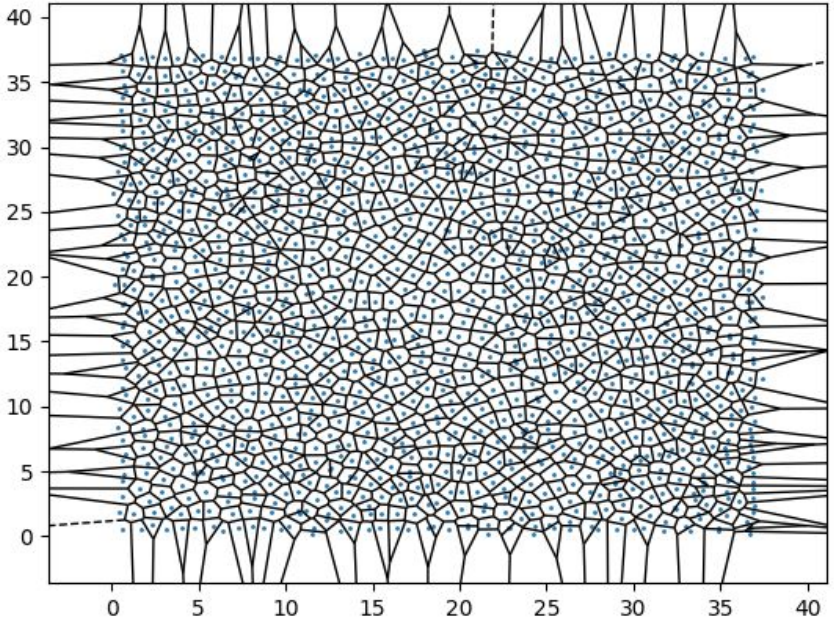
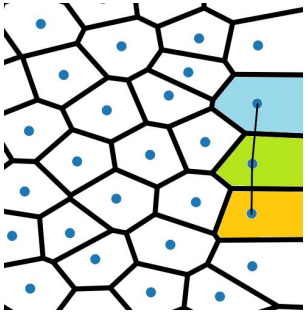
Analyzing the effect of mechanical properties of cellular processes on cellular packing patterns using unsupervised machine learning

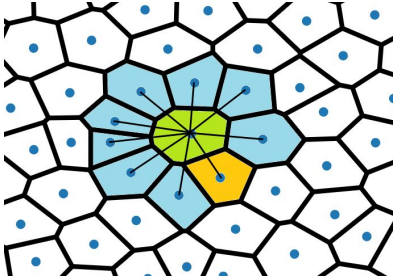
SCIComp 9502B Project
Yasamin Modabber
251390444

