

# Algorithmic Quilting Pattern Generation for Pieced Quilts

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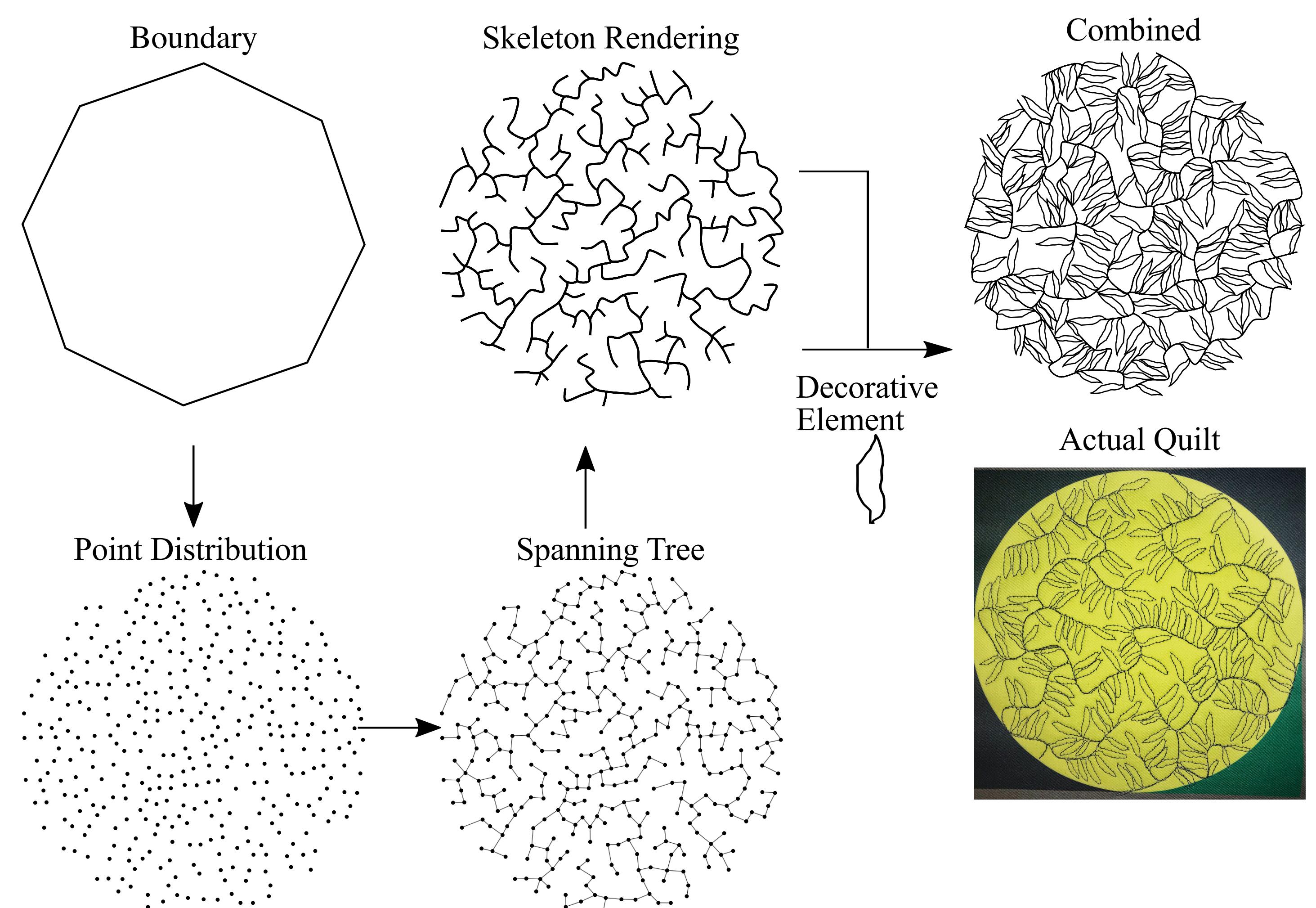
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## Abstract

Free-motion quilting patterns are functional and decorative patterns sewn on pieced quilts using a single stitch path for each region of the quilt. We present an approach for computationally generating two families of these patterns using a set of parameters specified by the user. Our algorithm starts by sampling a point set in a designated region, generates a spanning tree over that set, then adds decorative elements. We show quilted examples for each type of pattern.

