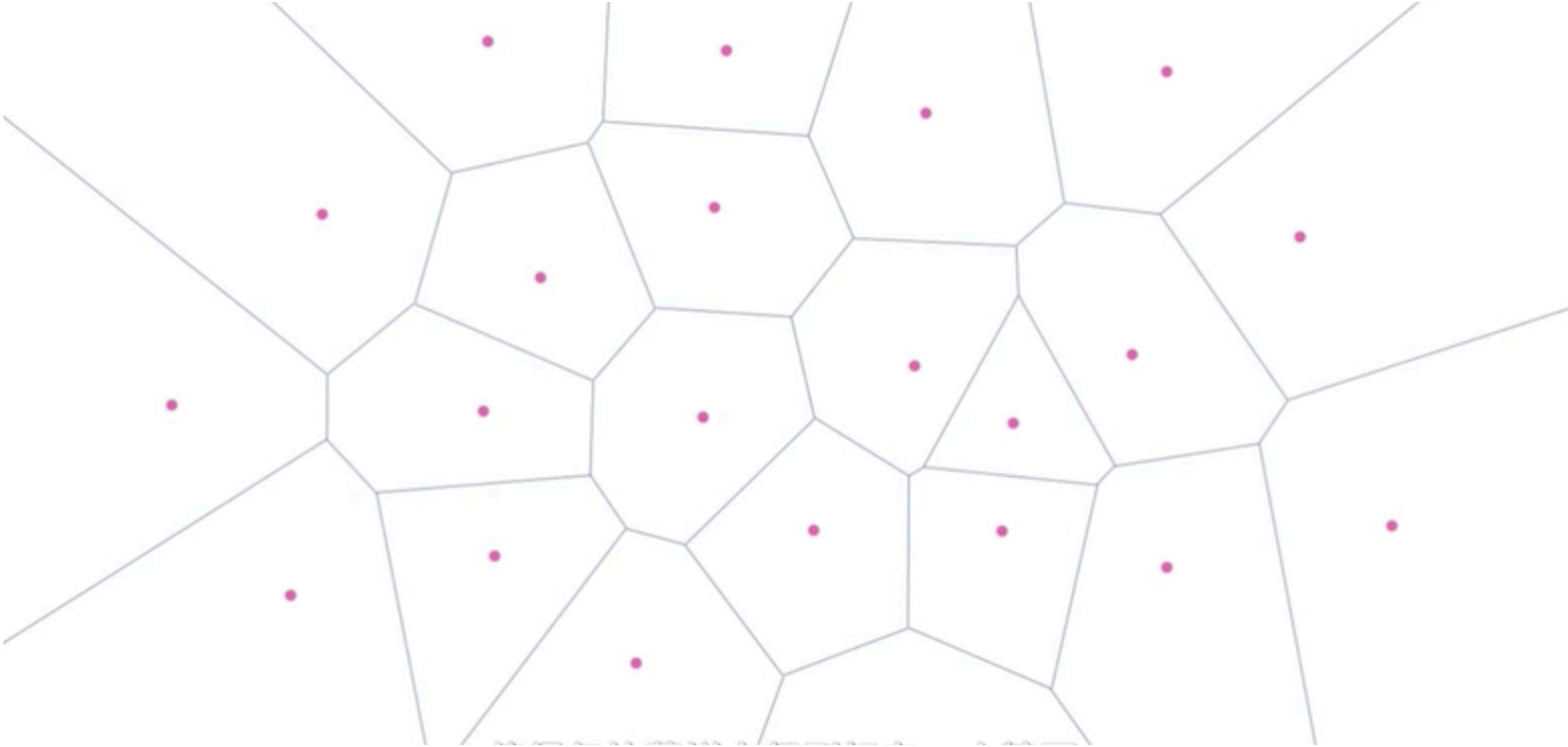
VORONOI DIAGRAM

PRESENTED BY NOLAN MA

GEORGY VORONOY



DEFINITION

Let X be a metric space with distance function d. Let K be a set of indices and let $(P_k)_{k\in K}$ be a tuple (ordered collection) of nonempty subsets (the sites) in the space X. The Voronoi cell, or Voronoi region, R_k, associated with the site P_k is the set of all points in X whose distance to P_k is not greater than their distance to the other sites P_j, where j is any index different from k. In other words, if $d(x,\ A) = \inf\{d(x,\ a) \mid a \in A\}$ denotes the distance between the point x and the subset A, then

$$R_k = \{x \in X \mid d(x, P_k) \leq d(x, P_j) \text{ for all } j \neq k\}$$

WHERE CAN WE FIND VORONOI DIAGRAM?