Finding a tool to quantify local structure

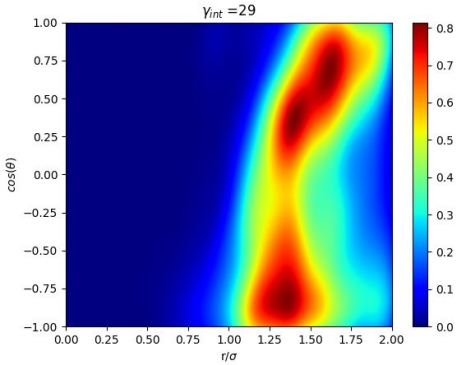


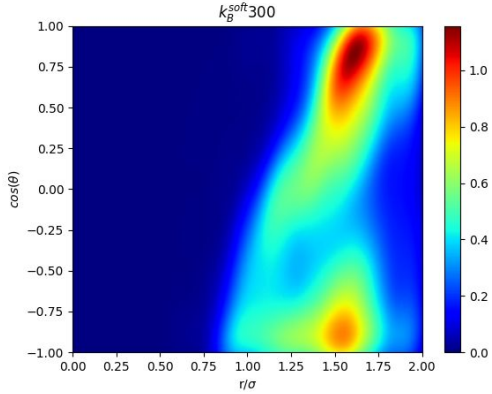
Voronoi diagram

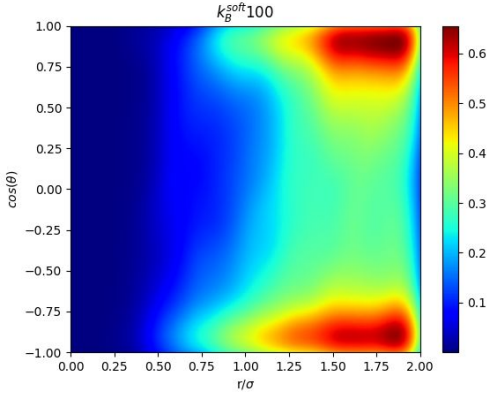


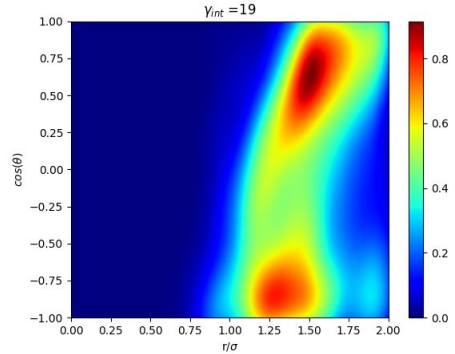


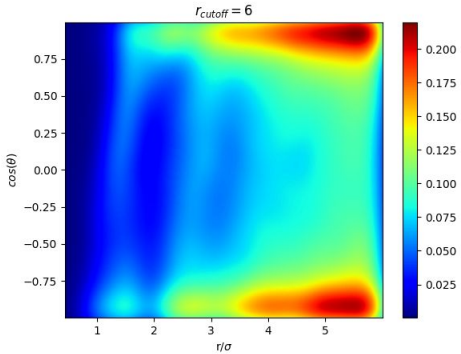
G3 distribution function





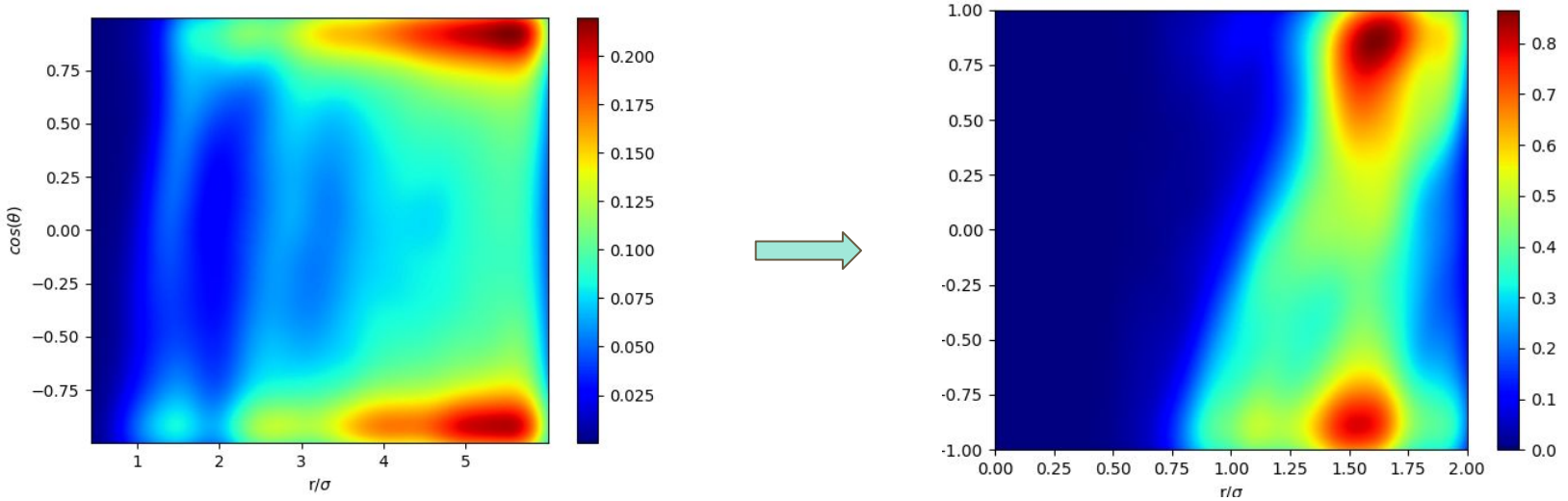




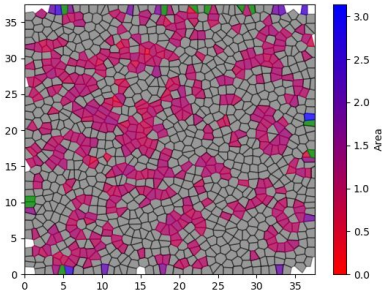


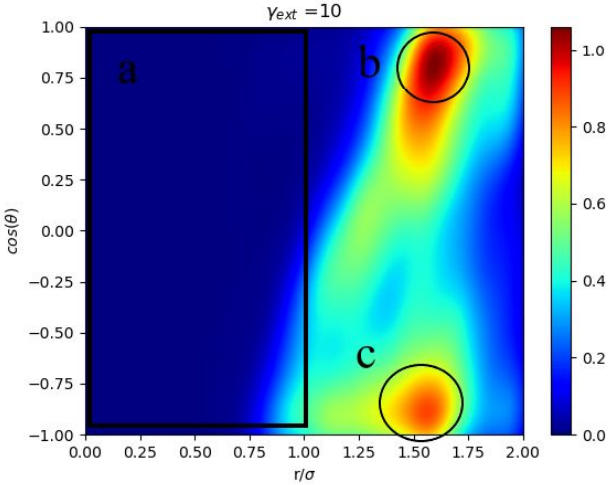
