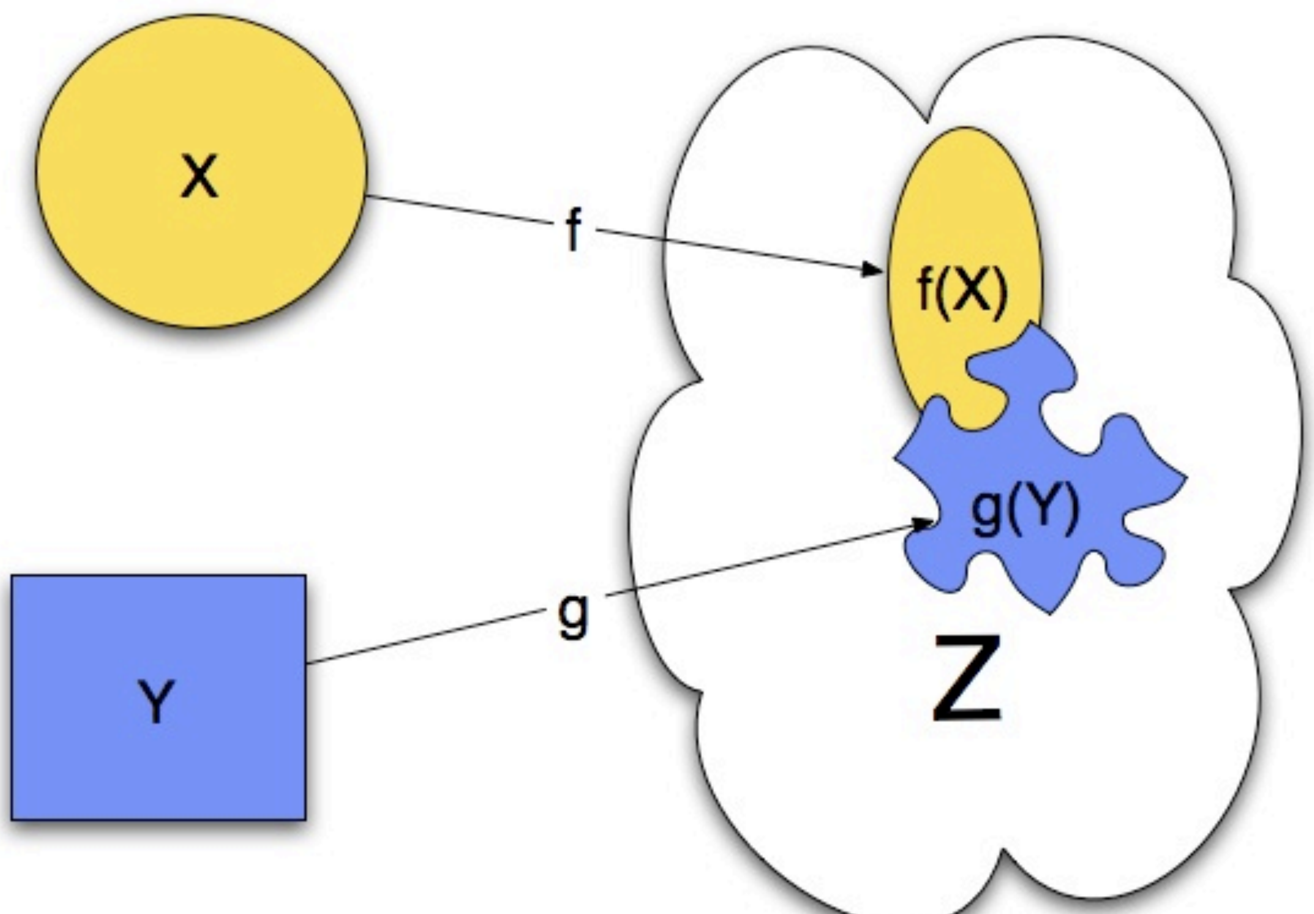
GH: definition

$$d_{\mathcal{GH}}(X,Y) = \inf_{Z,f,g} d_{\mathcal{H}}^{Z}(f(X), g(Y))$$



The Elad-Kimmel approach

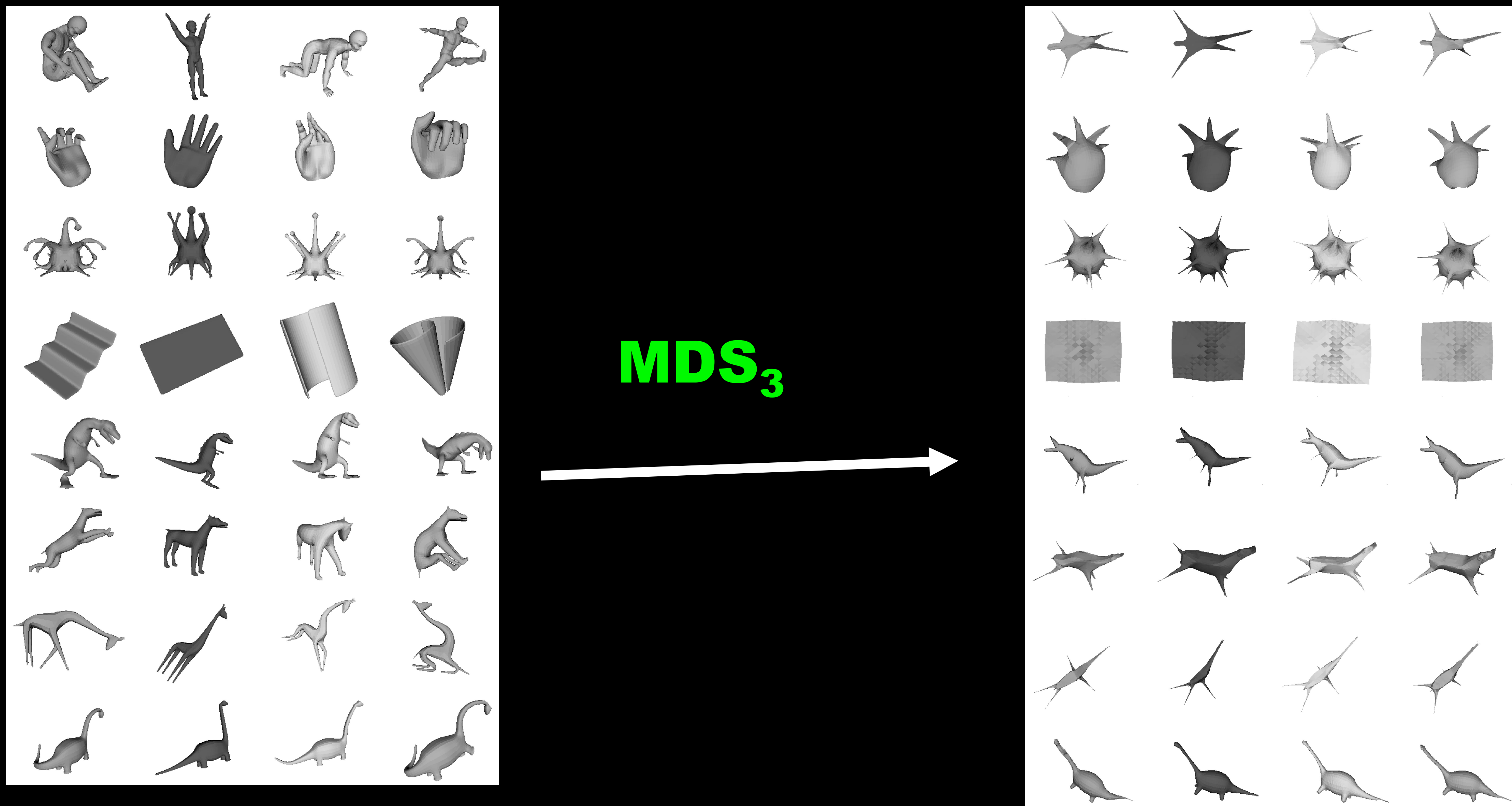
- compare surfaces under invariance to *bends*.
- MDS, or multidimensional scaling.
- Given D distance matrix of size $n \times n$ find n points $\mathbb{Z}$ in Euclidean space s.t. $\mathbf{D}(\mathbb{Z})$ is as close as possible to D.
- So, given two shapes X and Y (triangulated surfaces), use the triangulations and Dijkstra (or whatever you want, fast marching etc) to obtain an estimate of the geodesic distance matrices d_X and d_Y.
- Select subsets $\mathbb{X}$ andn $\mathbb{Y}$ of X and Y using $max-min$ (a.k.a. FPS, farthest point sampling).

