

Introduction

Working with the Community School of Davidson, our project is to create a photomosaic using student's artwork. A photomosaic is large scale photo that is built from a combination of smaller photos, and was originally created by Robert Silvers at MIT in 1996. They are a form of "Opt Art", where optimization is used to create a mosaic of a given size that resembles a set target image (Bosch 2006).

When working on this project, we decided to build our code in MATLAB, combining the use of online image resizing software with the use of binary integer linear programming (BILP) to building the photomosaic. We used the principles of a BILP, which is an optimization problem with a linear objective and binary integer constraints, to limit the number of times a photo was used to only once in an effort to showcase most of the students artwork.

References

- Bosch, Robert, (2006, February), Opt Art, retrieved March 30th, 2017 from http://www.maa.org/sites/default/files/pdf/upload_library/22/Evans/Horizons-Feb06-p.06-09.pdf.
- Bosch, Robert, (2009, February), TSP Art, retrieved March 30th, 2017 from <http://www.oberlin.edu/math/faculty/bosch/tspart-page.html>.

Abstract

A photomosaic is a large scale photo that is built by combining smaller photos together in a cohesive way. The team works with the Community School of Davidson to use student's artwork and activities photos to create a banner that spelling the word "spARTans". This poster exhibits the use of math modeling through binary integer linear programming (BILP) as a way to build this photomosaic. As we investigate in how to approximate images, we see how mathematical modeling could be utilized and applied to simple real world problem.

Methods

First, we coordinated with the community sponsor to assemble photos and acquire the target image for the photomosaic. While doing this, we started assembling the necessary elements to create the photomosaic, including researching photo resize methods and building the MATLAB code complete with BILP elements. From there, we started putting it all together; using MATLAB, we loaded the students' photos and the target image into the program to receive our final image.

Results

The photomosaic picture we have created.

Simplifications

As far as the simplifications go for this project, there aren't many variables that we could assume and take for granted, however there were a couple. The first assumption and simplification we made was the assumption that all pictures we receive have different colors. To make a photomosaic with color and have it look good, a lot of different colors are necessary, and so with this project, we assumed that the pictures and photos we received from the elementary school, would contain many variety of colors, not just black and white. Another simplification, going off the color scheme, would be that the title page or main image we are trying to achieve isn't black and white. This would cause the photos we have that are colored, to inaccurately be mapped to some black or white, however, we need them to be mapped to a similar average color. Thus we need the title page to be not black and white.

Conclusions

Acknowledgement

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