$$g_3(r,\theta)$$

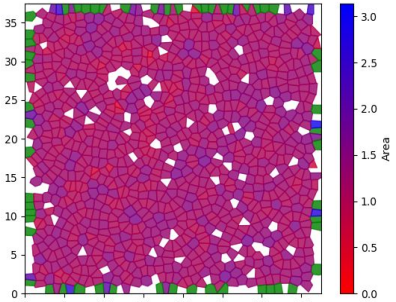
Finding a good cutoff radius

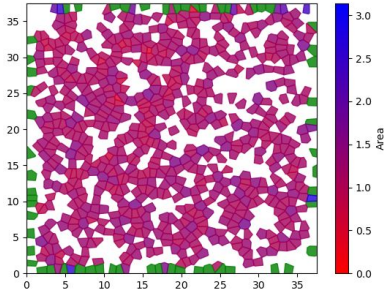


Points of interest









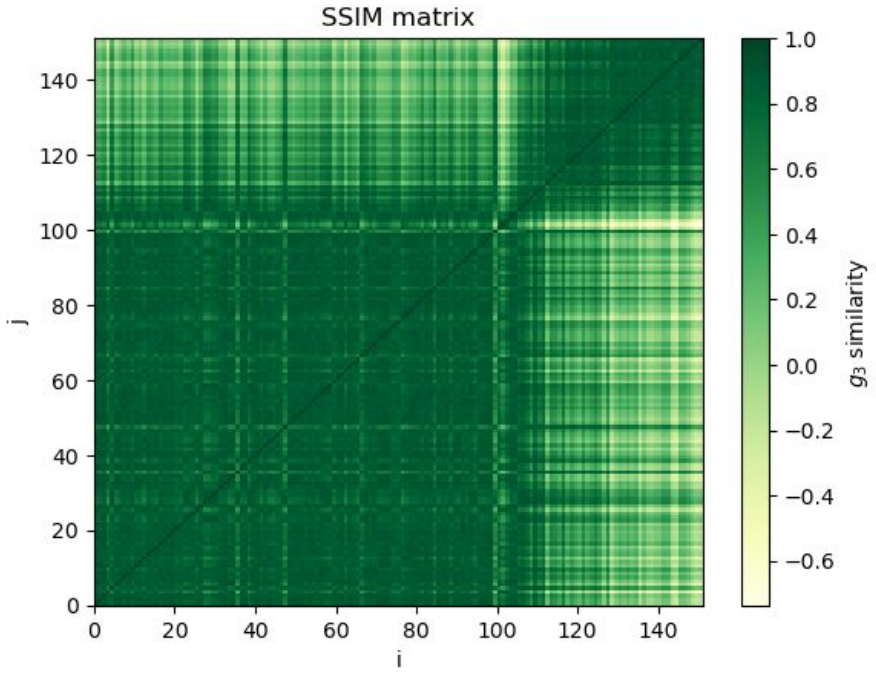
A metric for finding similarity between different distributions

$$\mathrm{SSIM}(x,y) = \frac{(2\mu_x\mu_y + c_1)(2\sigma_{xy} + c_2)}{(\mu_x^2 + \mu_y^2 + c_1)(\sigma_x^2 + \sigma_y^2 + c_2)}.$$

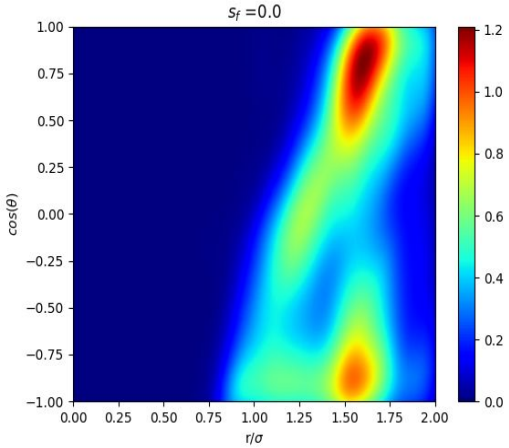
$$\sigma^2 = variance$$

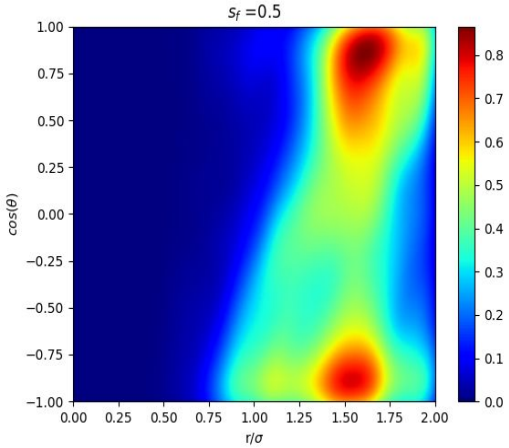
$$\sigma_{xy} = covariance$$

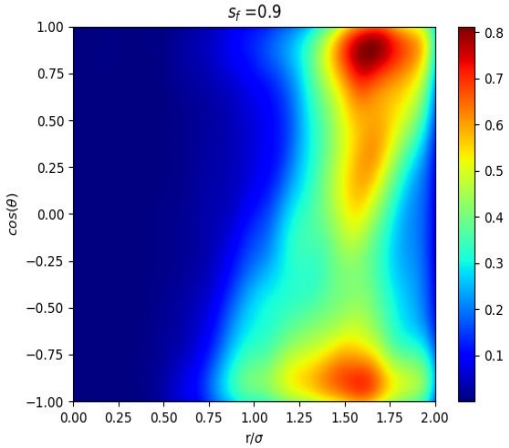
$$\mu = mean$$

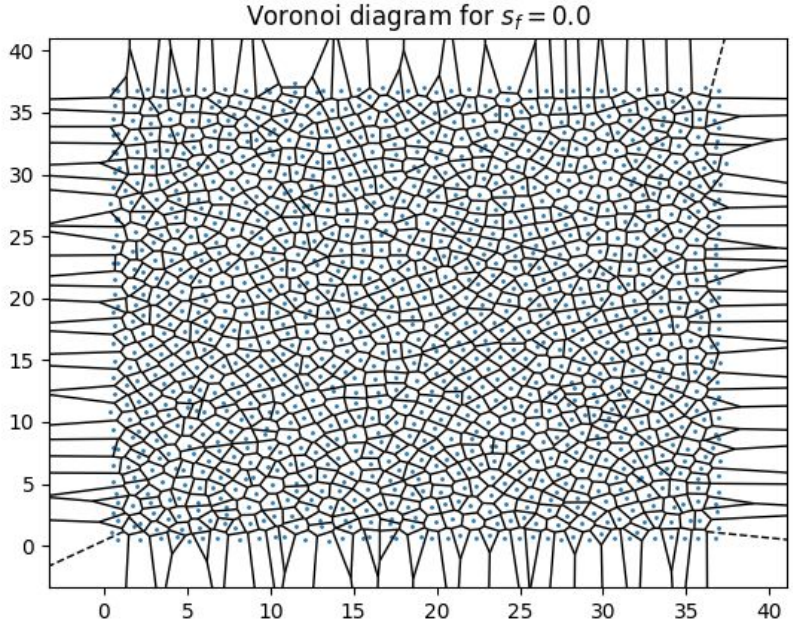


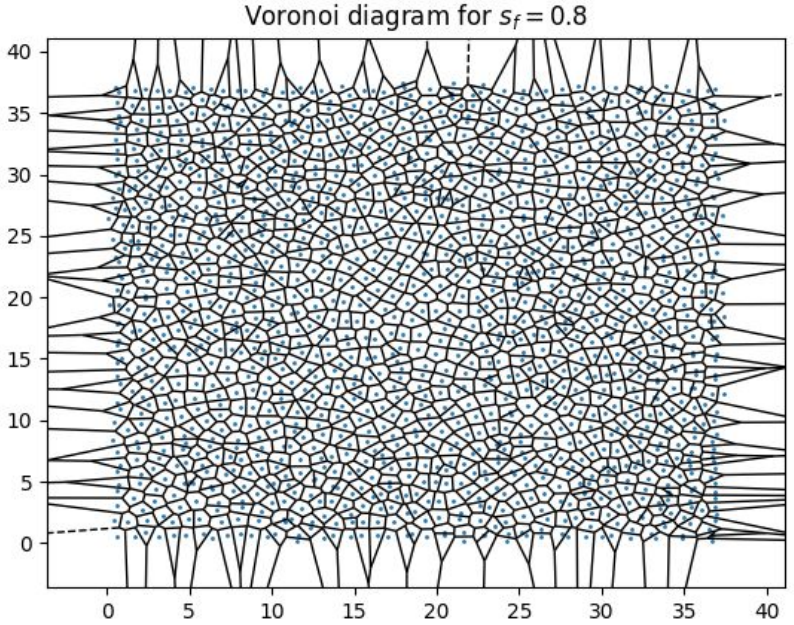
g3 distribution for different values of Sf