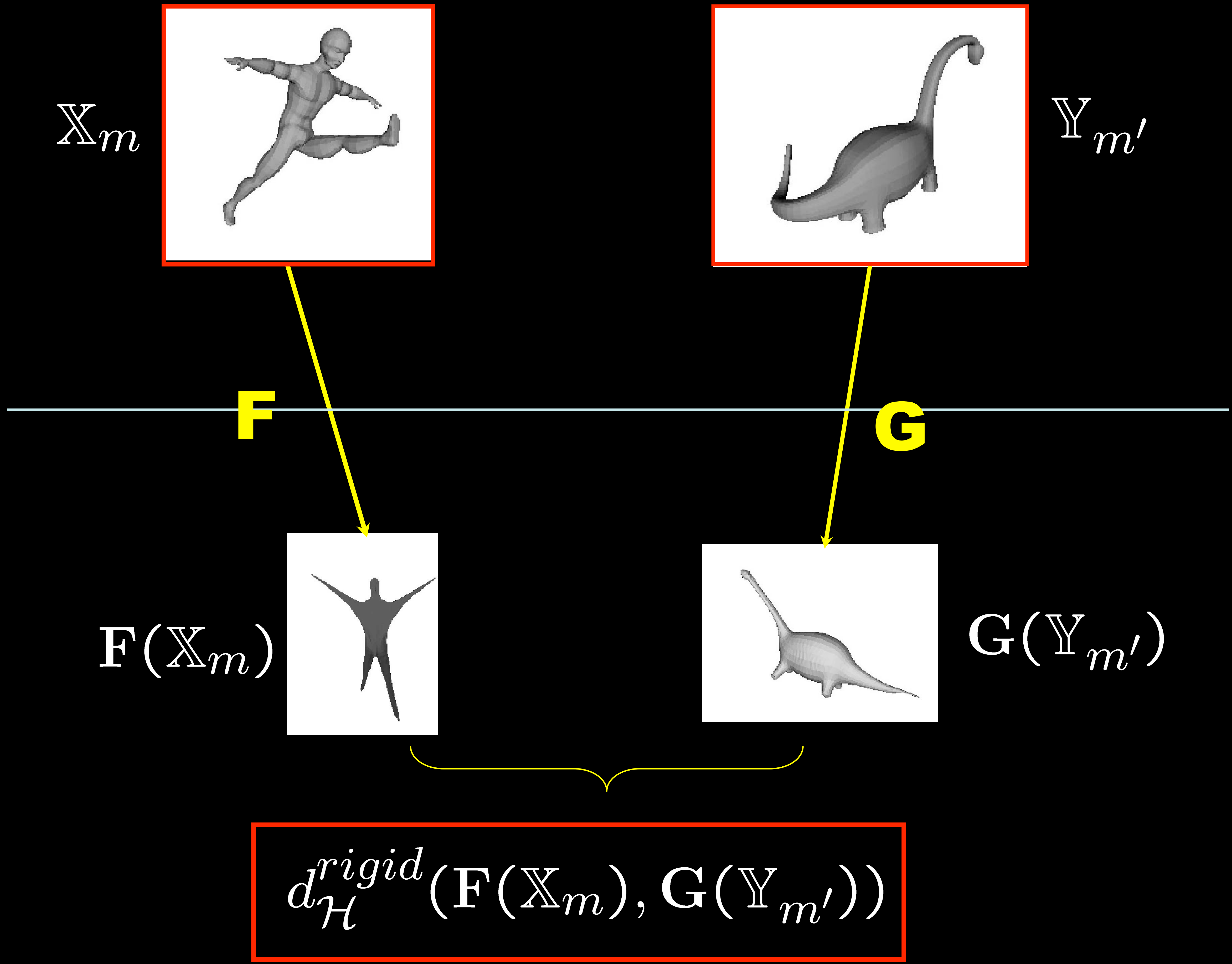
$\mathbb{X}_m = \{x_1, \ldots, x_m\} \subset X$

$D_{\mathbb{X}_m} = [d_X(x_i, x_j)]$

Using MDS, find $E_m = \{p_1, \ldots, p_m\} \subset \mathbf{R}^3$ such that $\|D_{E_m} - D_{\mathbb{X}_m}\|$ is minimal. We can think that we found a map $\mathbf{F} : \mathbb{X}_m \to \mathbf{R}^3$ s.t. $E_m = \mathbf{F}(\mathbb{X}_m)$ ...$\mathbf{F}$ <u>will not</u> be an isometry in general..

Do the same for $\mathbb{Y}_{m'}$


MDS3


$\mathbb{X}_m$
$\mathbb{Y}_{m'}$
F
G
$\mathbf{F}(\mathbb{X}_m)$
$\mathbf{G}(\mathbb{Y}_{m'})$
$d_{\mathcal{H}}^{rigid}(\mathbf{F}(\mathbb{X}_m), \mathbf{G}(\mathbb{Y}_{m'}))$