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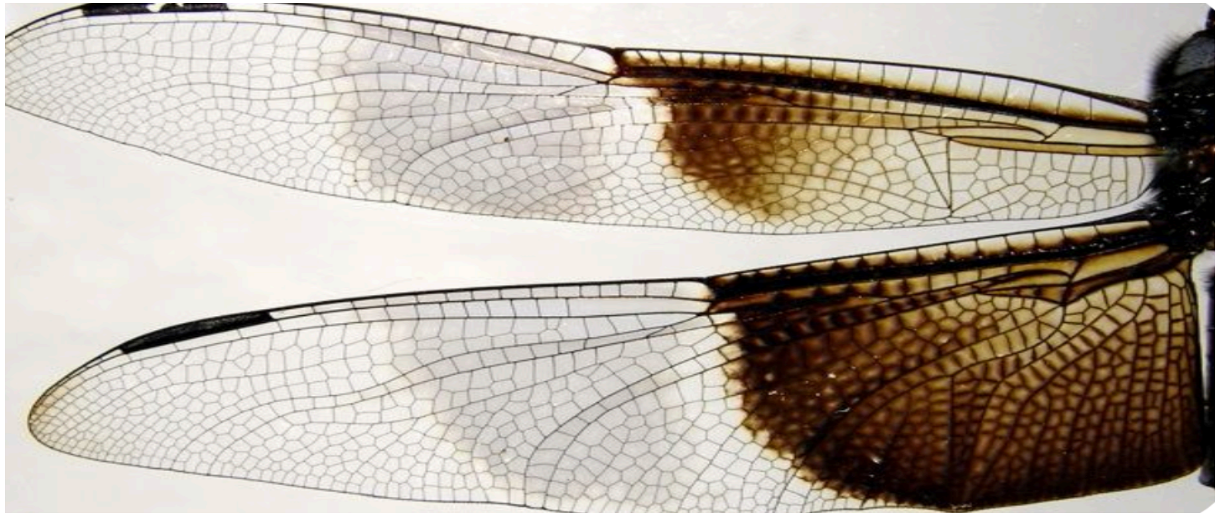

