



Fig. 4.13: **Features and results.** (a) Feature responses are defined via integral images in displaced 3D boxes, denoted with \mathbf{B} . (b,c,d,e) Some results on four different test patients. The right kidney (red box) is correctly localized in all scans. The corresponding ground-truth is shown with a blue box. Note the variability in position, shape and appearance of the kidney, as well as larger scale variations in patient's body, size, shape and possible anomalies such as the missing left lung, in (e).

information gain:

$$I_j = \log |\Lambda(\mathcal{S}_j)| - \sum_{i \in \{L,R\}} \frac{|\mathcal{S}_j^i|}{|\mathcal{S}_j|} \log |\Lambda(\mathcal{S}_j^i)| \quad (4.6)$$

with $\Lambda(\mathcal{S}_j)$ the 6×6 covariance matrix of the relative displacement vector $\mathbf{d}(\mathbf{p})$ computed for all points $\mathbf{p} \in \mathcal{S}_j$. Note that here as a prediction model we are using a multivariate, probabilistic-*constant* model rather than the more general probabilistic-linear one used in the earlier examples. Using the objective function (4.6) encourages the forest to cluster voxels together so as to ensure small determinant of prediction