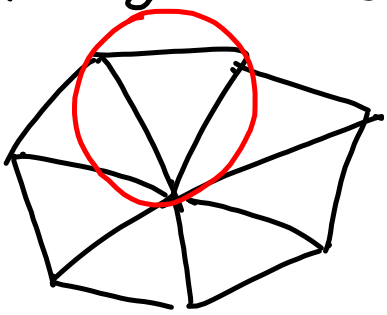
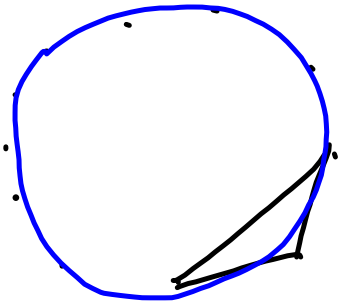
# Delaunay Triangulation

"nice"

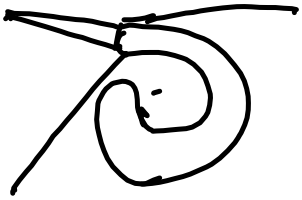


Delaunay prop.:

- max. min. interior angle
- circumcircle of $\Delta$ is empty



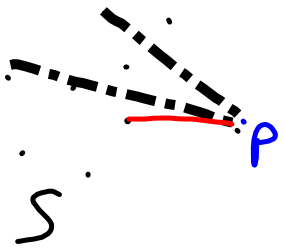
How can we extract the contour?



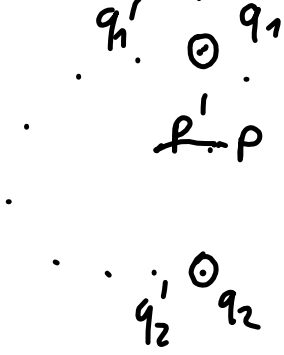
$S$ some set of points ($\in \mathbb{R}^n$)

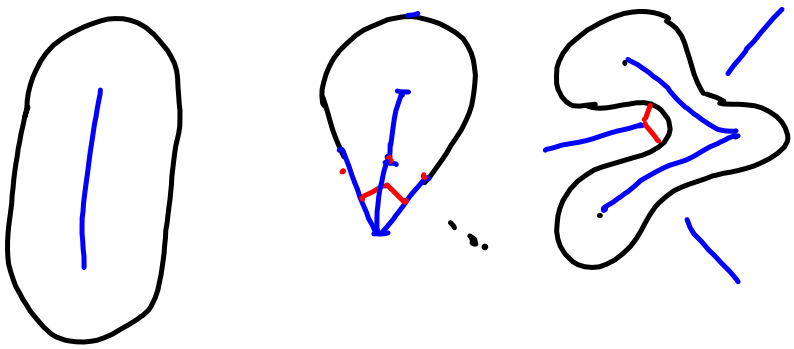
$p \in \mathbb{R}^n$

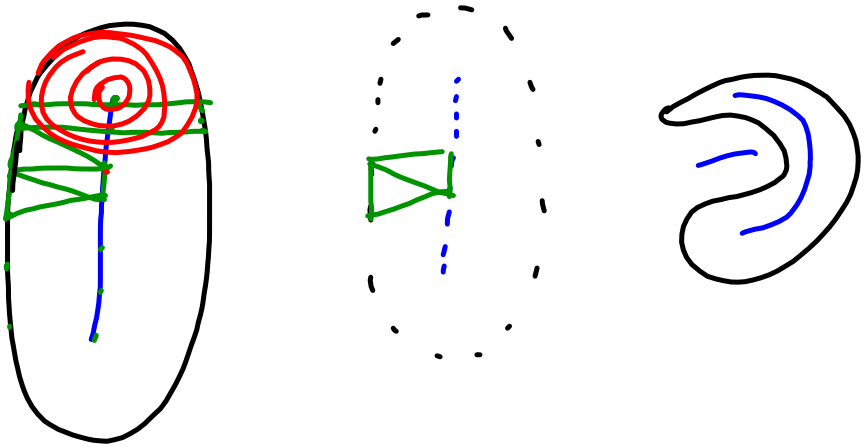
$d(p, S) = \min_{q \in S} \{ \|p - q\| \}$



Medial Axis : $\{p, p', \ldots\}$

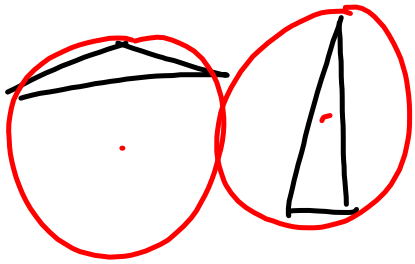






Contour tessellation in 3D?

