Chinese Sea Punica Granatum Pattern Synthesis

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Outline

- Introduction
- Related Work
- Sea Punica Granatum Pattern Synthesis
- Conclusion

Background

Recovery picture of Byodo-in temple in Japan

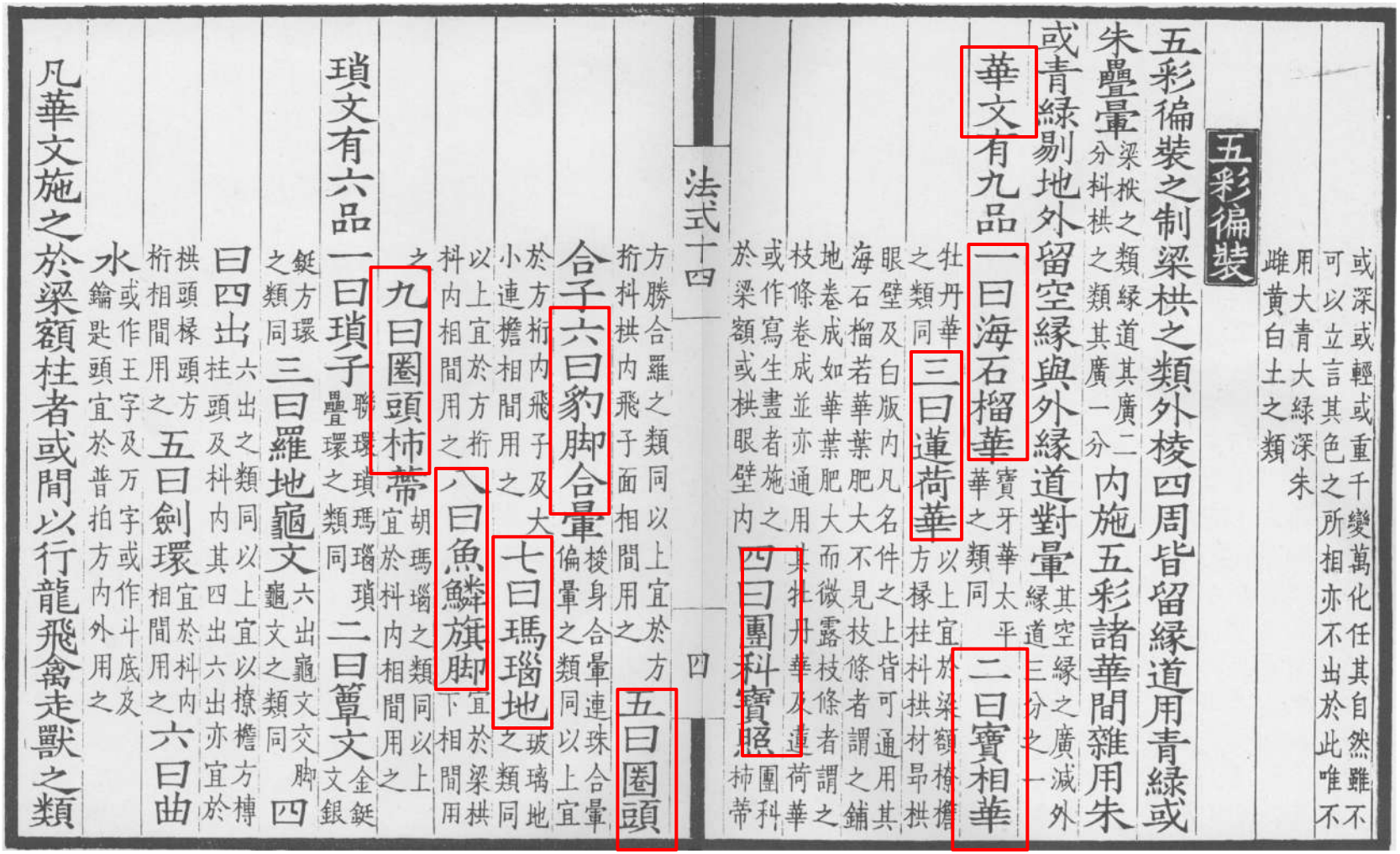
李路珂, 《營造法式彩畫研究》
Luke Li. Studies on the Rules for Color Painted Works in Yingzao fashi

Broken bucket panting

Geyuan
Temple

李路珂, 《營造法式彩畫研究》
Luke Li. Studies on the Rules for Color Painted Works in Yingzao fashi

Recovery Painted Works



或深或輕或重千變萬化任其自然雖不可以立言其色之所相亦不出於此唯不用大青大緑深朱雌黄白土之類

五彩徧裝

五彩徧裝之制梁栱之類外棱四周皆留緣道用青緑或朱疊暈梁栱之類緣道其廣二分栱之類其廣一分内施五彩諸華間雜用朱或青緑剔地外留空緣與外緣道對暈其空緣之廣減外緣道三分之一

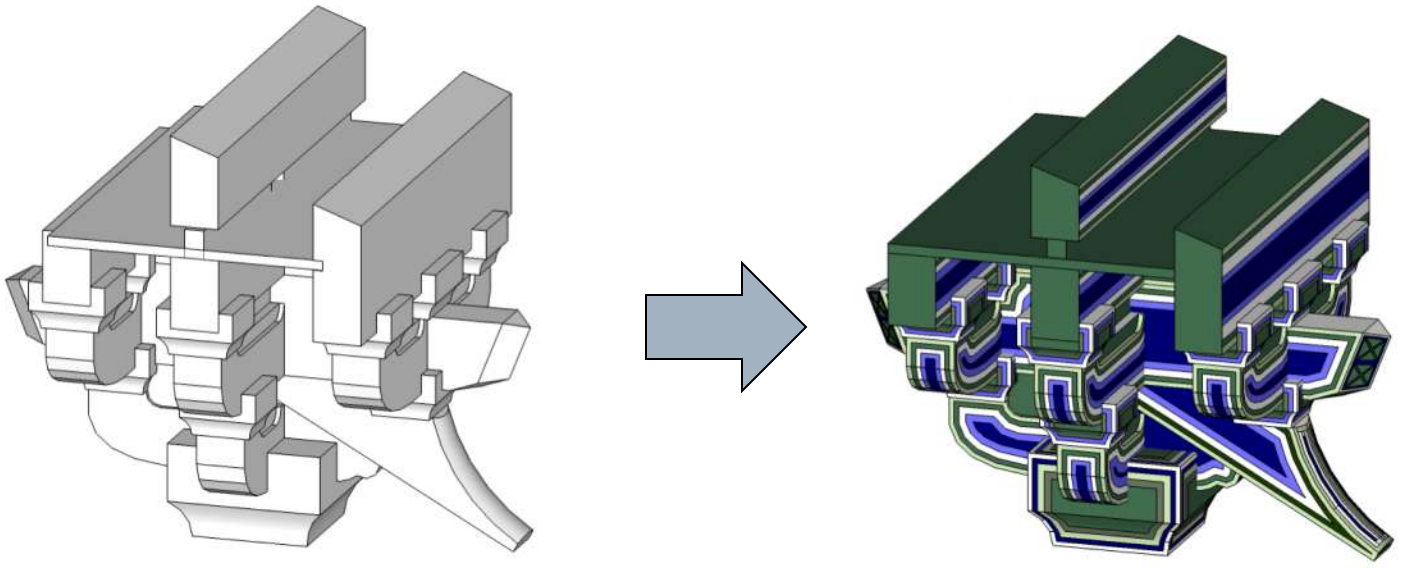
華文有九品一曰海石榴華寶牙華太平華之類同二曰寶相華牡丹華之類同三曰蓮荷華以上宜於梁額椽檐方椽柱枓栱材昂栱眼壁及白版内凡名件之上皆可通用其海石榴若華葉肥大不見枝條者謂之鋪地卷成如華葉肥大而微露枝條者謂之枝條卷成並亦通用其牡丹華及蓮荷華或作寫生畫者施之於梁額或栱眼壁内四曰團科寶照團科柿蒂