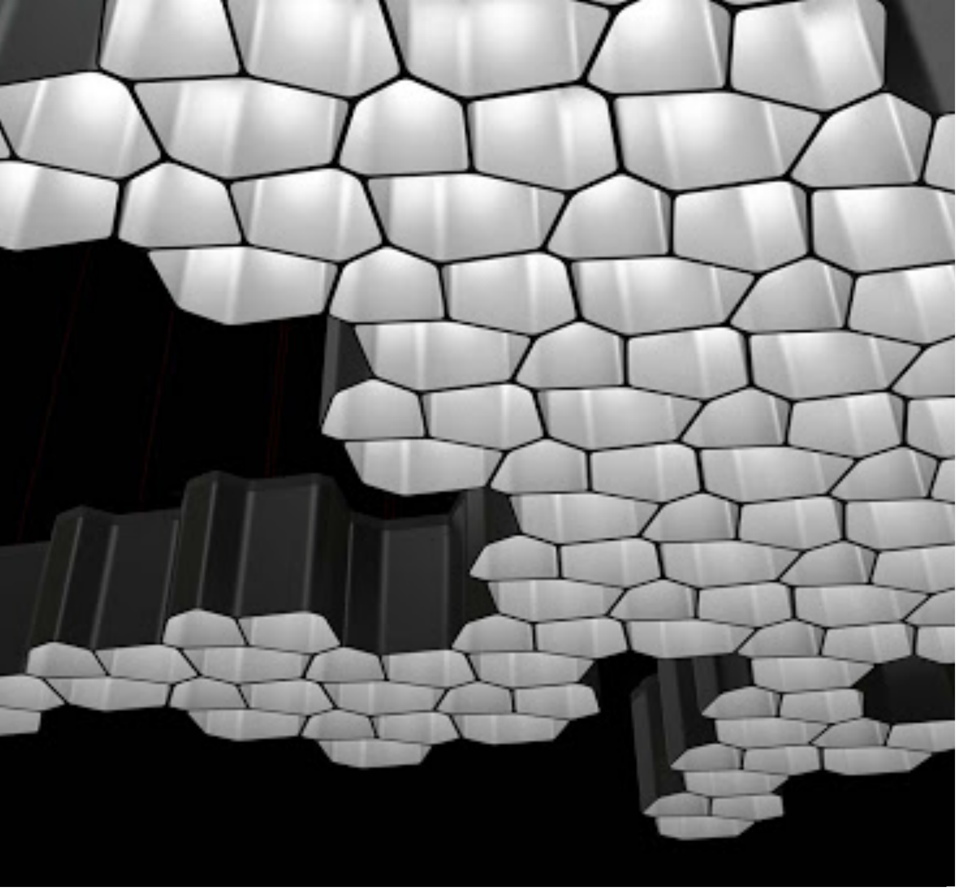


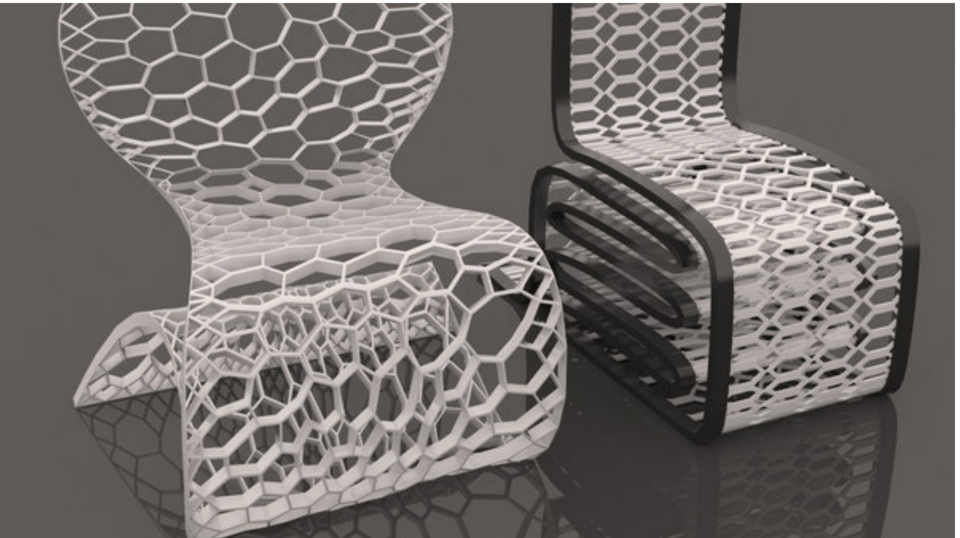

ARCHITECTURE

MAPPING