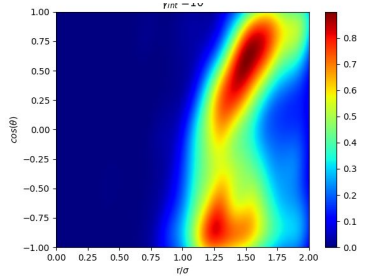


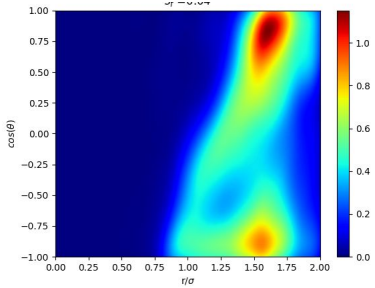


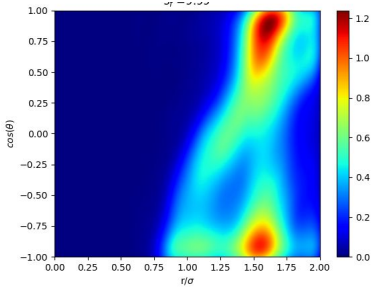

Voronoi diagram for $s_f = 0.0$
0
5
10
15
20
25
30
35
40

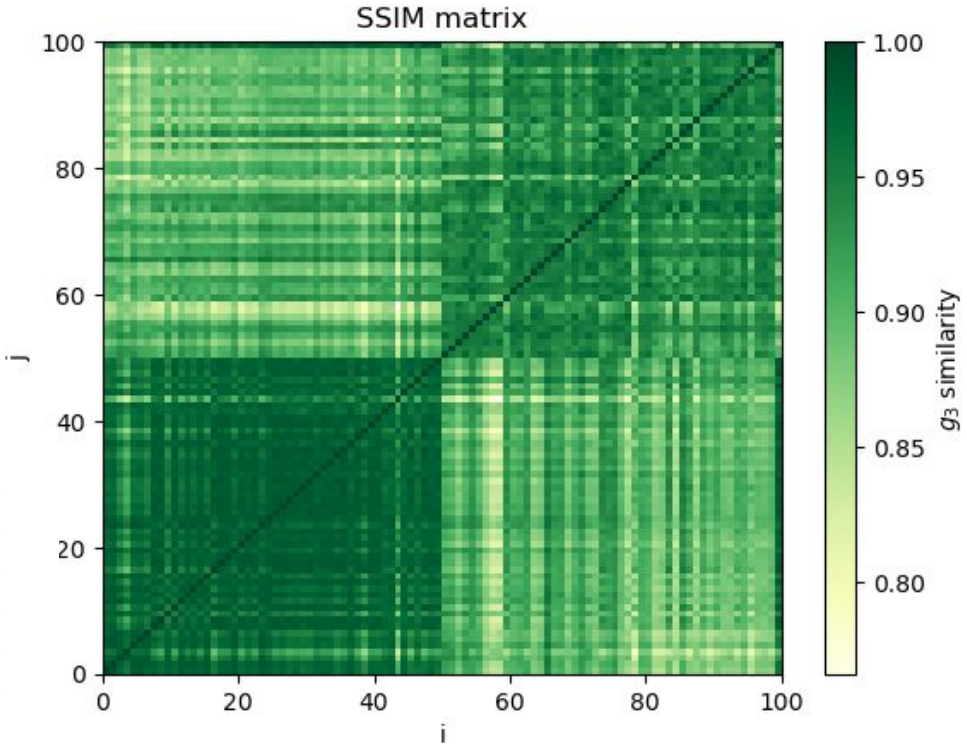

Voronoi diagram for $s_f = 0.8$