方勝合羅之類同以上宜於方桁枓栱内飛子面相間用之五曰圈頭合子六曰豹脚合暈棱身合暈連珠合暈偏暈之類同以上宜於方桁内飛子及大小連檐相間用之七曰瑪瑙地玻璃地之類同以上宜於方桁枓栱内相間用之八曰魚鱗旗脚宜於梁栱下相間用之九曰圈頭柿蒂胡瑪瑙之類同以上宜於枓内相間用之

瑣文有六品一曰瑣子聯環瑣瑪瑙瑣疊環之類同二曰簟文金銊文銀銊方環之類同三曰羅地龜文六出龜文交脚龜文之類同四曰四出六出之類同以上宜以撩檐方搏柱頭及枓内其四出六出亦宜於栱頭椽頭方桁相間用之五曰劍環宜於枓内相間用之六曰曲水或作王字及万字或作斗底及鑰匙頭宜於普拍方内外用之

凡華文施之於梁額柱者或間以行龍飛禽走獸之類

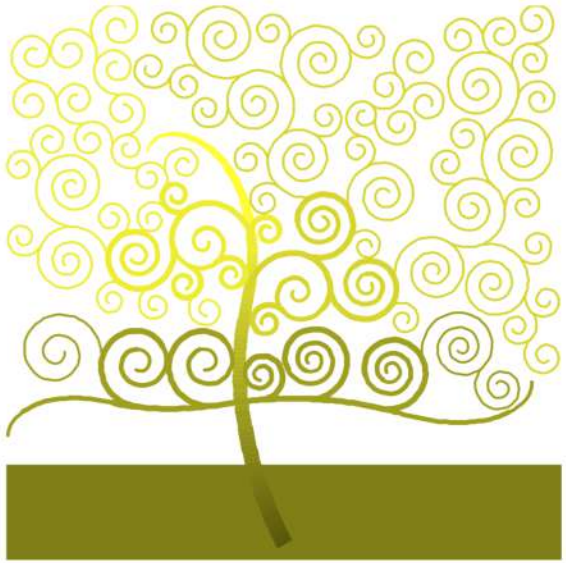
Recovery Painting Works



Outline

- Introduction
- Related Work
  - Space filling
  - Path following
- Sea Punica Granatum Pattern Synthesis
- Conclusion