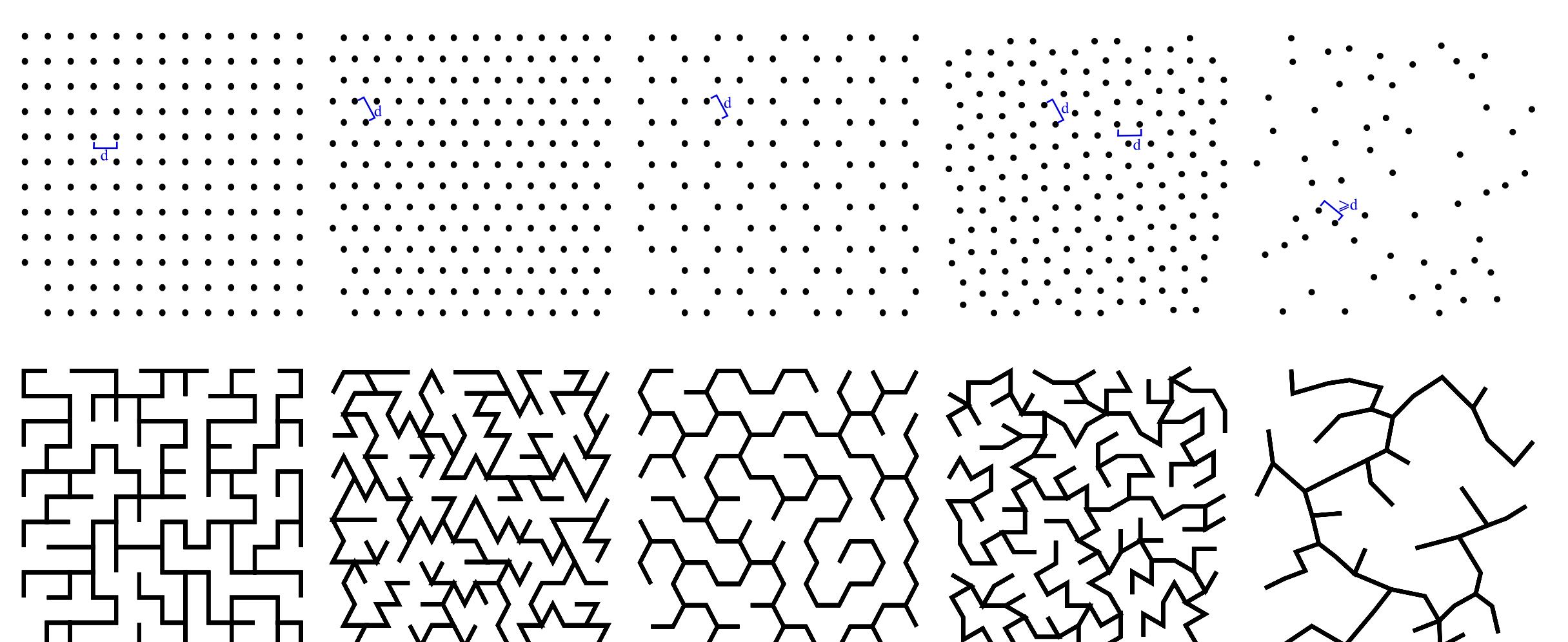
## Framework



## Point Distribution

**Tessellation** points have a structured pattern

**Random Sampling** points have a random look



## Constraints

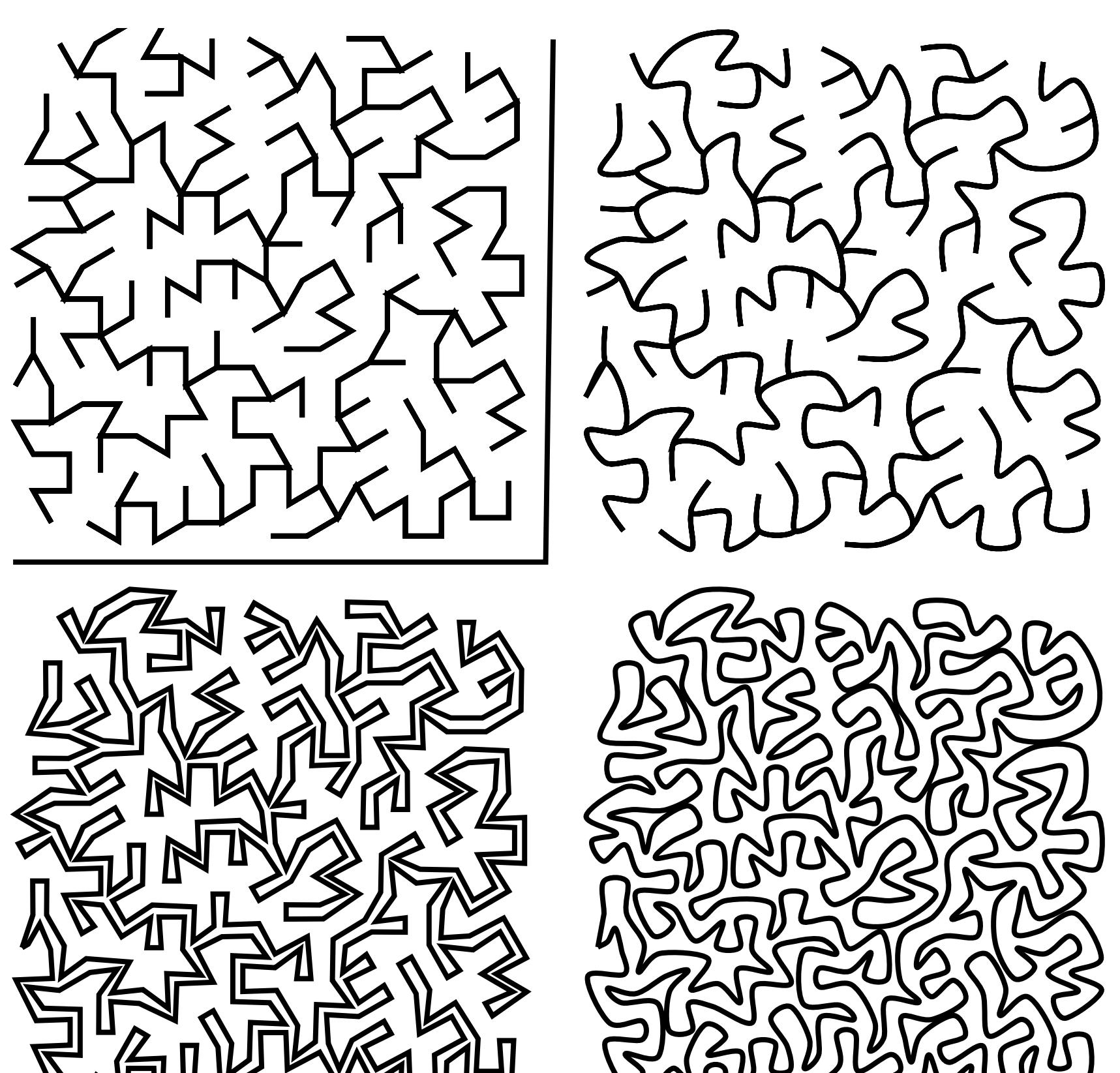
- Drawing element → line segments
- Minimize manual process → single line segment
- Quilting needs to hold fabrics → stitch lines distribute uniformly over the quilt
- Aesthetics → design respects the layout of the pieced quilt

