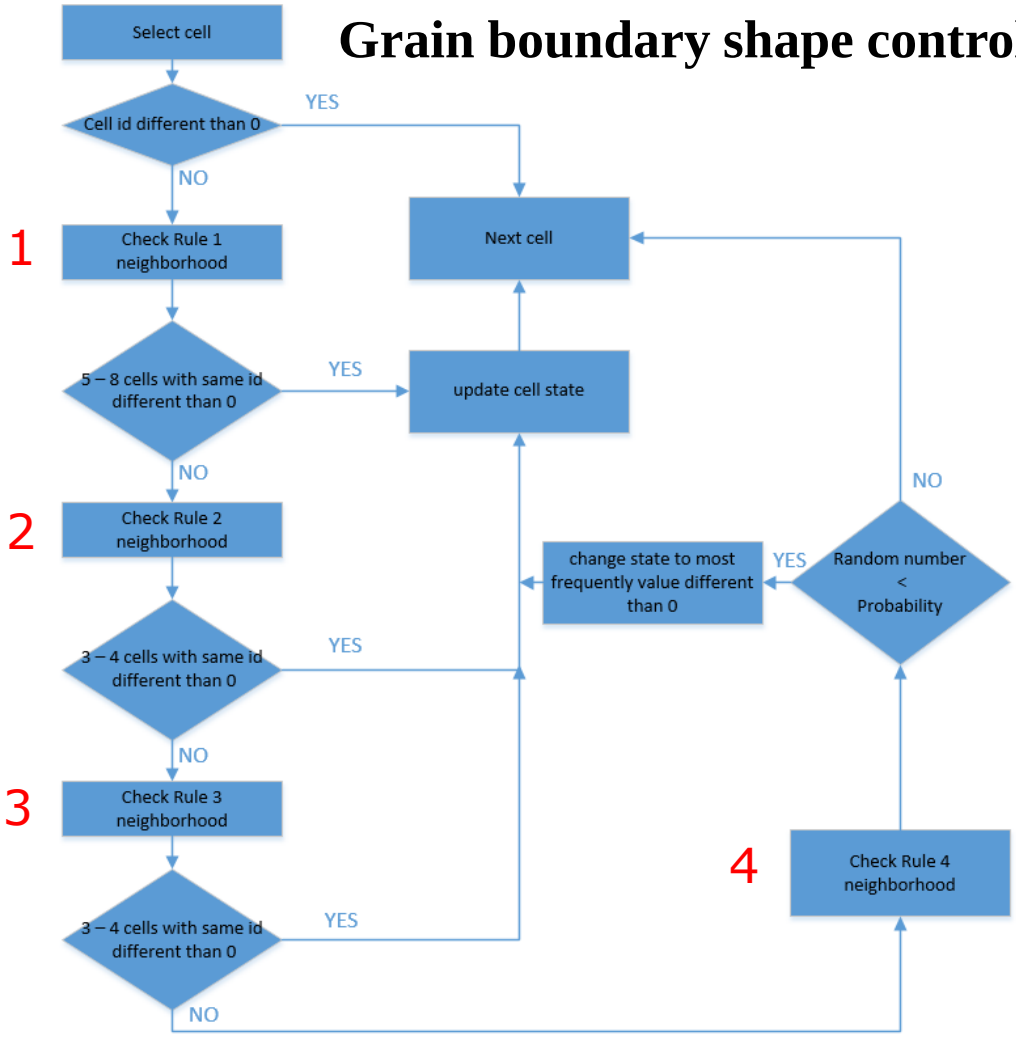
$n <= X$

$n \in (1-100)$

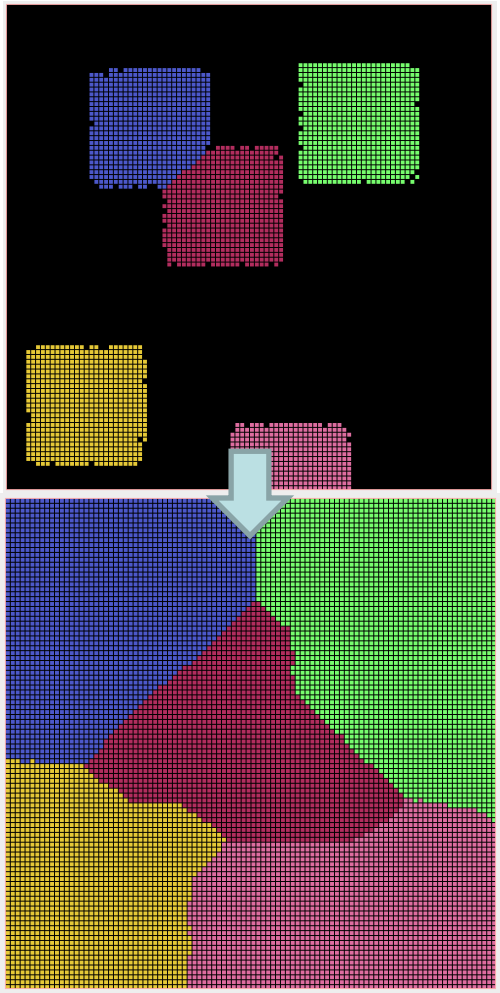
Simple Grain Growth CA algorithm



Grain boundary shape control



Example of grain growth with 90% probability for rule 4:



Example of grain growth with 10% probability for rule 4: