

Approximate Image-Based Tree Modeling using Particle Flows

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1 Background

Modeling complex botanical tree geometry has posed a challenge for computer graphics for decades. Beginning with abstract branching structures, the complexity and visual appearance has been enhanced over the years in such a way that today many tree models appear photo-realistic to us. However, creating this type of models is still tedious. Image-based modeling methods try to overcome this problem by using a set of photographs to create the geometry directly. Our method produces 3D tree models from input photographs with only limited user intervention. An approximate voxel-based tree volume is estimated using the image information. Performing a 3D flow simulation, the particles path is traced downwards to the tree basis and combined to form twigs and branches. The trunk and the first-order branches are determined in the input photographs and are used as attractors for the particle simulation. The geometry of the tree skeleton is produced using botanical rules for branch thicknesses and branching angles. Finally, leaves are added. Different initial seeds for the particle simulation lead to a model variety, yet similar-looking branching structures for a single set of photographs.

2 System

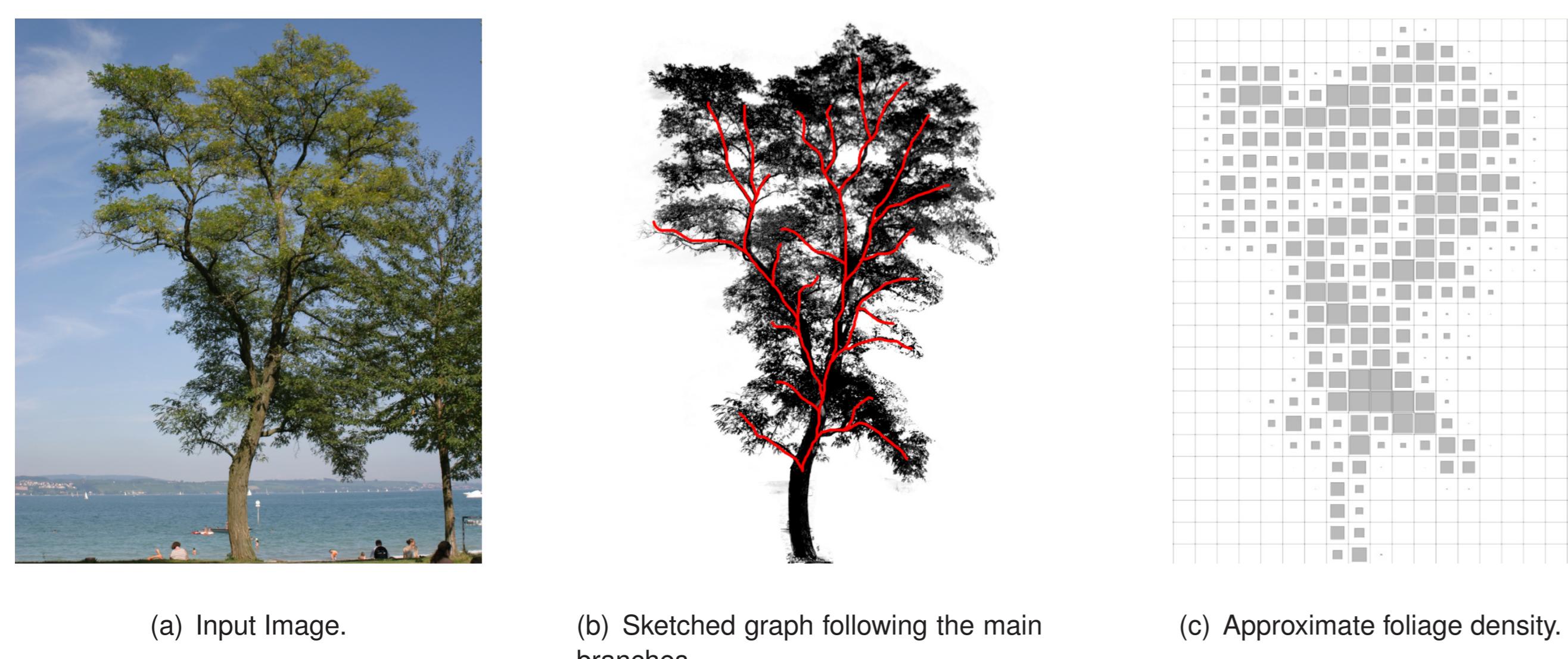


Figure 1: Image Data Processing

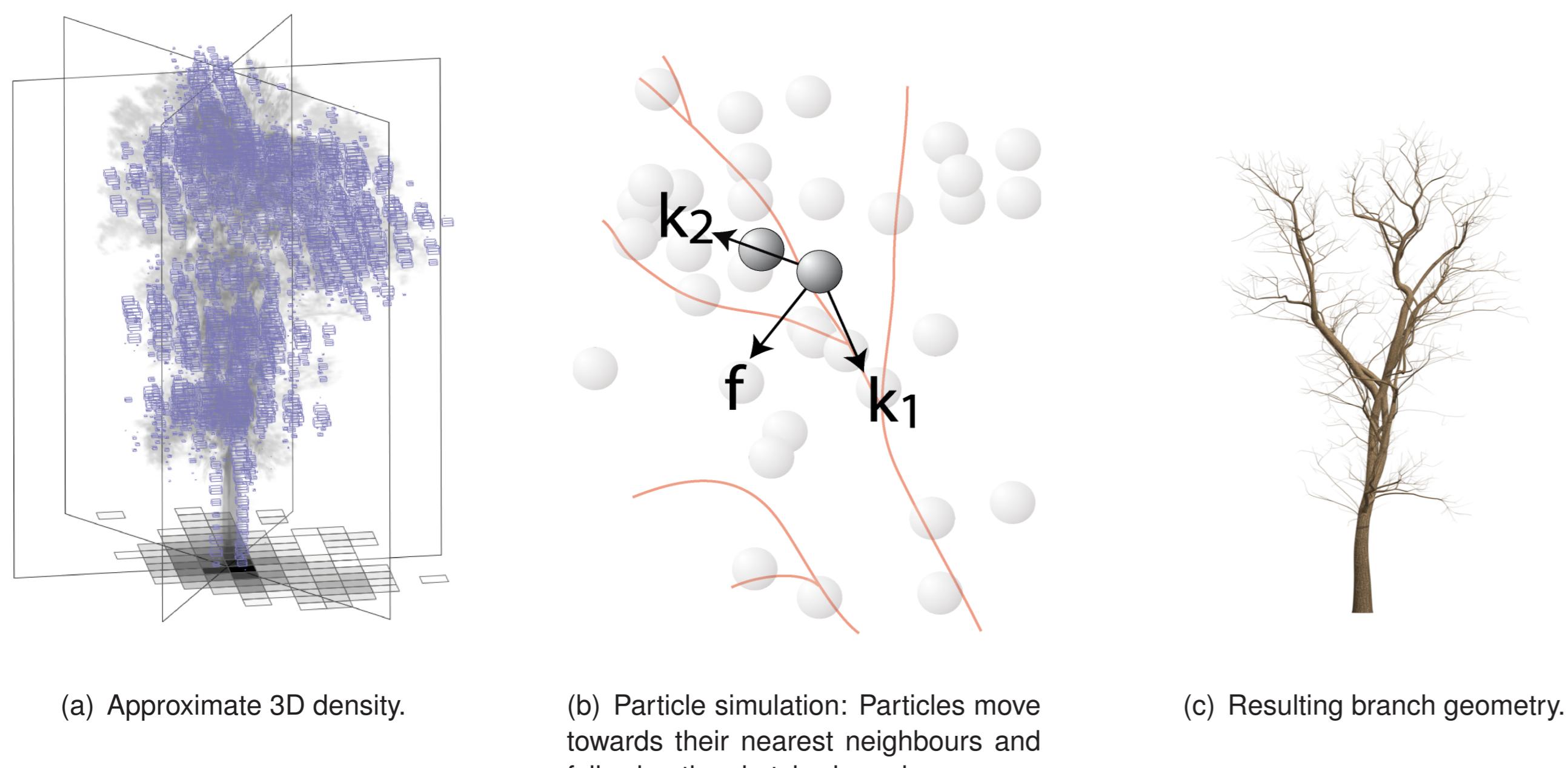


Figure 2: Particle Flow Simulation

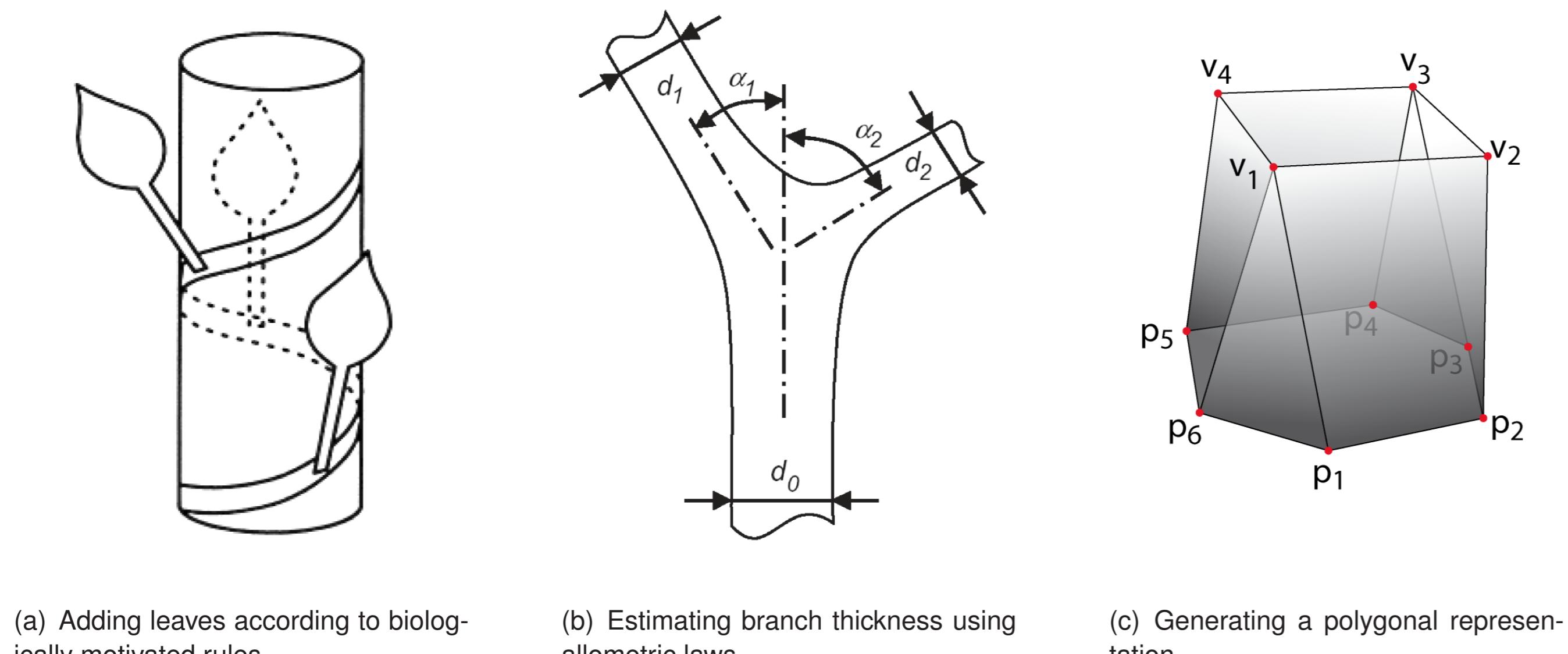


Figure 3: Rule-Based Model Details



Figure 4: Left: Input images, Right: Results.

References

- [1] Boris Neubert, Thomas Franken, and Oliver Deussen. Approximate image-based tree-modeling using particle flows. *ACM Trans. Graph.*, 26(3):88, 2007.