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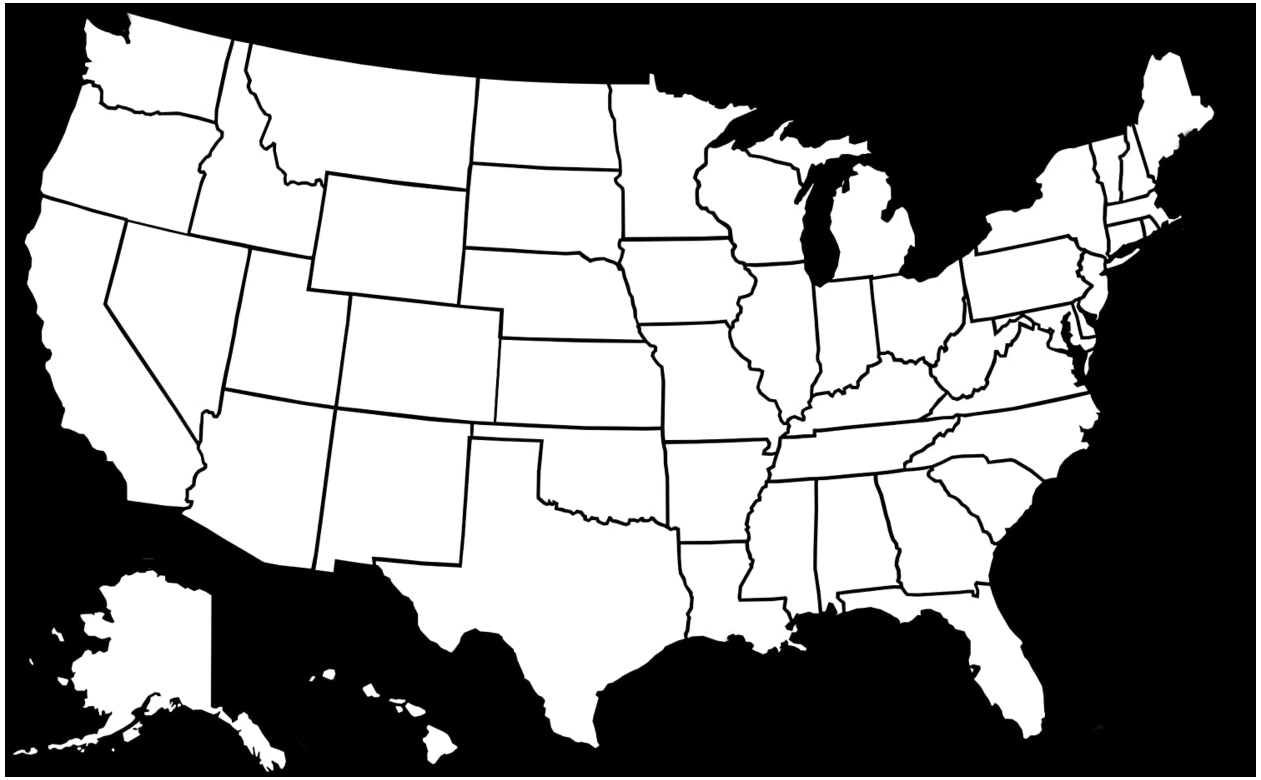
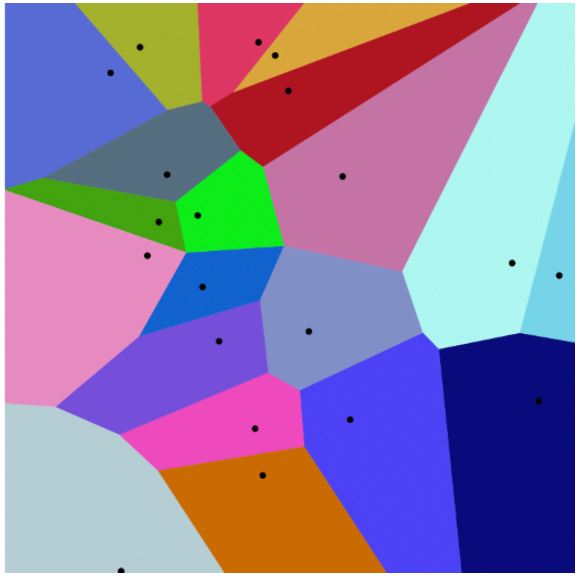