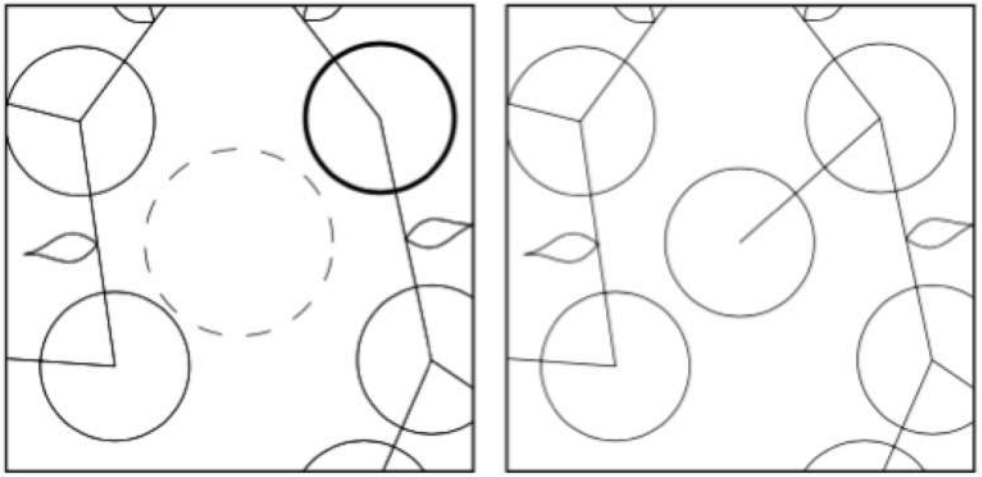
Generation mode

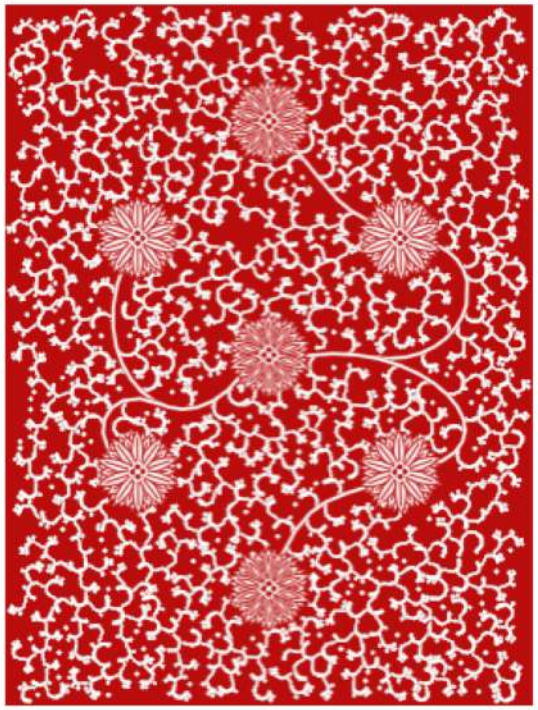


Space filling

Path following

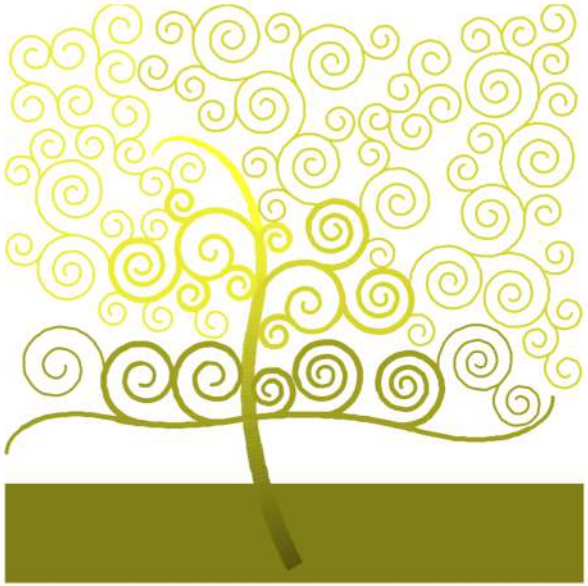
Space Filling





Douglas Zongker, Michael Wong,and David Salesin. Computer-generated floral ornament. *In Proceedings of the 25th annual conference on Computer graphics and interactive techniques*, 12, 423-434, 1998.

Space Filling



Original painting

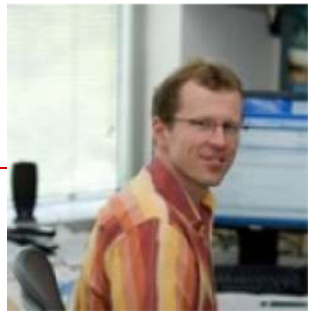
Generated result

Ling Xu and David Mould. Magnetic Curves: Curvature-Controlled Aesthetic Curves Using Magnetic Fields. Computational Aesthetics in Graphics, Visualization, and Imaging. 2009

Path Following

Jingwan Lu and Barnes, Connelly and Wan, Connie and Asente, Paul and Mech, Radomir and Finkelstein, Adam. Decobrush: Drawing structured decorative patterns by example. *ACM Transactions of Graphics*, 33(4):90:1–90:9, 2014.

Path Following



Shape filling Brush directly Near brush stroke

Radomír Mech and Gavin Miller, The Deco Framework for Interactive Procedural Modeling, *Computer Graphics Techniques*. 1, 1, 43–99, 2012.

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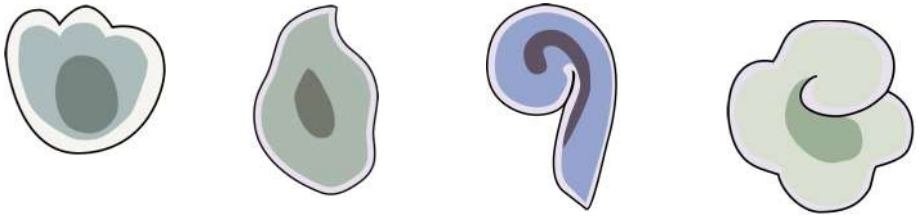
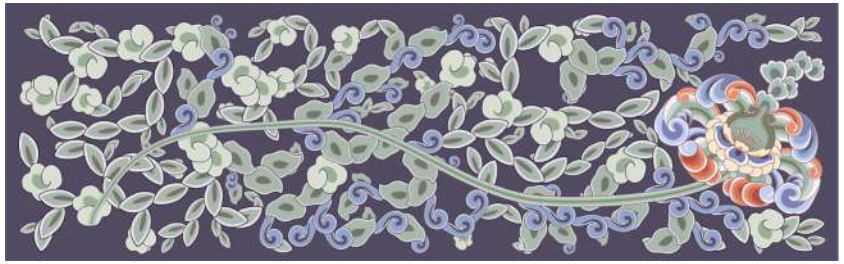
  - Propose
  - Generate Stem
  - Space Filling
  - Paste Leaves
- Conclusion

Research Propose



Generate Process

prepared pattern hand-painted path result



prepared pattern hand-painted path result

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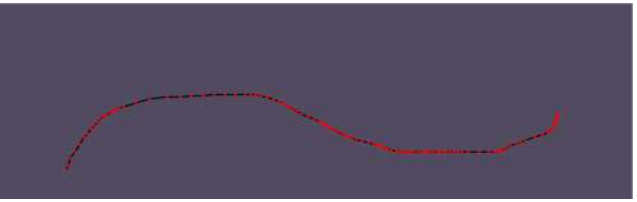
Generate Stem