0
5
10
15
20
25
30
35
40

The importance of choosing a good size for the system

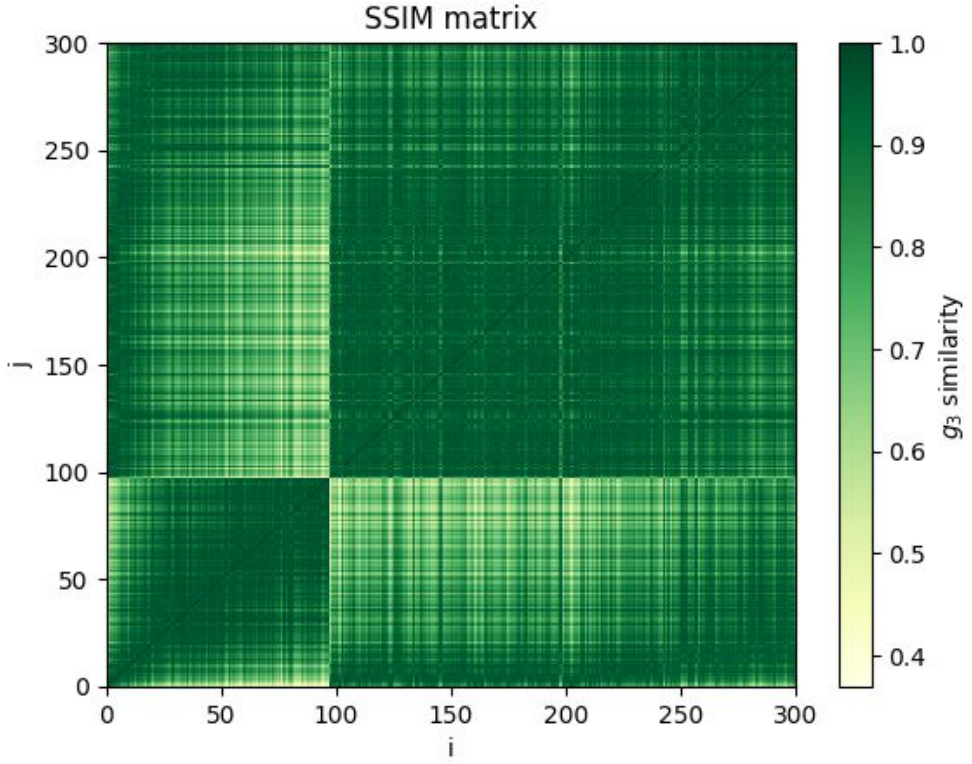








Sf, inter-membrane friction and medium friction



The effect of medium and inter-membrane friction on critical sf