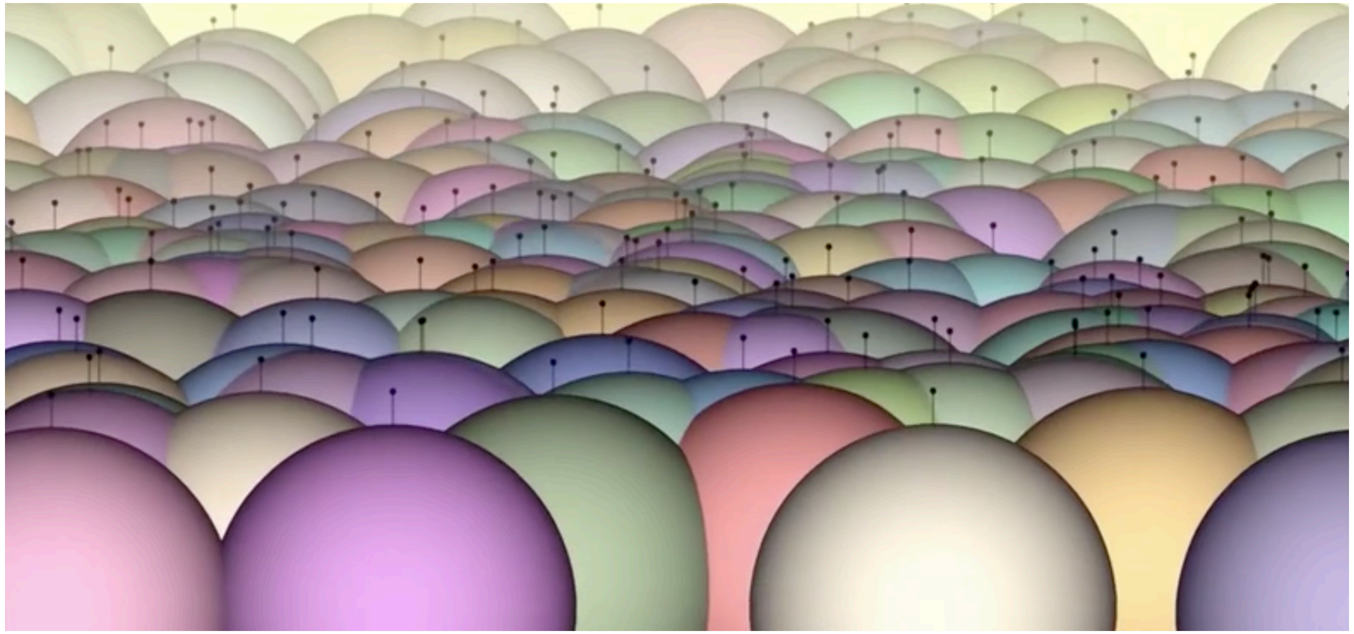
THE GIFT SHOP PROBLEM

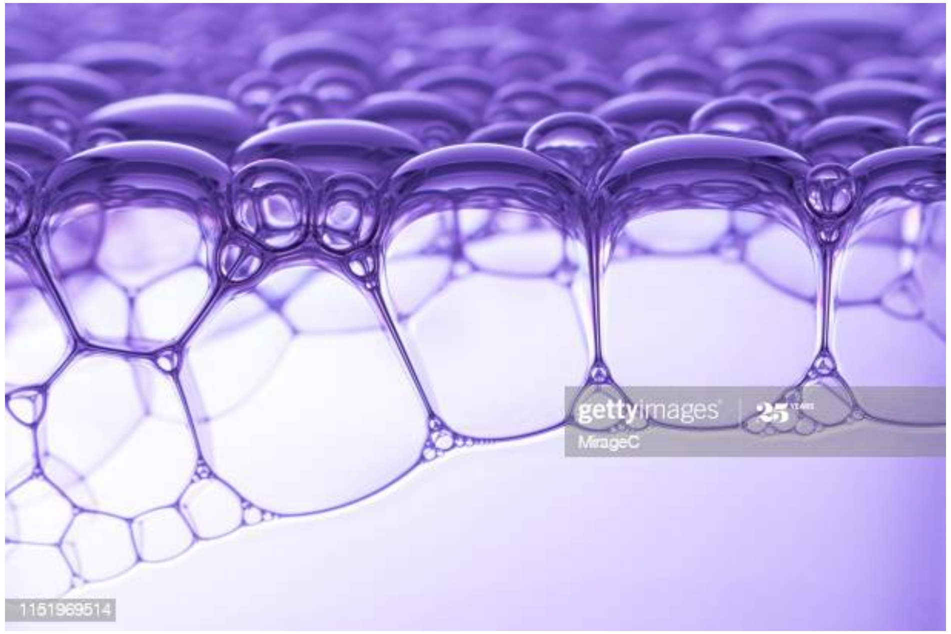
- consider a group of shops in a city. Suppose we want to estimate the number of customers of a given shop. With all else being equal (price, products, quality of service, etc.), it is reasonable to assume that customers choose their preferred shop simply by distance considerations: they will go to the shop located nearest to them.

$$\ell_2 = d\left[(a_1, a_2), (b_1, b_2)\right] = \sqrt{(a_1 - b_1)^2 + (a_2 - b_2)^2}$$