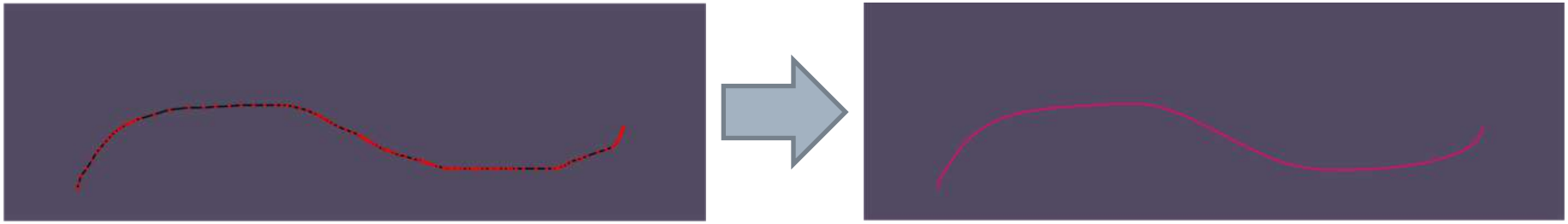


Hand-Painting

Smoothing

Bold Stem

Convert Point Path to Beazer Curve



Points Path

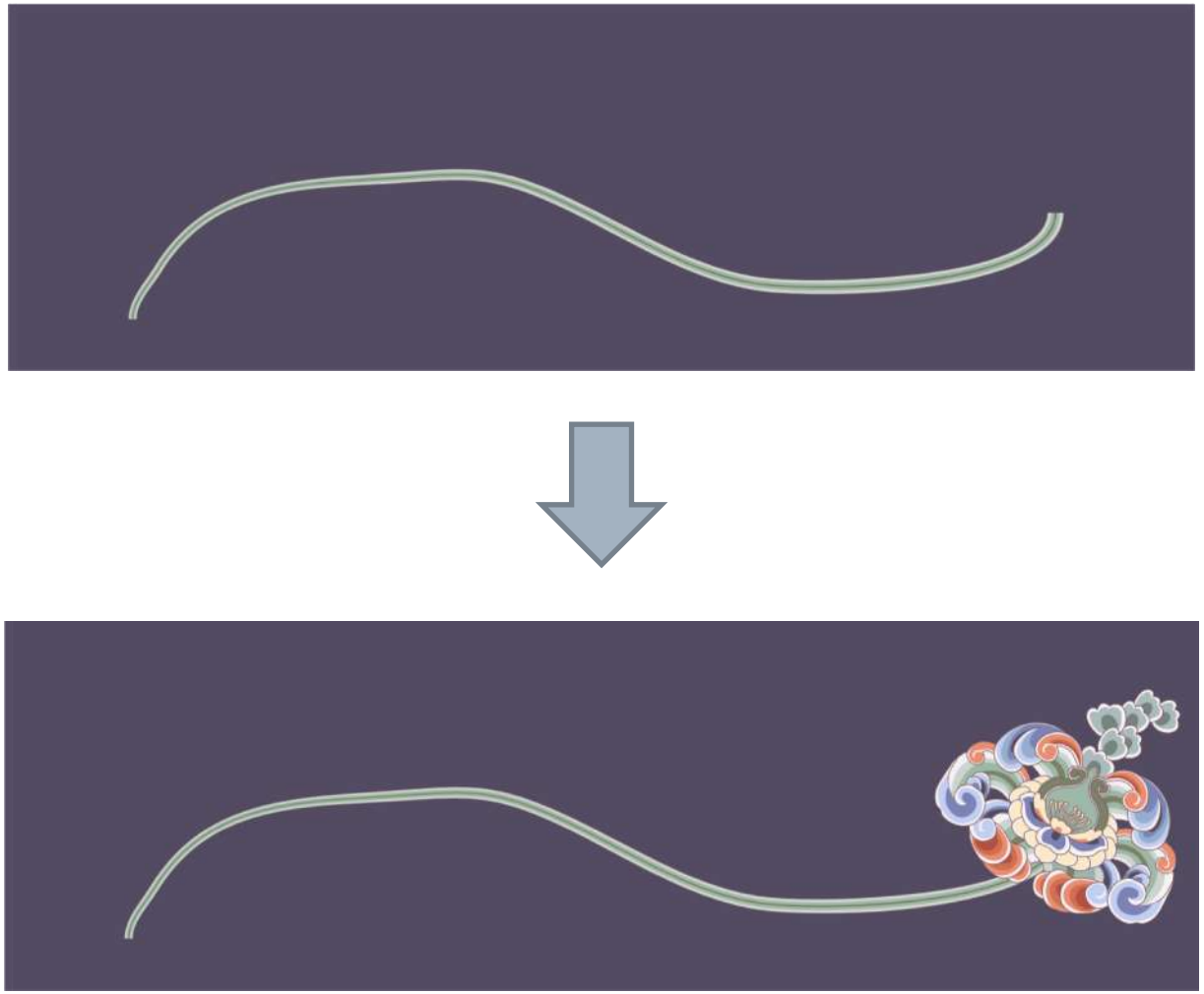
Bezier Curve

Bold Stem

Curve

Stem

Complete Stem



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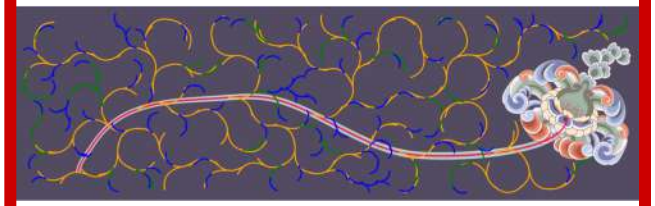
Generate Process

