Fig. 5.14: **Regression from density forests.** The conditionals $p(y|x = x_i)$ show multimodal behaviour. This is an improvement compared to regression forests.

Given a fixed and known $x = x^*$ we would like to sample different random values of y distributed according to the conditional $p(y|x = x^*)$. Like in the previous version we assume available a density forest which has been trained with axis-aligned weak learners (fig. 5.15). The necessary steps are described in Algorithm 5.3.

Each iteration of Algorithm 5.3 produces a value y drawn randomly from $p(y|x = x^*)$. Results on our synthetic example are shown in fig. 5.16, for five fixed values of the independent variable x. In fig. 5.16b darker regions indicate overlapping sampled points. Three distinct clusters of points are clearly visible along the $x = x_3$ line, two clusters along the $x = x_2$ and along the $x = x_4$ lines and so on. This algorithm extends to more than two dimensions. As expected, the quality of the sampling depends on the usual parameters such as the tree depth D,