1 Model

1.1 Complex, Filtration and Homotopy

In this model we define the simplicial complex by the Delauney triangulation of $n = 10$ points uniformly distributed in $[0, 1]^d$ for $d = 2$.

We defining the filtration on this complex, by assuming uniformly distributed in $[0, 1]$ height $h(f)$ for each vertex v. Then the filtration value of the simplex will be the maximum haight of its vertices.

$$f(\sigma) = \max_{v \in \sigma} h(v)$$

We define 2 filtrations like this and study the linear homotopy between them. In the Figure 1 we can see these 2 filtrations:

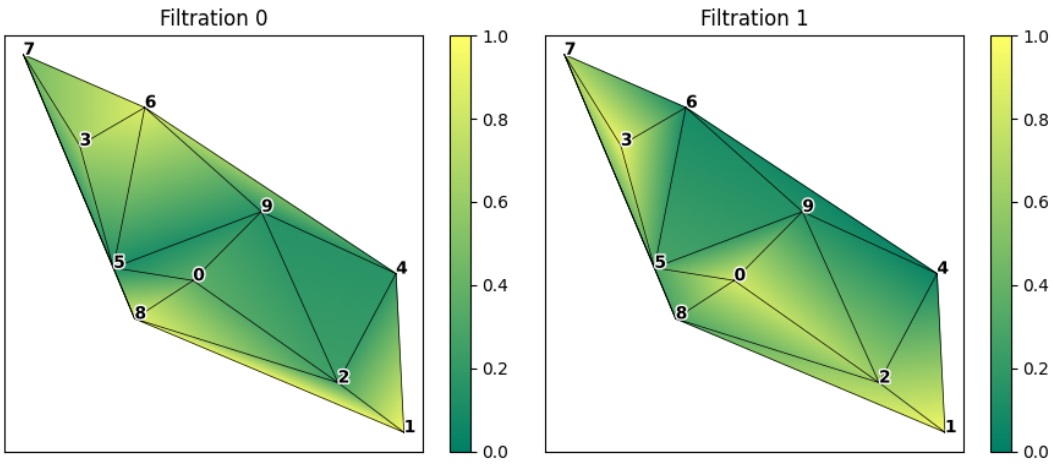

Figure 1: 2 filtrations on the defined complex.

Having these 2 filtrations we can define the homotopy between them by defining the linear homotopy between heights:

$$h_t(v) = h_0(v) \cdot (1 - t) + h_1(v) \cdot t$$

$$f_t(\sigma) = \max_{v \in \sigma} h_t(v)$$

1.2 Transpositions

In the Figure 1.2 we can see the vertices height $h_t(v)$ during this homotopy. And the transpositions will happen, when these lines cross.

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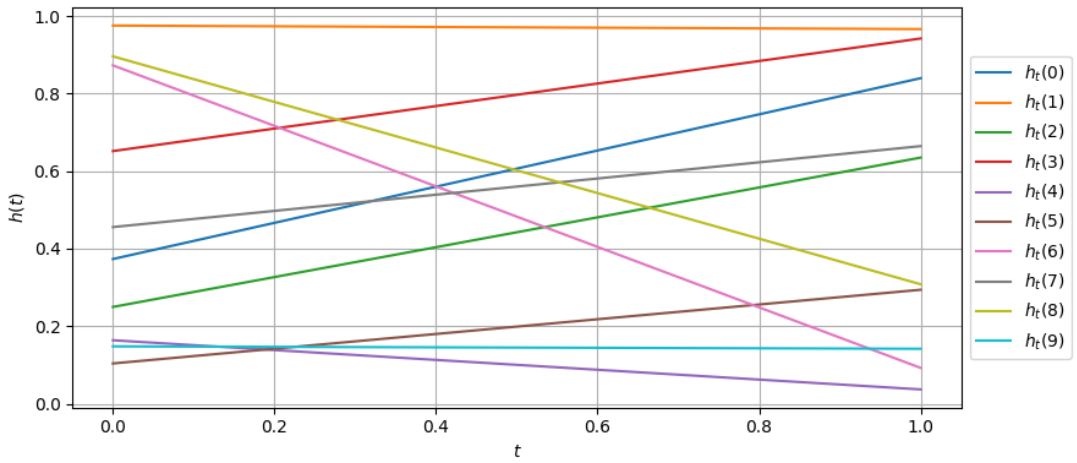

Figure 2: Heights of Vertices during the Homotopy.