Completed Stem



Space Filling

Paste Leaves

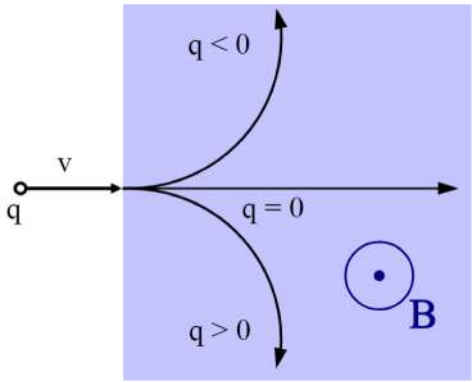
Space Filling

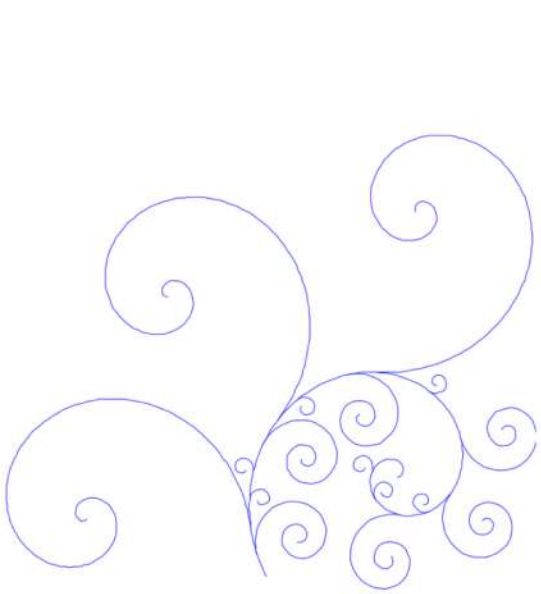
Original painting

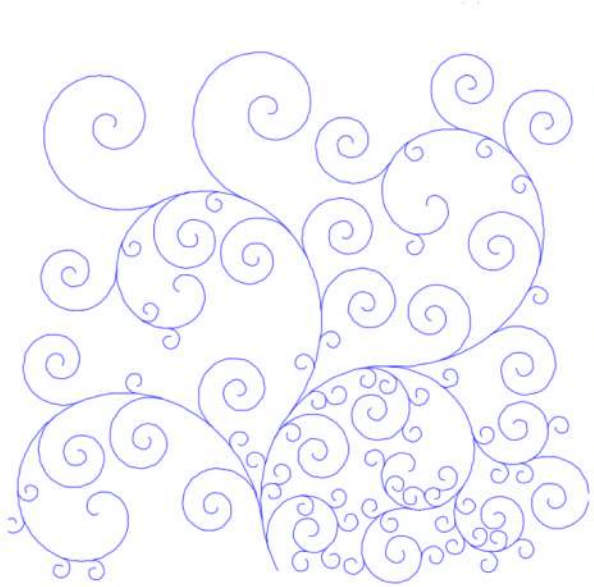
Generated result

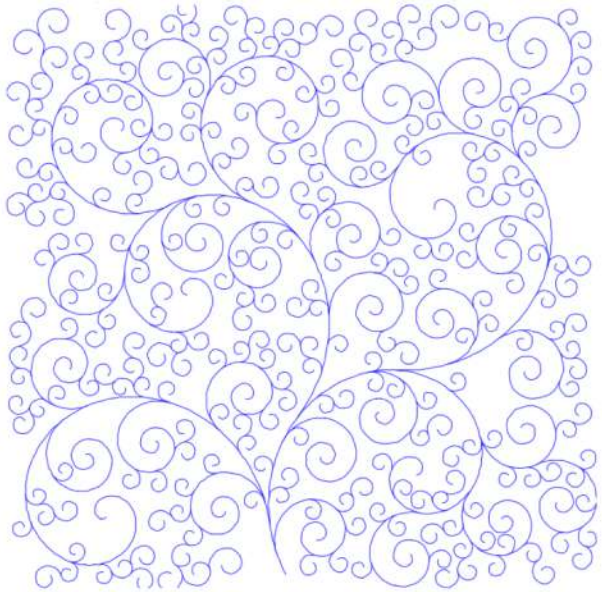
Ling Xu and David Mould. Computational Aesthetics in Graphics, Visualization, and Imaging. Magnetic Curves: Curvature-Controlled Aesthetic Curves Using Magnetic Fields. 2009

