

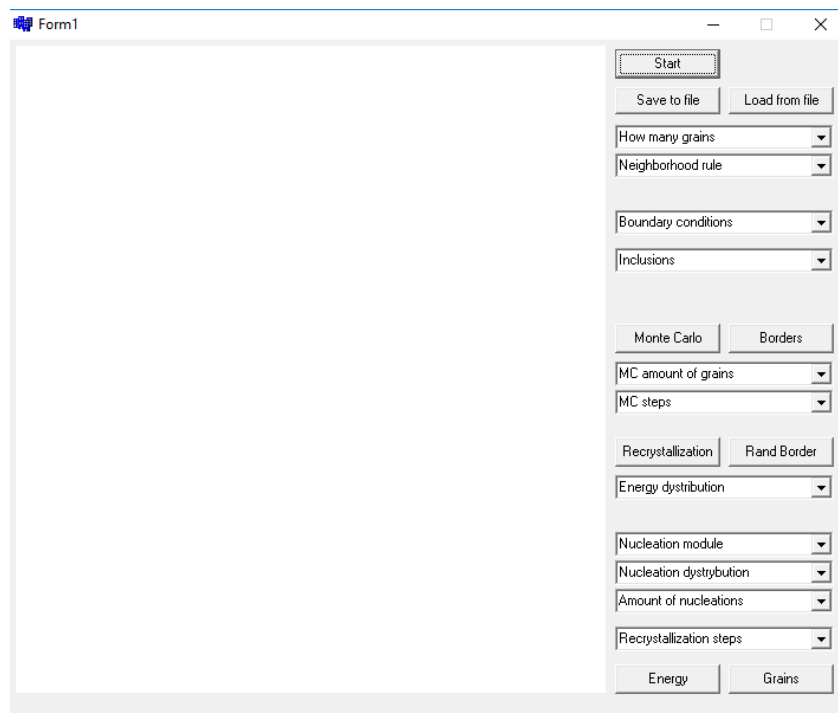
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Multiscale Modeling Report 2

1. Technology

Project is a continuation of my first project to grain growth applications. I'm still using a C++ programming language and build use a builder c++.

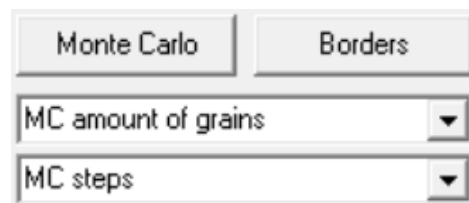
2. User Interface



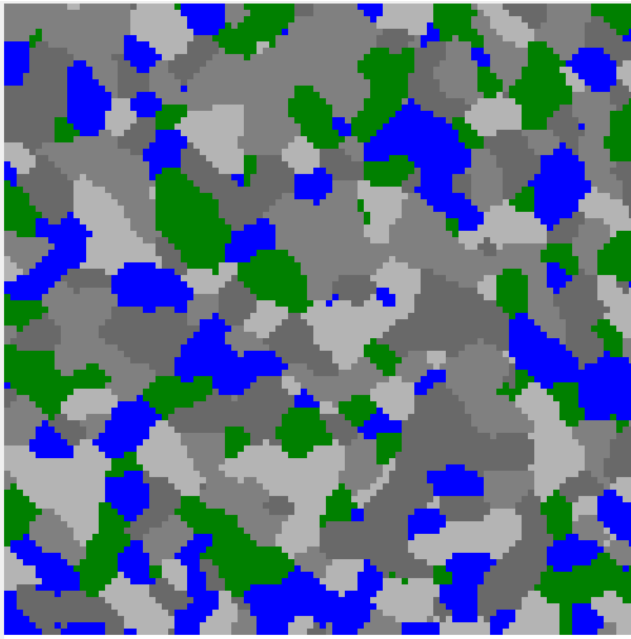
Picture 1 (GUI Application)

