



Figure 5.10: Illustration of how the nearest neighbor algorithm breaks up the input space into regions. An example (represented here by a circle) within each region defines the region boundary (represented here by the lines). The  $y$  value associated with each example defines what the output should be for all points within the corresponding region. The regions defined by nearest neighbor matching form a geometric pattern called a Voronoi diagram. The number of these contiguous regions cannot grow faster than the number of training examples. While this figure illustrates the behavior of the nearest neighbor algorithm specifically, other machine learning algorithms that rely exclusively on the local smoothness prior for generalization exhibit similar behaviors: each training example only informs the learner about how to generalize in some neighborhood immediately surrounding that example.