Magnetic Curves



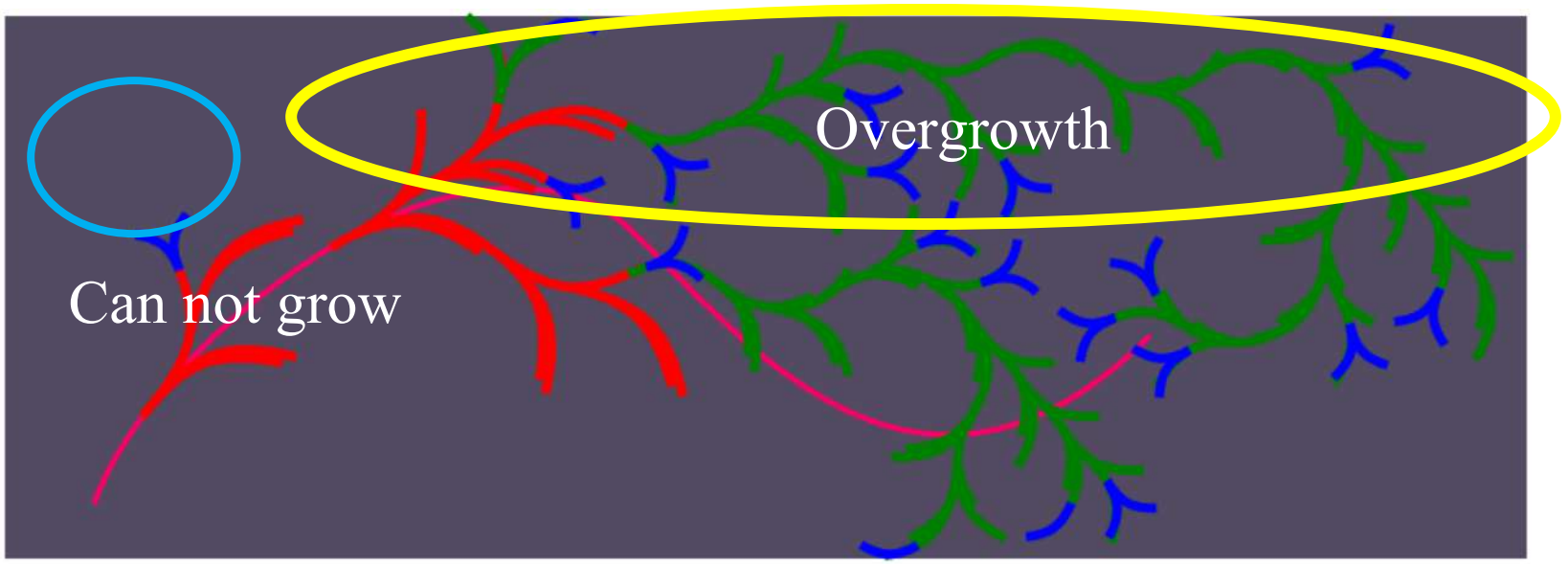




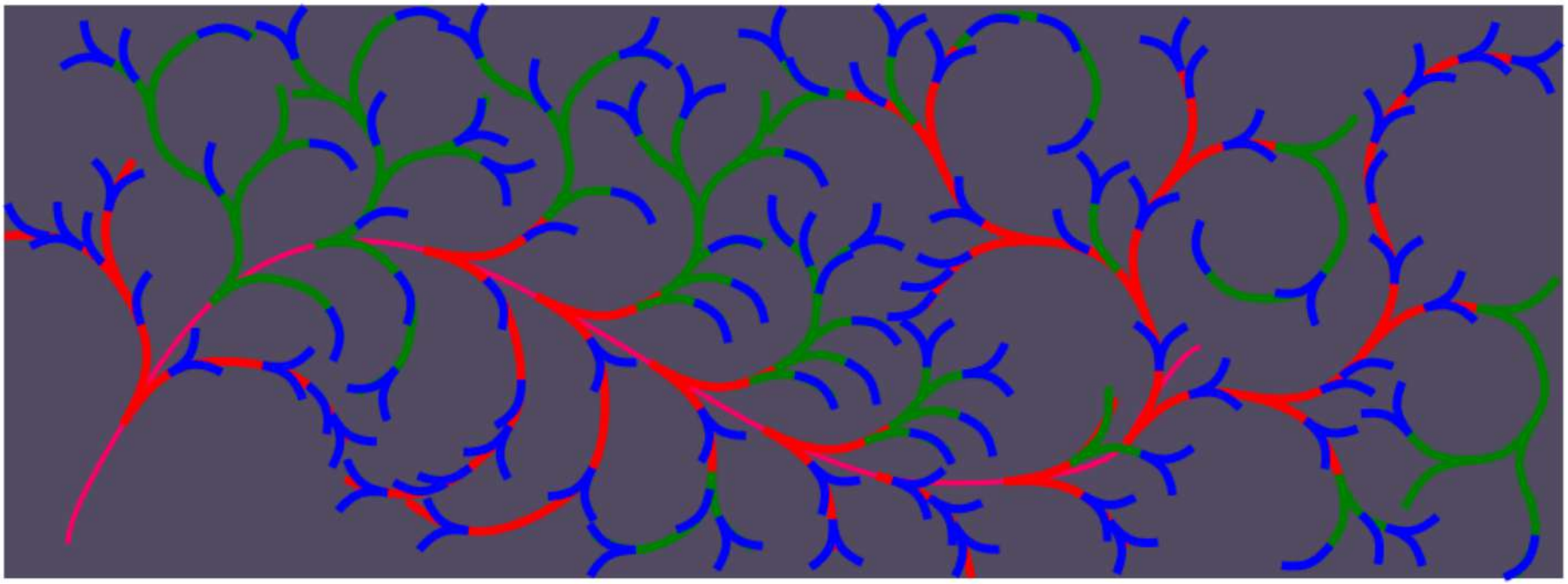


Space Filling

the color represents the leaf length, from long to short:
red →green →blue



Space Filling



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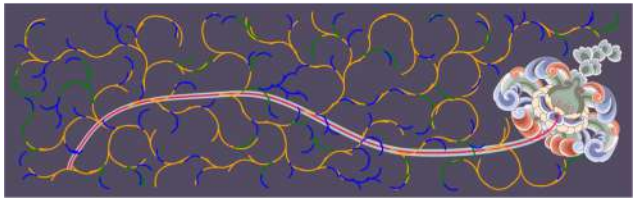
Paste Leaves

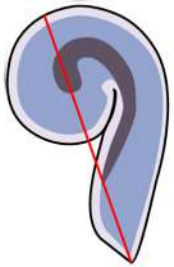
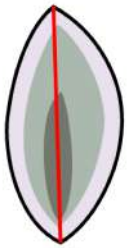
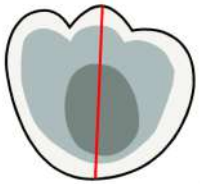
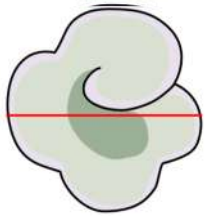
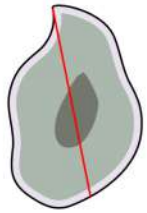
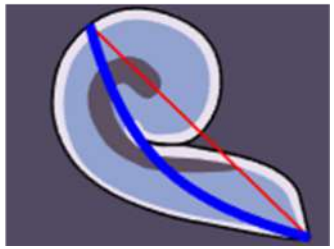
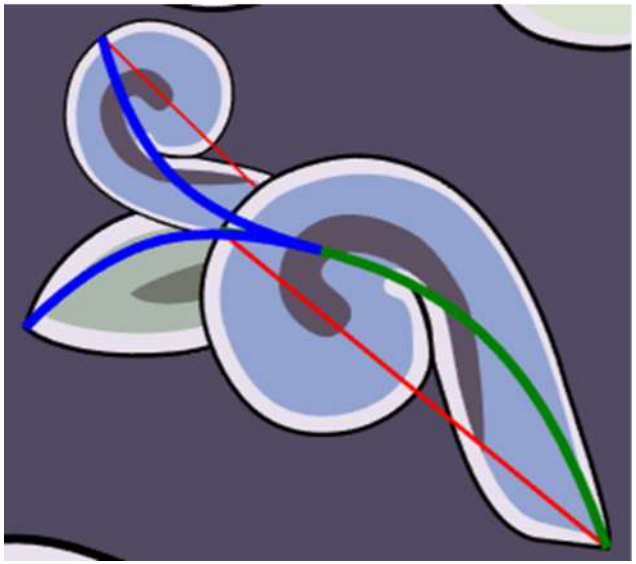
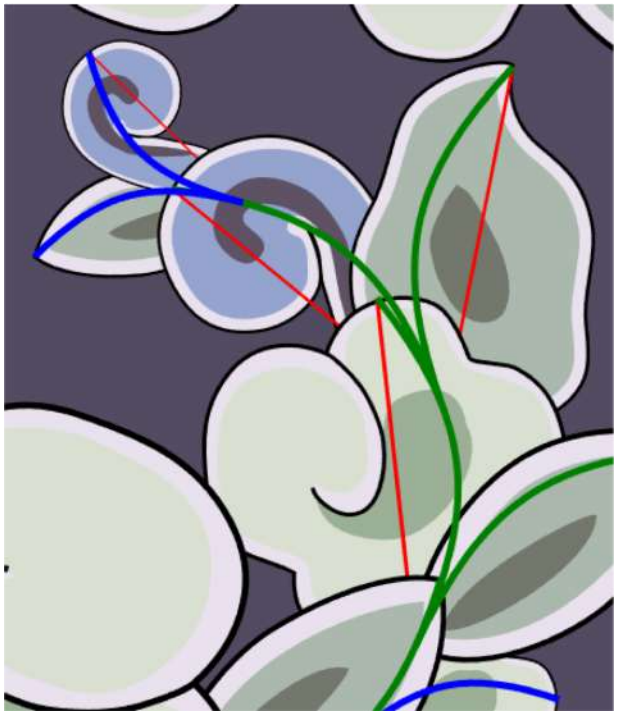
Complete Stem