3. Application

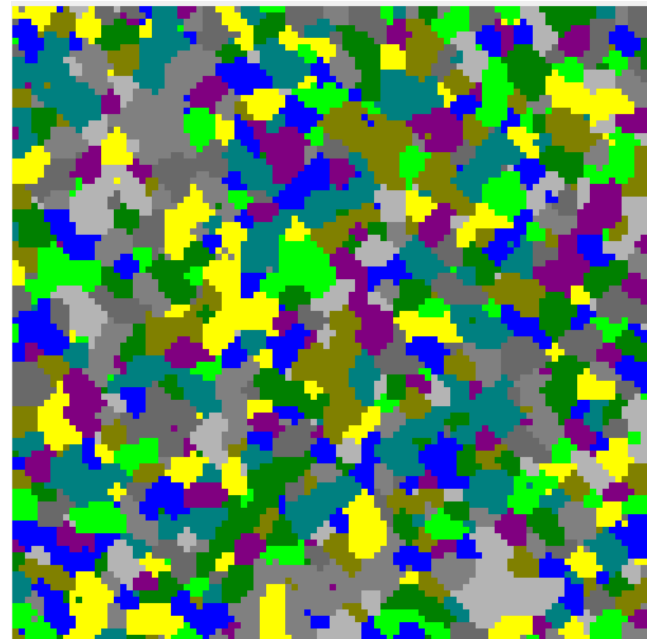
The application give us a possibility to generate and simulation grain structure, using a Monte Carlo Method. We can choose a number of grain and amount iteration.



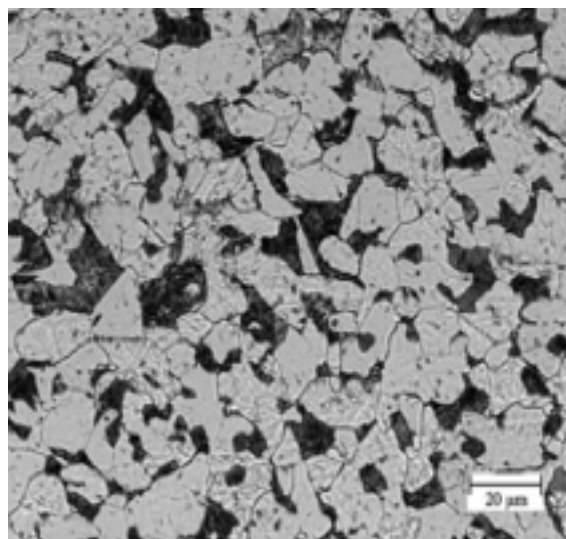
Picture 2 (Monte Carlo options)



Picture 3 (Monte Carlo 5 amount of grains
grains and 1100 iterations)



Picture 4 (Monte Carlo 10 amount of
700 iterations)



Picture 5 (real a carbon microstructure)

Compare simulating microstructure and simulation microstructure, I think that Monte Carlo giving a real realistic result. The structures are a similar.

4. Recrystallization

My program can simulate the recrystallization. We can choose two different options of additional energy distribution

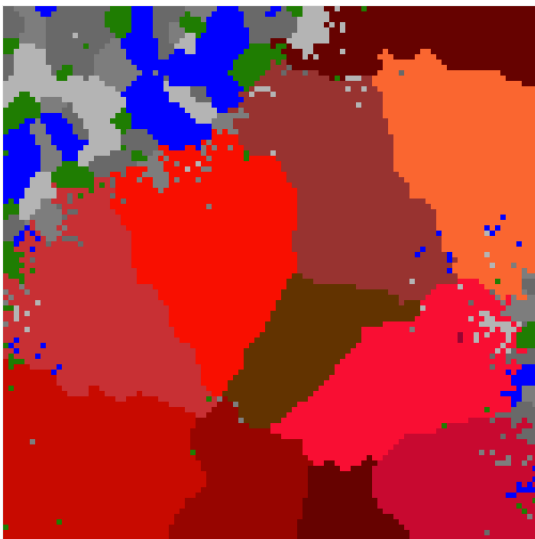
- homogeneous add same value of energy to all cells.
- heterogeneous can add two different values of the energy.