## Skeleton Rendering

**Interpolation** uses Catmull-Rom splines

**Fixed-width** sets a fixed offset when rendering

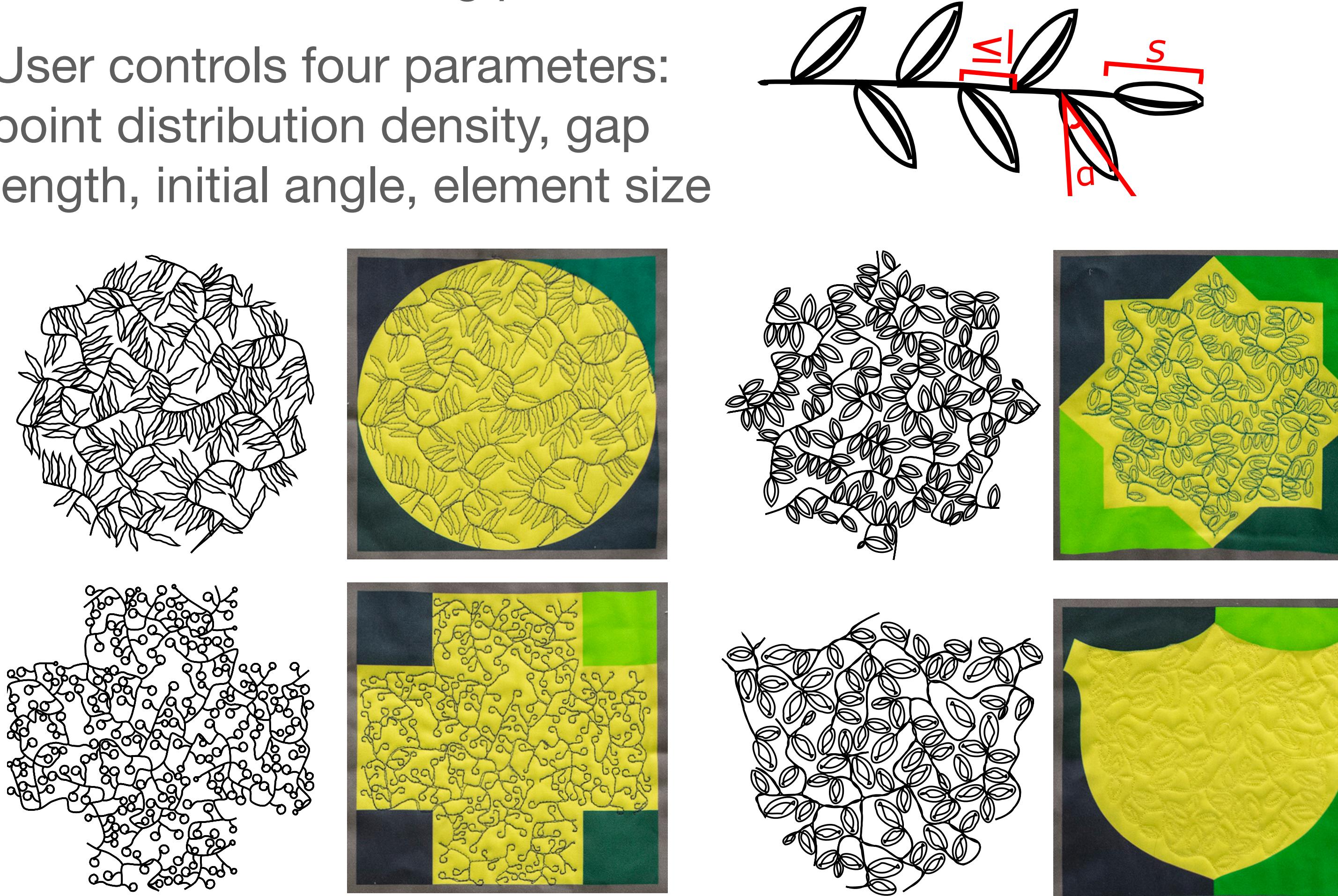
**Stippling** combines interpolation and fixed-width fill



