



Voronoi Diagrams

Mathematics, Forests, and Art

Voronoi Diagrams

A voronoi diagram is a partitioning of a plane with n generating points into convex polygons such that each polygon contains exactly one generating point and every point in a given polygon is closer to its generating point than any other point. They are also known as Voronoi tessellation, Voronoi decomposition, Voronoi Partition, or Dirichlet tessellation.

Creating Art

Using the Voronoi Diagram we can create crystal or painting like representations of an original image. To do this we use the following algorithm

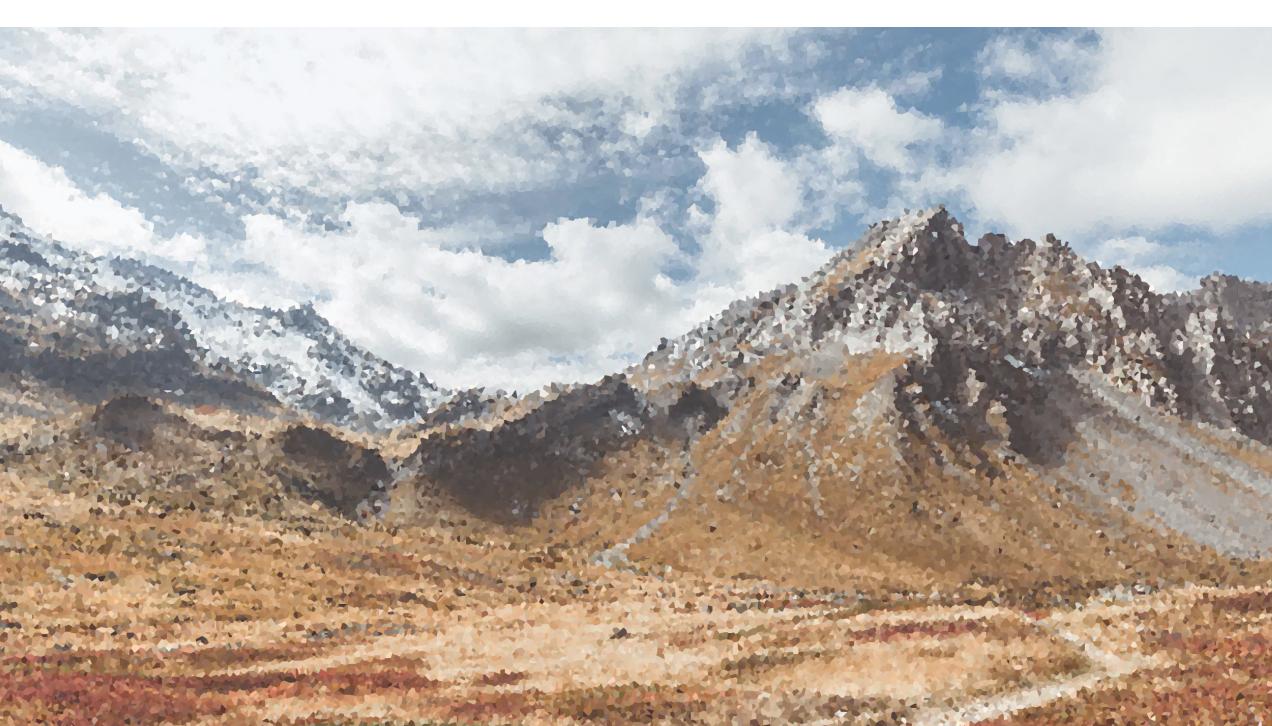
1. Given a image I , generate a random set of n points P which lies within the perimeter of I .
2. Generate a Voronoi Diagram V from the set of points P . Let v_i denote a polygon in V .
3. Color each polygon v_i using the pixel value from I located at the center of v_i .
4. If a polygon v_i center is not located on I , color v_i using the pixel value from the closest point on I to the center of v_i .

While using the algorithm the final image can vastly differ depending on your set of points P . For instance, if you generate your set P using a Gaussian distribution, increasing the amount of points n improves the clarity of the final image. While using a skewed distribution to create P can make a sense of depth or focus to the final image.

Original Image



Recreation



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