Nucleation has four options to use:

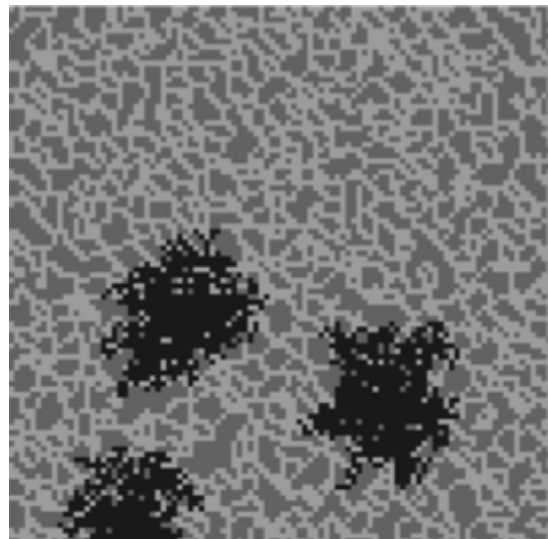
- Constant
- Increasing
- Decreasing
- Only the beginning

All options might be used on boundaries or anywhere.

Examples:



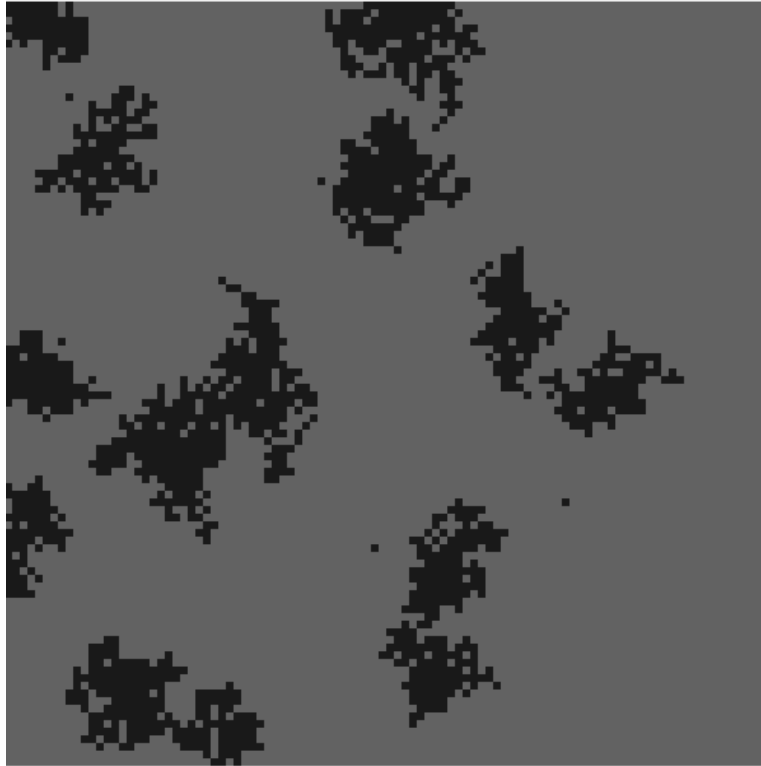
Picture 6
(homogeneous, 5 energy, increasing,
anywhere, 8 nucleations 10 000 steps)



Picture 7
(Simulation energy
heterogeneous recrystallization)



Picture 8 (heterogeneous, 4 bound energy, 5 grains
energy, constant, on boundaries, 13 amount
nucleations, 13 000 steps)



Picture 9 (example of simulation homogenous recrystallization)

5. Summary

In this project we can use a Monte Carlo method to simulate grain growth. Is a more advanced from Cellular Automata but its slower. The most important think in MC is a amount of iterations. Simulations is a real good option from constructions because is a cheeper and we can use a expending options to check various situations.