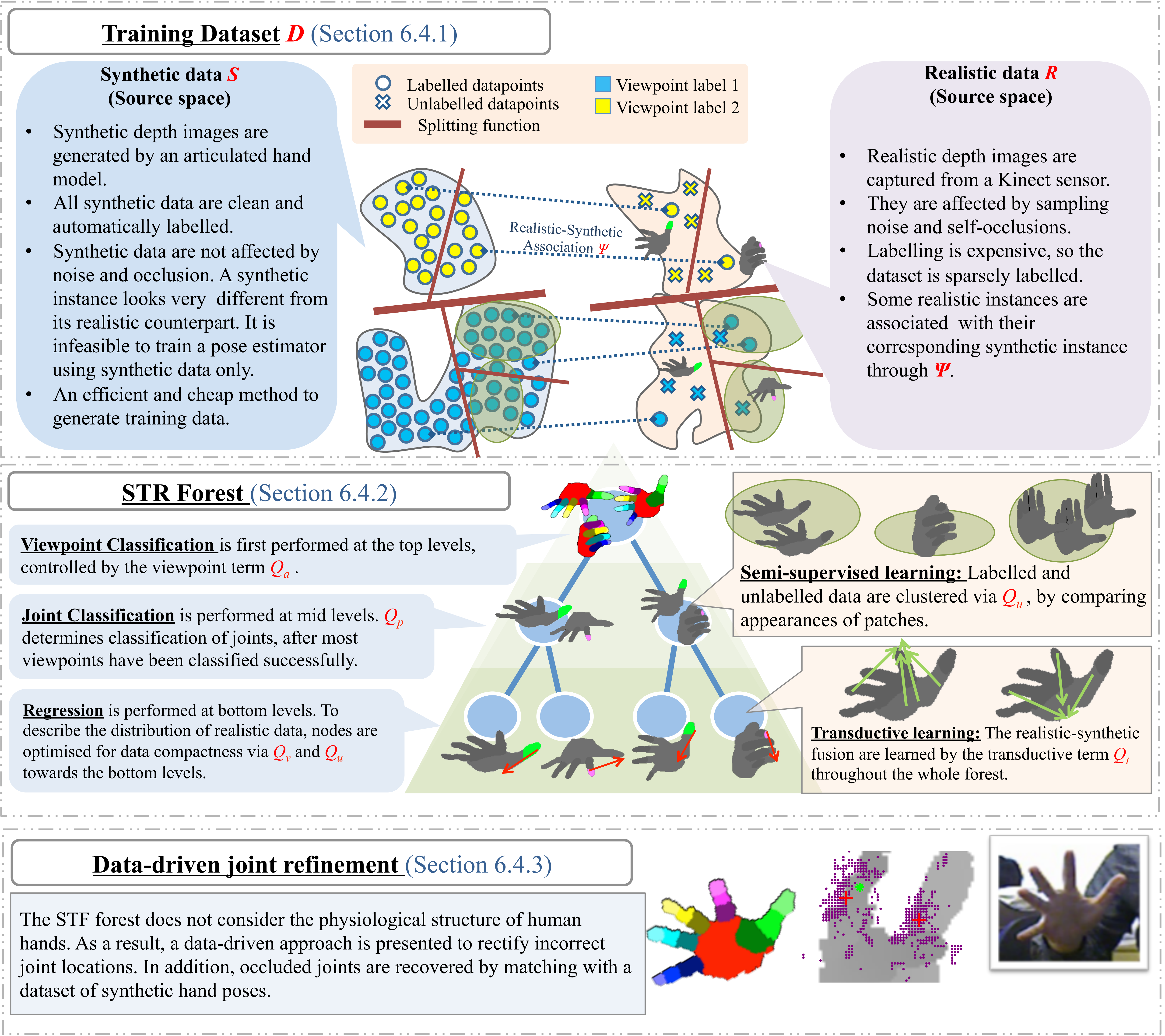
Training Dataset D (Section 6.4.1)
Synthetic data S (Source space)
• Synthetic depth images are generated by an articulated hand model.
• All synthetic data are clean and automatically labelled.
• Synthetic data are not affected by noise and occlusion. A synthetic instance looks very different from its realistic counterpart. It is infeasible to train a pose estimator using synthetic data only.
• An efficient and cheap method to generate training data.
Labelled datapoints
Unlabelled datapoints
Splitting function
Viewpoint label 1
Viewpoint label 2
Realistic-Synthetic Association Ψ
Realistic data R (Source space)
• Realistic depth images are captured from a Kinect sensor.
• They are affected by sampling noise and self-occlusions.
• Labelling is expensive, so the dataset is sparsely labelled.
• Some realistic instances are associated with their corresponding synthetic instance through Ψ.
STR Forest (Section 6.4.2)
Viewpoint Classification is first performed at the top levels, controlled by the viewpoint term Q_a .
Joint Classification is performed at mid levels. Q_p determines classification of joints, after most viewpoints have been classified successfully.
Regression is performed at bottom levels. To describe the distribution of realistic data, nodes are optimised for data compactness via Q_v and Q_u towards the bottom levels.
Semi-supervised learning: Labelled and unlabelled data are clustered via Q_u , by comparing appearances of patches.
Transductive learning: The realistic-synthetic fusion are learned by the transductive term Q_t throughout the whole forest.
Data-driven joint refinement (Section 6.4.3)
The STF forest does not consider the physiological structure of human hands. As a result, a data-driven approach is presented to rectify incorrect joint locations. In addition, occluded joints are recovered by matching with a dataset of synthetic hand poses.