Skinning Vector Graphics with GANs

Ankit Phogat
Adobe
phogat@adobe.com

Matthew Fisher
Adobe
matfishe@adobe.com

Danny M. Kaufman
Adobe
kaufman@adobe.com

Vineet Batra
Adobe
vbatra@adobe.com

Figure 1: Multiple poses of dancing couple created form initial pose *(left most)*. Resolution independent, can be zoomed into.

ABSTRACT

We propose a novel method for editing vector graphics which enables users to intuitively modify complex Bézier geometry. Our method uses a Generative Adversarial Network (GAN) to automatically predict salient points for any arbitrary geometry defined by cubic Bézier curves, which are used as *handle* locations for a Linear Blend Skinning transformation. Further, we bind input geometry to a triangle mesh, to decouple the complexity of input geometry from mesh topology. Finally, to reconstruct Bézier curves from the transformed mesh, we formulate a linear optimization problem and solve it in performant manner to ensure real time feedback, without increasing the number of Bézier segments.

CCS CONCEPTS

• **[Computer Graphics]: Computational Geometry and Object Modeling**;

KEYWORDS

Free-form Deformation, Vector Graphics, Linear Blend Skinning

SIGGRAPH '19 Posters, July 28 - August 01, 2019, Los Angeles, CA, USA

ACM ISBN 978-1-4503-6314-3/19/07.
https://doi.org/10.1145/3306214.3338544

ACM Reference format:
Ankit Phogat, Matthew Fisher, Danny M. Kaufman, and Vineet Batra. 2019. Skinning Vector Graphics with GANs. In *Proceedings of SIGGRAPH '19 Posters, Los Angeles, CA, USA, July 28 - August 01, 2019,* 2 pages.
https://doi.org/10.1145/3306214.3338544

1 INTRODUCTION

Traditional vector graphics editing is based on piece-wise modification of cubic Bézier segments using control handles. This is a tedious workflow, demanding high level of expertise in order to achieve desired results. Paradigms such as Linear Blend Skinning [Liu et al. 2014] demonstrate significant potential to provide intuitive method for editing vector graphics. However, these techniques still present a steep learning curve, as users are required to plot handles manually. We build upon advancements in deep learning, specifically GANs[Goodfellow et al. 2014] [Isola et al. 2016], and propose a model to automatically predict LBS handle locations, thereby eliminating the learning curve associated with plotting handles, and enabling users to start interacting right away. A method to adapt LBS for Bézier geometry was given by [Liu et al. 2014], wherein the Bézier curves are sampled to generate mesh vertices. However, this lacks robustness required for real world vector graphics, as generated mesh[1] is overtly complex and system fails when solving for biharmonic weights [Jacobson et al. 2011]. Furthermore, non-linear optimization step for curves-fitting makes it inadequate for real

[1]Mesh generation fails for complex Bézier geometry, e.g 'Elephant' in result section