Figure 7: High-level block diagram. The data is initially segmented into layers where each volume is related to a constant depth in the scene. The obtained layers are then decomposed using a 4D DWT along the viewpoint and spatial dimensions. Additionally, we illustrate the obtained transform coefficients at each stage of the method.

Figure 8: An $m$-dimensional dataset $\mathcal{D}$ is partitioned into $\mathcal{H}$ and $\overline{\mathcal{H}}$. The boundary is a closed curve defined by $\Gamma$ [17] and is an $(m-1)$-dimensional object.

### 3.1 General region-based data segmentation

Consider a general segmentation problem shown in Fig. 8. The aim is to partition an $m$-dimensional dataset $\mathcal{D} \subset \mathbb{R}^m$ into subsets $\mathcal{H}$ and $\overline{\mathcal{H}}$ where the boundary which delimits the two regions is defined by $\Gamma (\sigma)$ with $\sigma \in \mathbb{R}^{m-1}$. This type of problem can be solved using an optimization framework, where the boundary is obtained by minimizing an objective function $J$:

$$\Gamma = \arg\min \{J(\Gamma)\}.$$  

The cost function in (9) can be defined using either a boundary or region-based approach. The boundary methods evaluate the cost only on $\Gamma$ and, hence, they are influenced by local data properties and easily