

CSCI 5551 Project Progress Report - Bot Ross (The Joy of Painting)

Group Members:

Sam Williams (will6673)

Alex Overman (ayres036)

Nadya Postolaki (post018)

Current Progress:

The team experimented with ROS, and was able to successfully simulate and manipulate a TurtleBot in ROS Gazebo. This has led to the decision to alter the goal of simulating drawing a vectorized image via moving a TurtleBot instead of using the Baxter robot's arms. As an example application, imagine a city-hired street artist using this software to manipulate a TurtleBot with an attached spray can to create murals on some designated, unreasonably-smooth sidewalk.

Several methods for vectorizing an image have been identified.

Vectorization of Images

In order for TurtleBot to “draw” an image, it must view the drawing surface as a coordinate plane that it can travel on. A solution to creating the image to fit a plane is by vectorizing the image, as vector graphics are mathematical formulas that establish points on a Cartesian plane, connected by lines and curves which TurtleBot can follow along to create the image.

Python conveniently has libraries such as `linedraw.py` and `numpy.shape` that can aid in converting bitmaps to vector images. We can then use the mathematical formula from the resulting image to create a path that TurtleBot will travel on.

Edge Detection and Vectorization via Numpy

One such method that has been explored is the use of Sobel edge detection techniques to find the edges in an image, followed by turning the resulting image into a matrix via `numpy`. The idea here would be to “pen up” whenever the color in a pixel was below a certain threshold and “pen down” when it was above a certain threshold. Early attempts at Sobel edge detection algorithms in Python have proved inconclusive.

A final method is still to be decided and implemented.

Future Plans:

The current plan is to design a program to make the turtle bot move in a square path when run. From there, the path will be updated to utilize an inputted image that has been vectorized.