Subdivision Curves with Negative Weight

Alex Day

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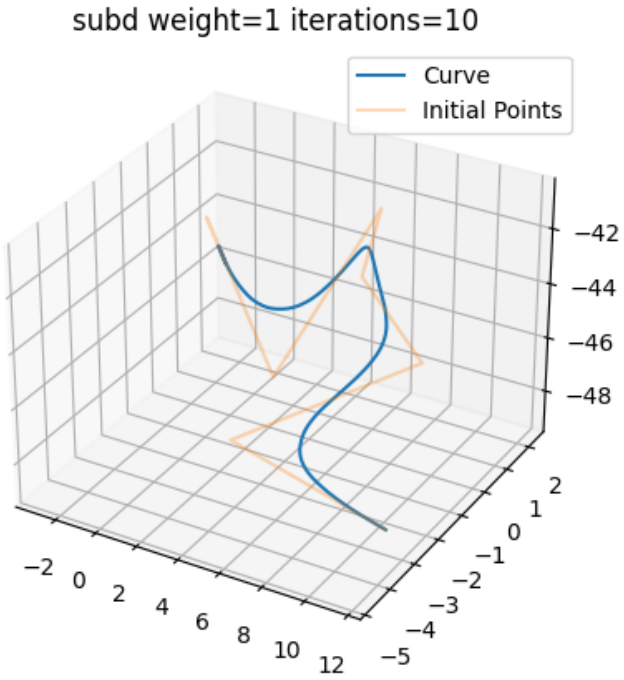
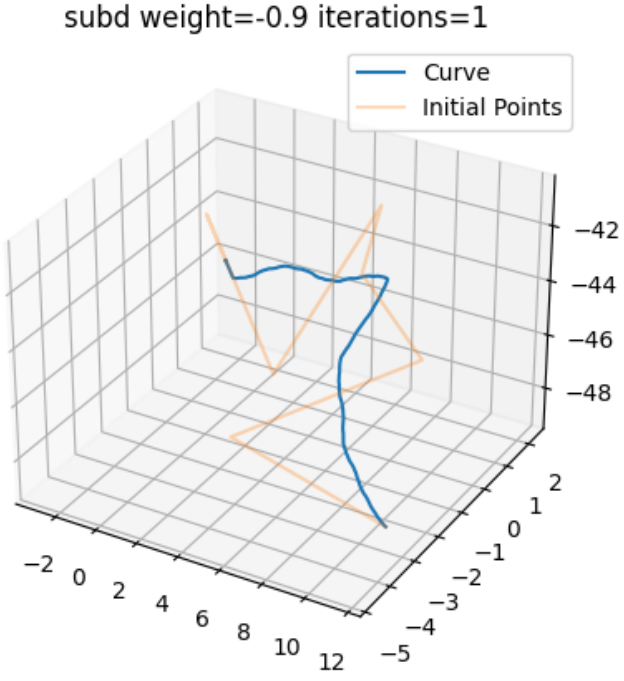
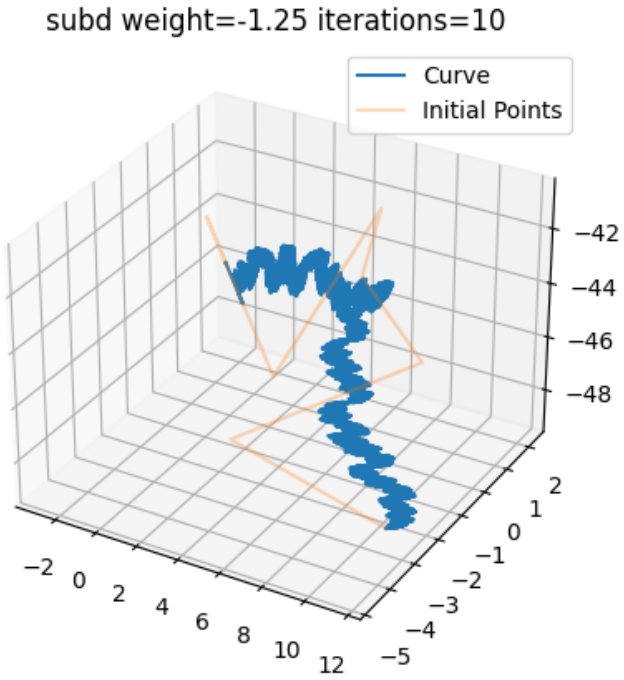
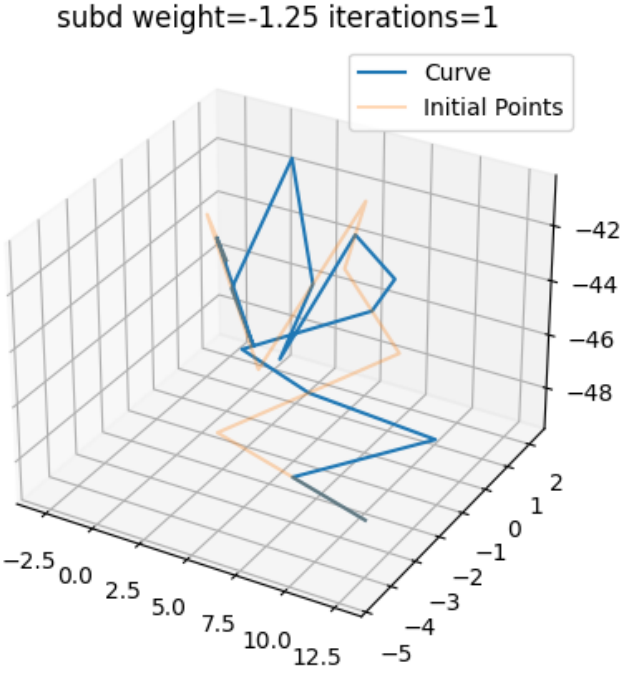
Reasonable curve is a purely subjective term. I would define a reasonable curve as one that could be realistically used in some sort of rendering process, which is quite broad. Subdivision curves with positive weights fill this requirement by definition, as they create smooth curves which approximate some line segment. Although one could argue that this technique is only useful up to a maximum weight bound the behavior doesn't become undefined the higher the weights go.

Negative weighted curves, on the other hand, become jagged around -0.9 and practically unusable below -1.25. This is due to the undefined behavior of weighted averages when negative weights are used. Rather than the intermediate points approaching the perfectly smoothed curve, these points progress in the opposite direction, this behavior is most apparent with a single iteration of the algorithm. Successive iterations repeat this behavior until the resulting "curve" is indistinguishable from scribbles on a paper


subd weight=1 iterations=10
Curve
Initial Points
−42
−44
−46
−48
−2
0
2
4
6
8
10
12
−5
−4
−3
−2
−1
0
1
2


subd weight=-0.9 iterations=1
Curve
Initial Points
−42
−44
−46
−48
−2
0
2
4
6
8
10
12
−5
−4
−3
−2
−1
0
1
2


subd weight=-1.25 iterations=10
Curve
Initial Points
−42
−44
−46
−48
−2
0
2
4
6
8
10
12
−5
−4
−3
−2
−1
0
1
2


subd weight=-1.25 iterations=1
Curve
Initial Points
−42
−44
−46
−48
−2.5
0.0
2.5
5.0
7.5
10.0
12.5
−5
−4
−3
−2
−1
0
1
2