Space Filling

Paste Leaves

Paste Leaves

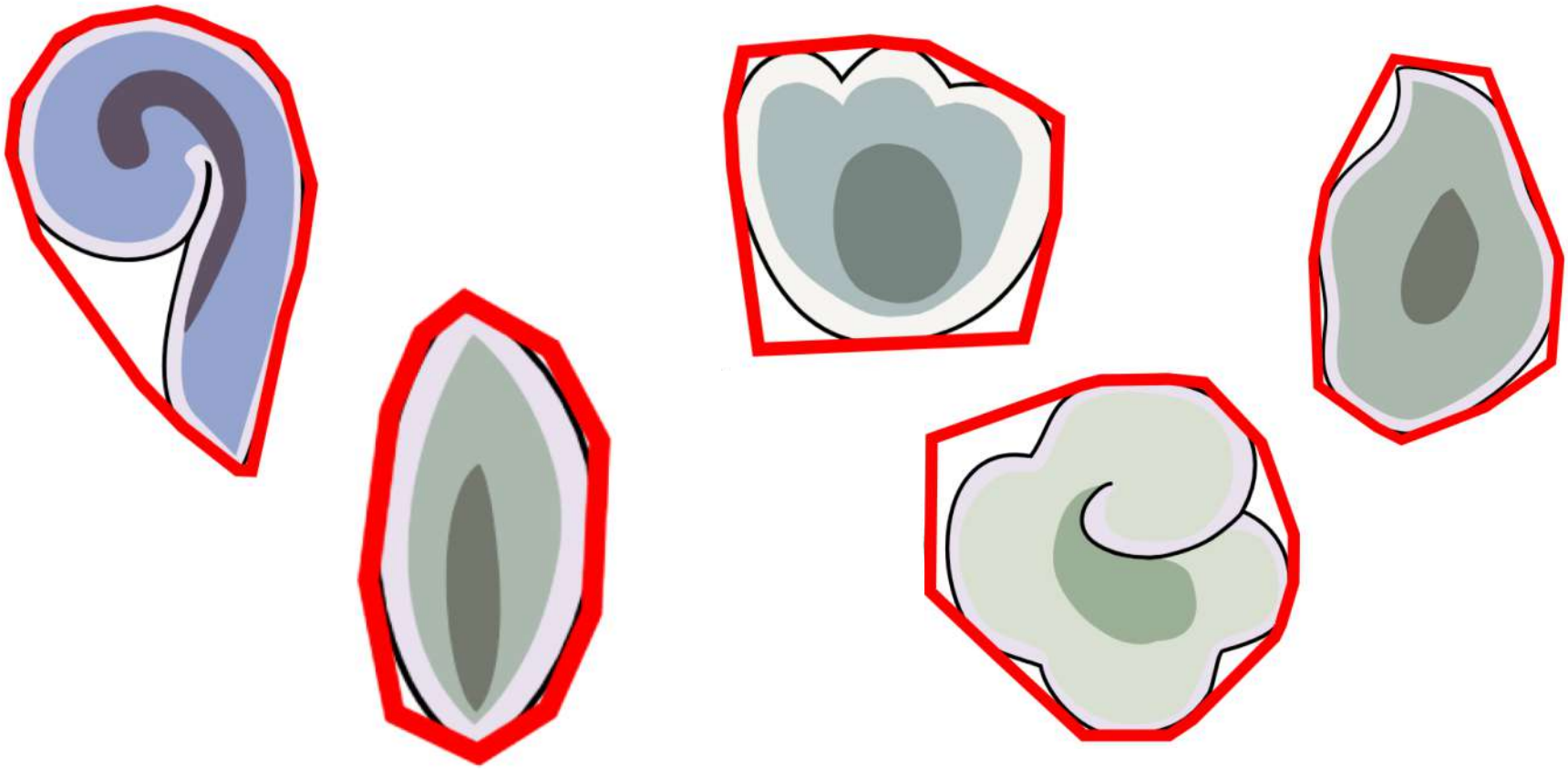









Result of Randomly

Original Painting

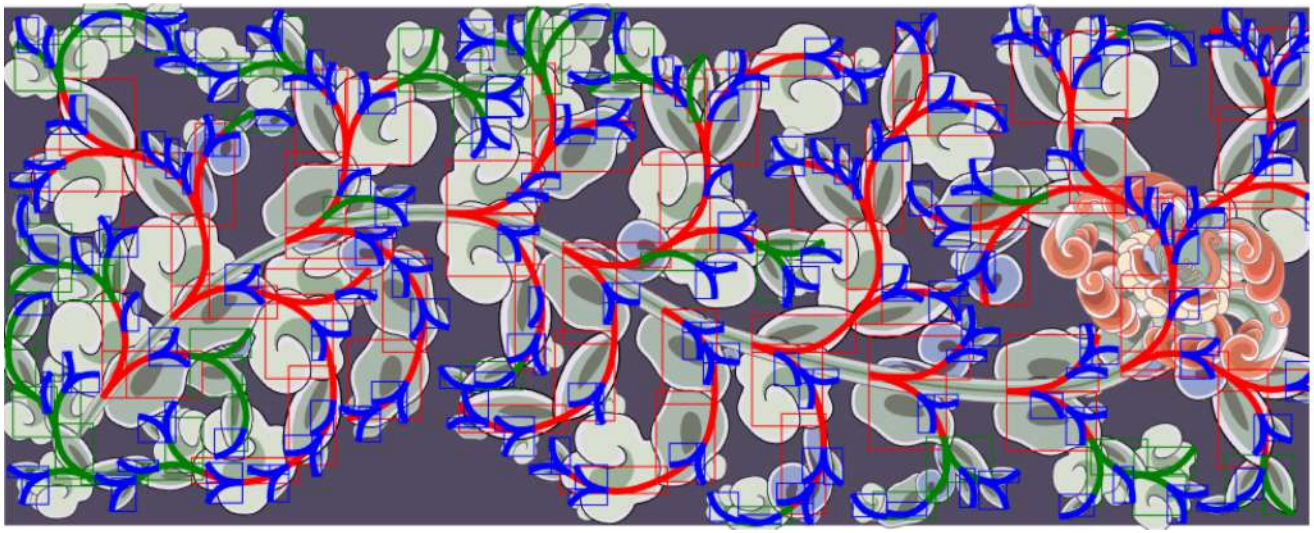
Random

Improved Collision

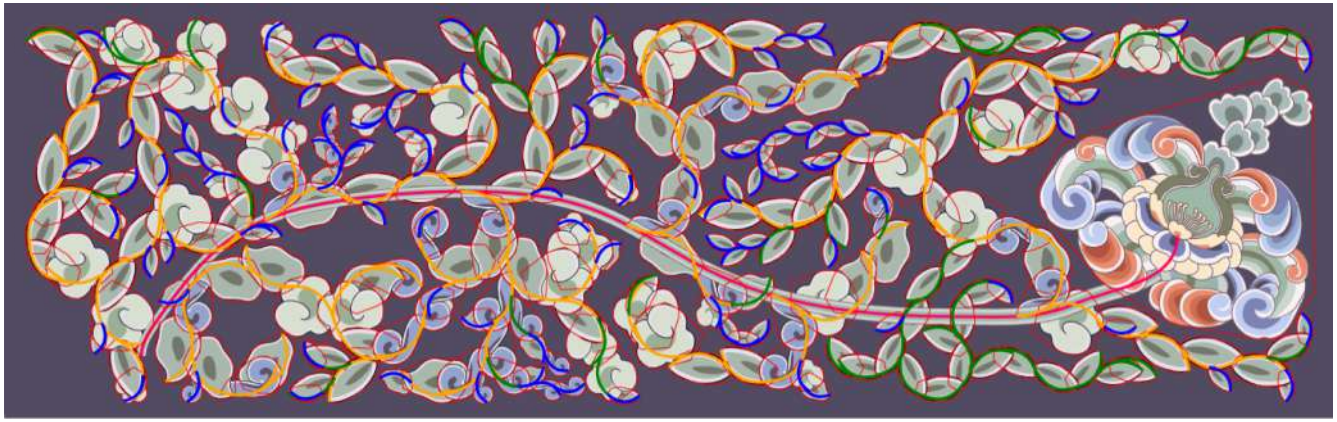


Result of Improved Collision

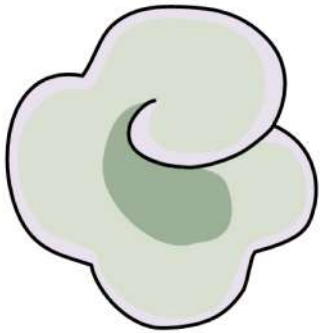
Bounding Box

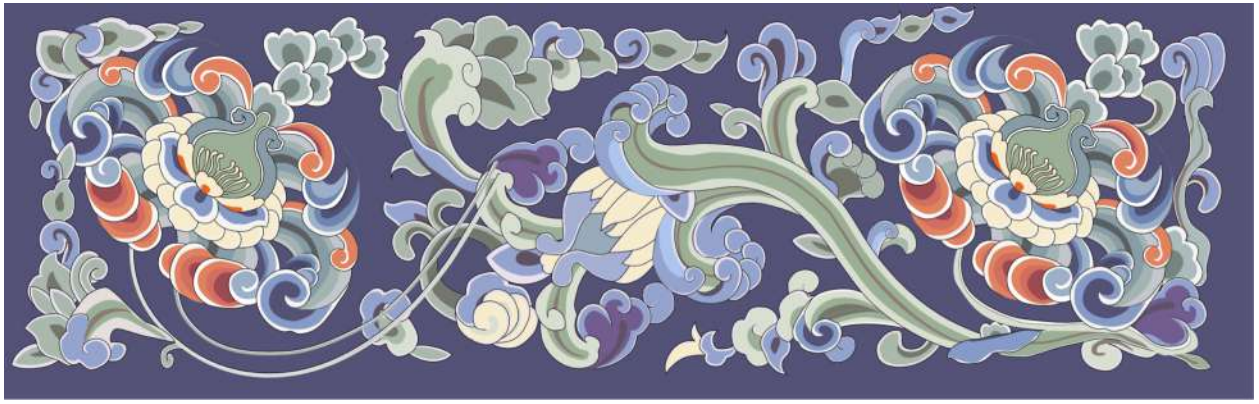


Convex Hull



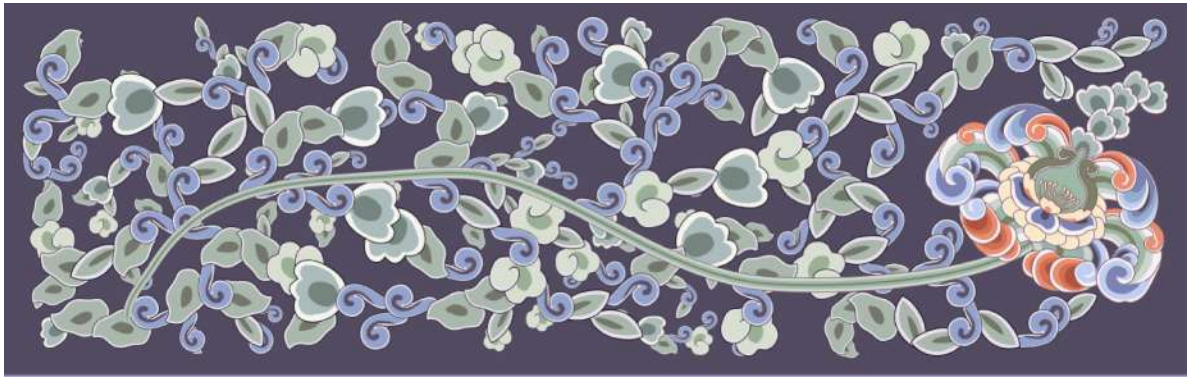
Problem of Random



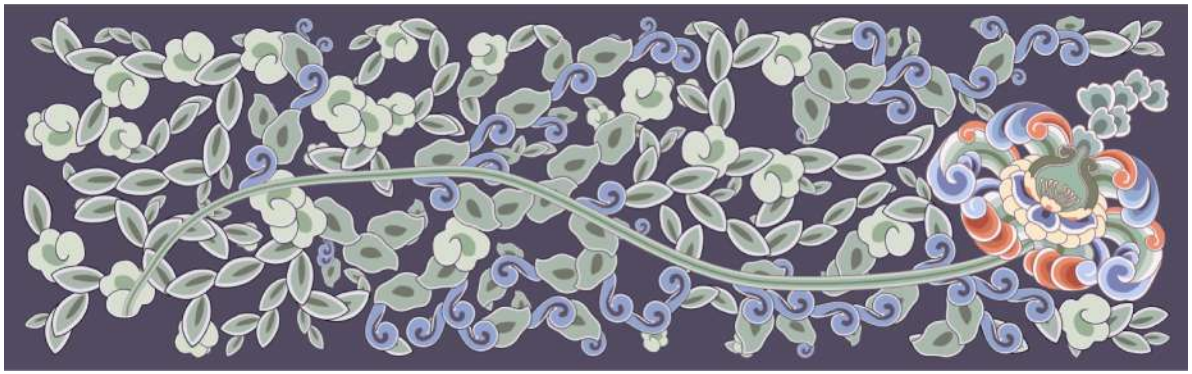


Result of Markov matrix

Random



Markov matrix



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Conclusion

- Combined with the existing technology to create pattern in “Yingzao fashi”
- Vectorize pattern as components and colored by rule
- Generate stem by smoothing and offsetting curve
- Collision detect to filling space
- Improve performance

Future Work

- Use SVG as a texture and attach it to the surface of the building model
- Deform the leaf pattern to fit the skeleton
- Locate the flower position automatically