Course: Introduction to materials informatics

Tutorial 1

Title: Microstructure data generation

Questions

1. Write a code to generate a random microstructure [50% black, 100 x 100 grid size]
2. Write a code to generate 2 microstructures using nucleation and growth. Create Equiaxed and elongated morphology. Calculate fraction of grain boundary and grain interior. [50 grains, 100 x 100 grid size]
3. Write a code to generate 2 microstructures using Gaussian thresholding. Create Equiaxed and elongated morphology. Calculate fraction of grain boundary and grain interior. [100 x 100 grid size]
4. Generate 5 microstructures using voronoi tessellation

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Additional references:

Basics of python

https://www.utc.fr/~jlaforet/Suppl/python-cheatsheets.pdf

PYMKS (Material Knowledge System)

https://materialsinnovation.github.io/pymks/

Gaussian thresholding of noise

https://in.mathworks.com/help/images/ref/imgaussfilt.html

https://docs.scipy.org/doc/scipy/reference/generated/scipy.ndimage.gaussian_filter.html

Voronoi tessellations

https://in.mathworks.com/help/matlab/math/voronoi-diagrams.html