Animato: A Domain-Specific Language for Animation and Drawing

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Animato is a domain-specific language aimed to tackle the problem of tedious drawing for animation and shape rendering. While there exists tools such as p5.js [p5j 2024] and Penrose [Ye et al. 2020], this project mimics and extends certain aspects of existing tools.

1 INTRODUCTION

Art is prevalent in all shapes and forms, one being visual. In the field of animation, drawing is a tedious yet important task that 2-dimensional animators often have to utilize. Due to the tedious nature of hand-drawn animation, Animato aims to relieve animators of the need to draw each frame and develop animations using the domain-specific language.

2 FRAMEWORK

2.1 Primitives

In the current iteration of Animato, there are multiple primitives for shapes that are ready to be utilized. These include squares, circles, line segments, and some other harder to achieve common shapes. Using these primitives, users are able to create custom shapes (functions) by defining a function as follows:

```
dsl_code = """
  (define star (cx 0) (cy 0) (radius 50) (
    (line (x1 (- cx radius))
          (y1 (- cy radius))
          (x2 (+ cx radius))
          (y2 (+ cy radius)))
    (line (x1 (- cx radius))
          (y1 (+ cy radius))
          (x2 (+ cx radius))
          (y2 (- cy radius)))
    (line (x1 cx) (y1 (- cy radius))
          (x2 cx) (y2 (+ cy radius)))
    (line (x1 (- cx radius)) (y1 cy)
          (x2 (+ cx radius)) (y2 cy))
  ))
  (star (cx 250) (cy 250) (radius 100))
"""
```

The above `dsl_code` input produces the

2.2 Implementation

Animato uses a Python backend with Pillow for drawing visualizations and z3 for constraint solving.

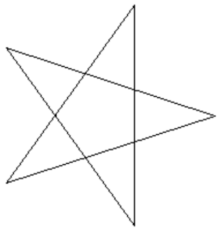

Fig. 1. Output image of `dsl_code` input

3 LIMITATIONS AND FUTURE WORK

While the intent of this project is to create a domain-specific language to assist programmers and animators to easily draw animations, there is still work that needs to be done in order to flesh out this idea. Firstly, the aspect of custom-defined functions is quite limited and Animato needs more functionality that gives a more user-friendly experience. While the aim of Animato is to allow everyone to create animations without the need to look in the backend to see what it's doing, this is quite difficult to allow users to actually do whatever they want. In testing, it has been apparent that actually creating custom functions is quite hard since the user needs a precise understanding of the canvas space.

4 CONCLUSION

Overall, while the aim of *Animato* is to provide a more concise and specialized language for animators/developers to use, further work must be done to polish the domain-specific langauge. At the current state, users are able to create a canvas with some specified shape drawings, including custom shapes.

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