## Branching

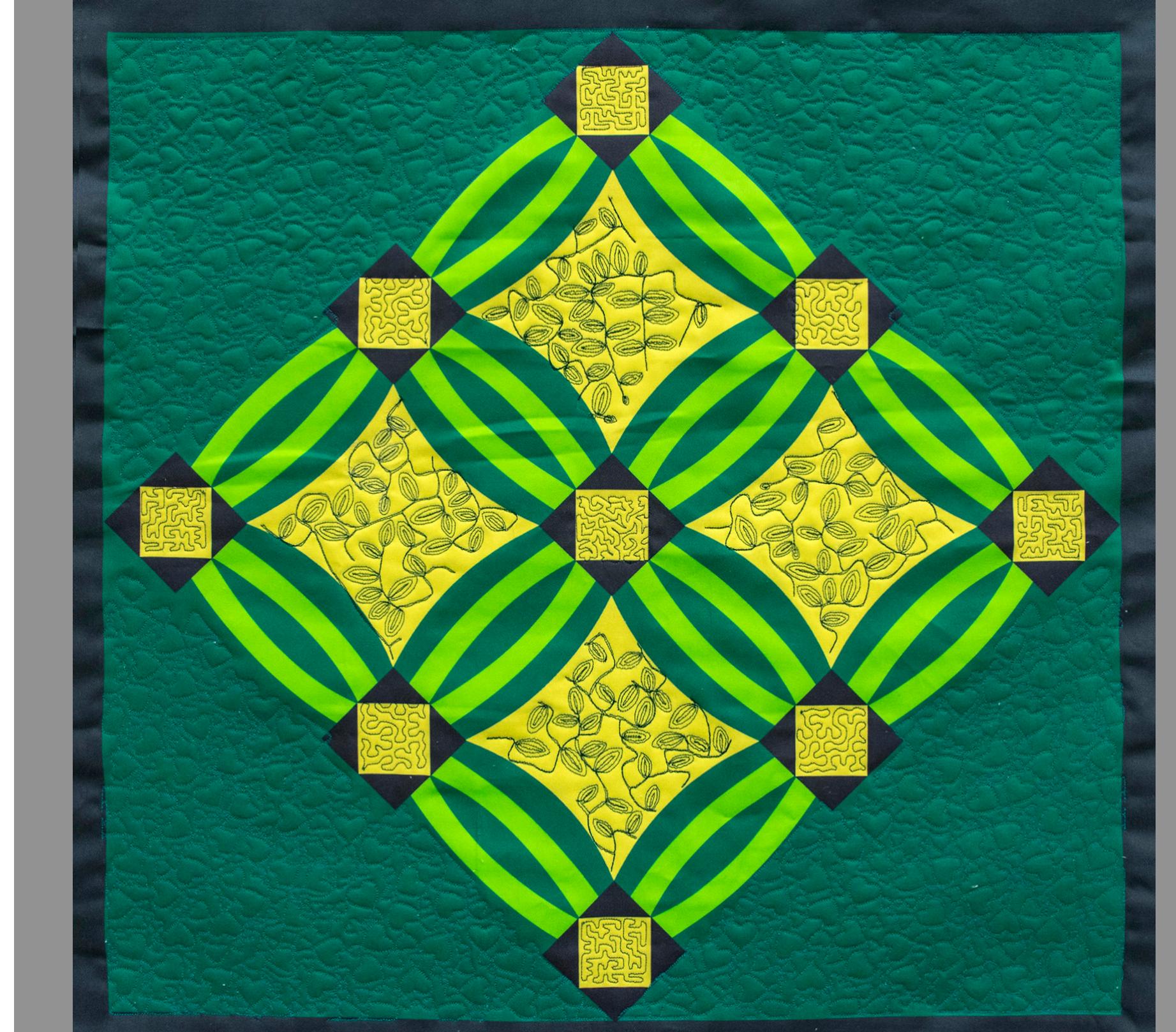
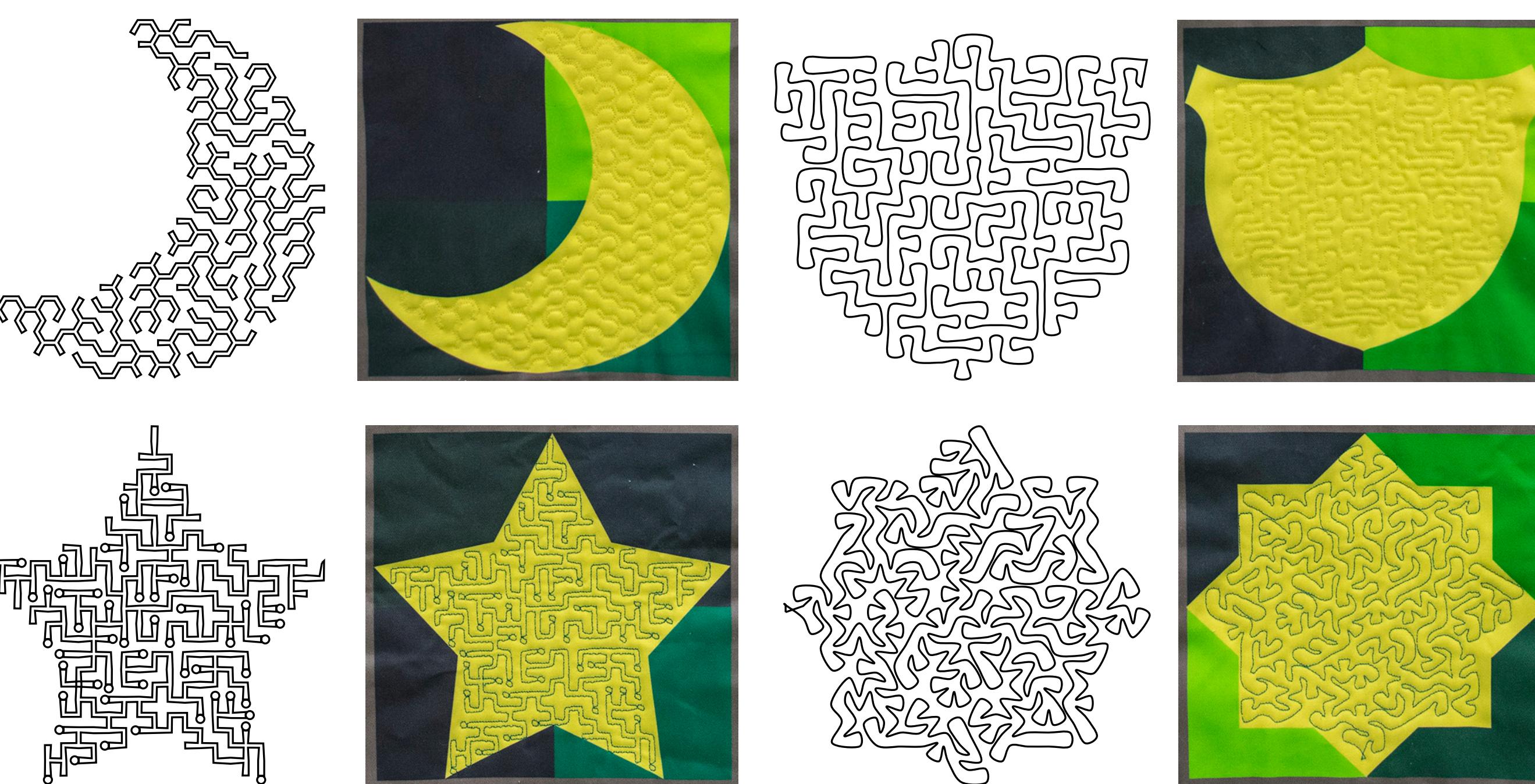
- mimics the natural look of plants
- decorative elements are placed on alternating sides of the stitching path

User controls four parameters:  
point distribution density, gap length, initial angle, element size



## Stippling/Fixed-width Fill

- one of the most popular forms of free-motion quilting



## Pebbling/Shape Packing

- attempts to pack the decorative elements as close as possible
- simplest form of shape packing
- pebbles can be used as minimum bounding circles for shape packing

User controls two parameters:

- point distribution density
- largest pebble size