$$d\left[(a_1, a_2), (b_1, b_2)\right] = |a_1 - b_1| + |a_2 - b_2|.$$

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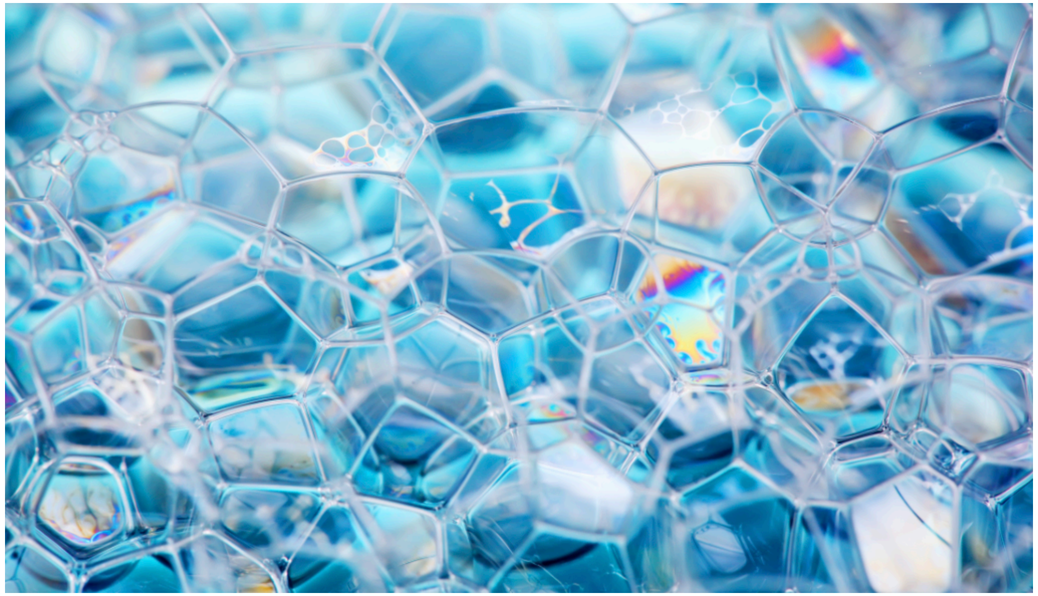

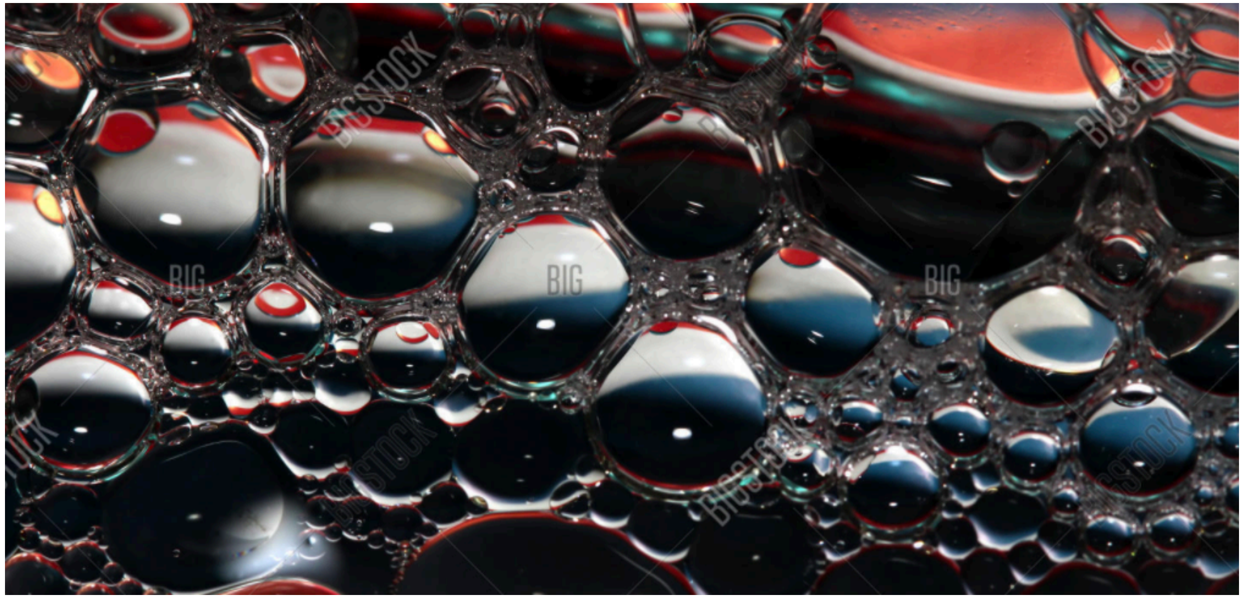
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WORK CITED

- https://observablehq.com/@d3/circle-dragging-iii
- https://www.researchgate.net/publication/329444868_Voronoi_diagrams_-_inventor_method_applications
- https://en.wikipedia.org/wiki/Voronoi_diagram