

# MM3110 Assignment 6 Part-1

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## 1 Problem 1

The source code for this question is in the file *pt1q1.m*

For a  $50 \times 50$  computational grid with 500 grains and a velocity vector of  $0.6\hat{i} + 0.6\hat{j}$ , the output image obtained is shown below.

The gif file showing the microstructure evolution of these equiaxed grains with 2 as the frequency at which output files are written is labelled *equiaxed\_evol.gif*

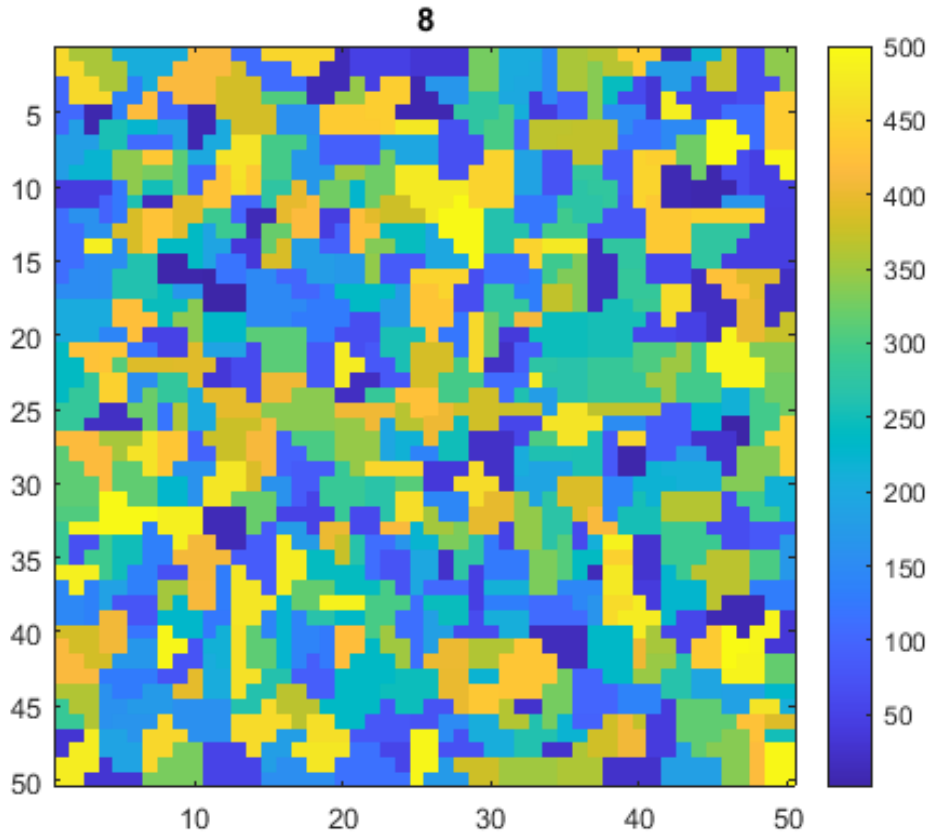


Figure 1: Output image of the evolved microstructure having equiaxed grains

For a  $50 \times 50$  computational grid with 500 grains and a velocity vector of  $0.6\hat{i} + 0.4\hat{j}$ , the output image obtained is shown in Figure 2.

The gif file showing the microstructure evolution of these elongated grains with 2 as the frequency at which output files are written is labelled *elongated\_evol.gif*

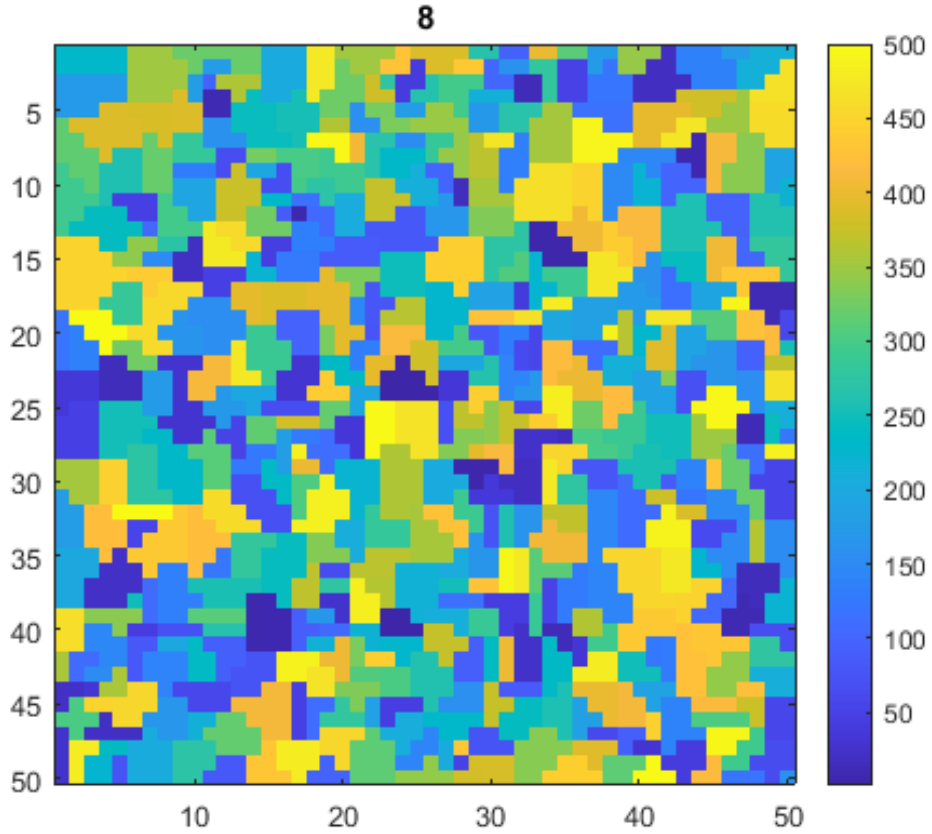


Figure 2: Output image of the evolved microstructure having elongated grains

## 2 Problem 2

The source code for this question is in the file *pt1q2.m*

For a  $1024 \times 1024$  computational grid having 100 grains:

Fraction of grain boundary pixels and triple point pixels = 0.0260

Fraction of grain interior pixels = 0.9740

The total computational time taken for the above calculation was 5 seconds.

For a  $1024 \times 1024$  computational grid having 500 grains:

Fraction of grain boundary pixels and triple point pixels = 0.0566

Fraction of grain interior pixels = 0.9434

The total computational time taken for the above calculation was 1127.88 seconds.

### 3 Problem 3

The source code for this question is in the file *pt1q3.m*

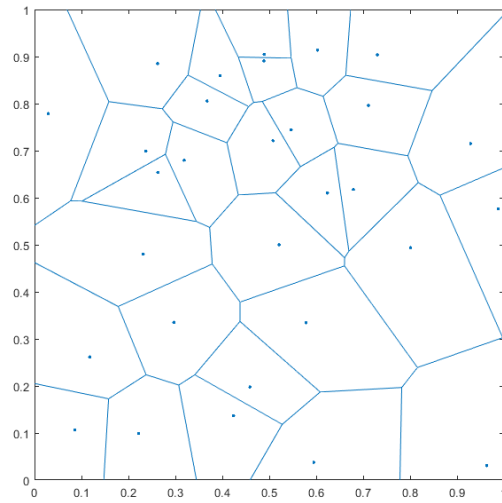


Figure 3: A digital microstructure generated using Voronoi tessellation with 30 grains as input