



Fig. 2.1: **Decision tree.** (a) A tree is a set of nodes and edges organized in a hierarchical fashion. In contrast to a graph, in a tree there are no loops. Internal nodes are denoted with circles and terminal nodes with squares. (b) A decision tree is a tree where each split node stores a test function to be applied to the incoming data. Each leaf stores the final answer (predictor). This figure shows an illustrative decision tree used to figure out whether a photo represents an indoor or outdoor scene.

A tree is a collection of nodes and edges organized in a hierarchical structure (fig. 2.1a). Nodes are divided into internal (or split) nodes and terminal (or leaf) nodes. We denote internal nodes with circles and terminal ones with squares. All nodes have exactly one incoming edge. Thus, in contrast to graphs a tree does not contain loops. Also, in this document we focus only on binary trees where each internal node has exactly two outgoing edges.

A *decision* tree is a tree used for making decisions. For instance, imagine we have a photograph and we need to construct an algorithm for figuring out whether it represents an indoor scene or an outdoor one. We can start by looking at the top part of the image. If it is blue then that probably corresponds to a sky region. However, if also the