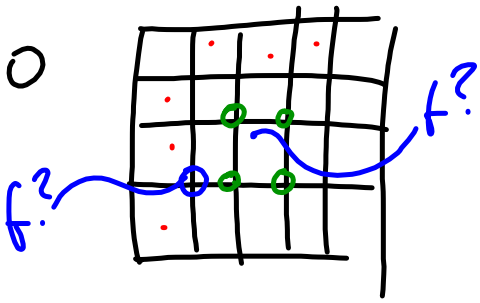
2D:



3D:

implicit repr. of $S$

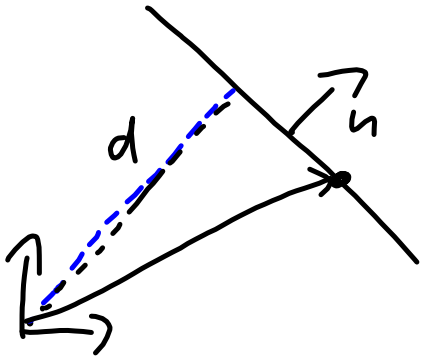
$f(\,) = 0$



Volumetric techniques:

$\{p_i\} \rightsquigarrow \{\pm n_i\} \rightsquigarrow \{n_i\} \rightsquigarrow$ SDF $\rightsquigarrow$ extract mesh

$\hookrightarrow$ USDF $\rightsquigarrow$ extract mesh




$\|n\| = 1$

$$d(p, T) = \begin{pmatrix} p \\ 1 \end{pmatrix}^T \begin{pmatrix} y \\ d \end{pmatrix}$$

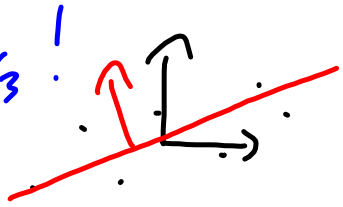
$$\min_T \sum_i d(p_i, T)$$

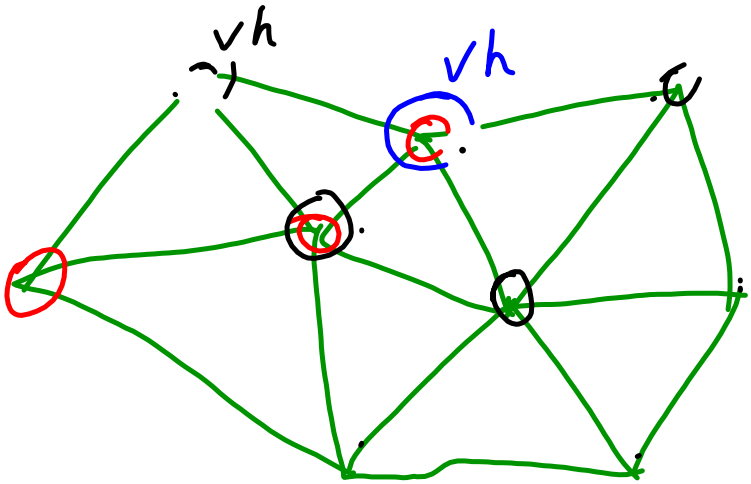
$$\Leftrightarrow \min \sum_i \begin{pmatrix} p \\ 1 \end{pmatrix}^T \begin{pmatrix} y \\ d \end{pmatrix}$$

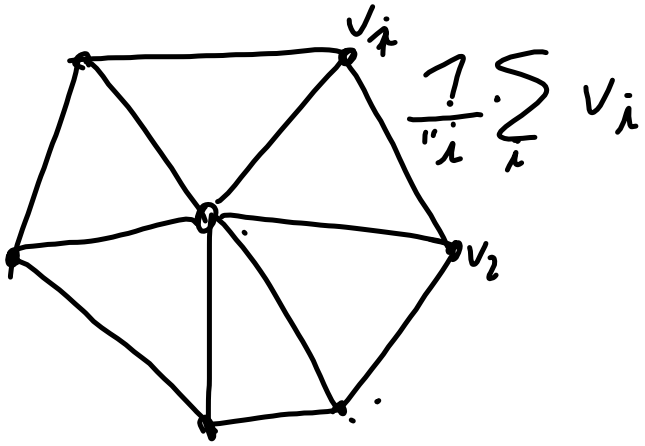
$$\Leftrightarrow \min \left\| \begin{pmatrix} y \\ d \end{pmatrix}^T \underbrace{\begin{pmatrix} p_0 & p_1 & \dots \\ 1 & 1 & \end{pmatrix}}_{Q} \right\|^2$$

$$\Leftrightarrow \min_{(n,d)} \underbrace{Q}_{M} Q^T \begin{pmatrix} y \\ d \end{pmatrix}$$

$\eta = v_3$ !




vh
vh


$v_i$
$\frac{1}{n_i} \sum_i v_i$
$v_2$