

DEPIXELIZING PIXEL ART

110050055 ANIRUDH VEMULA

CS775 PROJECT

110050051 VAMSIDHAR YEDDU

What is Pixel Art?

- ▶ Pixel Art is a form of digital art, created through the use of raster graphics software, where images are edited on the pixel level.
- ▶ Graphics in pre-mid 1990's video and console games mostly contain pixel art images.
- ▶ The best pixel art from the golden age of video games are masterpieces, many of which have become cultural icons.



Mario



Bomber Man

What is Vector Graphics?

- ▶ Vector Graphics is the use of geometrical primitives, which are based on mathematical expressions, to represent images in Computer Graphics.
- ▶ Geometrical Primitives can be points, lines, curves and polygons.
- ▶ This representation is resolution-independent i.e. it can be rendered at any resolution without any loss of clarity.
- ▶ Vectorizing a raster image is called Depixelizing.



Vector Graphics



Raster Graphics

<http://whiteboardstudio.com/cms/wp-content/uploads/2013/02/Raster-Blog1.jpg>

What our Algorithm does?

- ▶ Our algorithm extracts a resolution independent vector representation from the pixel art.



Why our method?

- ▶ Previous vectorization techniques were designed for natural images and not specific to pixel art images.
- ▶ In pixel art every single pixel can be a feature of its own or carry important meaning which the previous vectorization algorithms disregard. Thus, they suffer from detail loss when applied to pixel art images.
- ▶ Our algorithm is specifically designed for pixel art graphics with features at the scale of a single pixel.

Bicubic

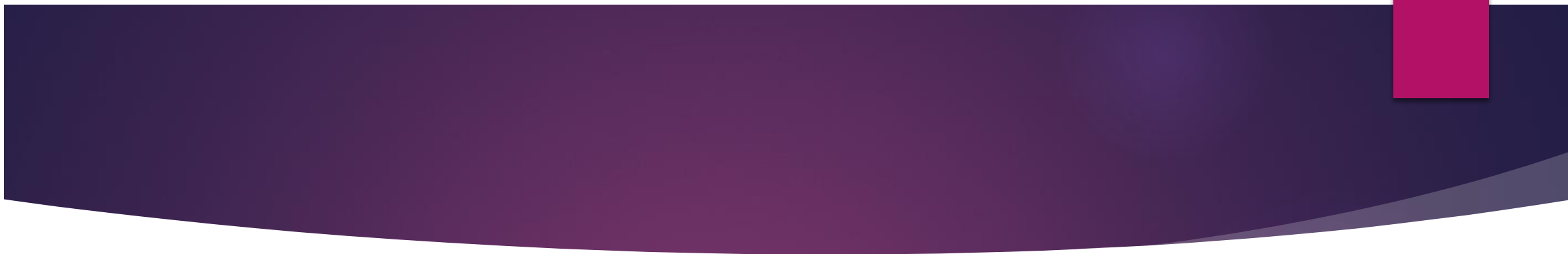


SuperEagle



Overview of our Algorithm

- ▶ Encoding the pixel art image as a square lattice graph(each pixel is a closed cell) and then add edges between the pixels in such a way that the features of the pixel art image are captured completely.
- ▶ Reshaping the cells according to their connectivity to other cells.
- ▶ Fitting Quadratic B-Splines to the visible edges and then optimizing the B-Splines(this helps avoiding staircasing effects)
- ▶ Finally, rendering the image using the obtained curve primitives.



Limitations

- ▶ In the later nineties, video game consoles and computers were able to display more than just a handful of colors.
- ▶ For these systems, the designers started from a multi color high resolution images and then downscale them. This results in very anti-aliased sprites.
- ▶ Sometimes our sprites smooth certain features too much. This is because corner detection patterns are based on heuristics and might not always agree with human perception.

