

Notes- Week #3

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How drawing works---

- Displays- driven by a grid of pixels- about a million pixels in all
- High resolution devices- 4K display
- Era of vector display graphics- electron beam draws line between end points - infinite resolution since no chunks of pixels- why is it not in use then?
- Drawing a line to find this out....
Representation of a line inclined at a certain angle by pixels- but representation is not accurate- so inc. resolution, inc. no. of pixels—so 8*8 image converted to 32*32 image.

Representations of an Image (Graphics)---

- Raster graphics:
 - display of raster data on a monitor
 - Each pixel- one color
 - common file formats: JPEG, PNG, GIF
 - compression: lossy or lossless
 - paint or photoshop can be used for editing
 - Difficult to lose quality of image if it is in JPEG format – it tries to reduce the amount of space used in memory while still preserving the image—JPEG is a better lossy format than other lossy formats
 - Raster is not always an image- it can also be a volume pixel that stores a number
- Vector graphics:
 - each component is a drawing component
 - display of vector info. – list of info. until it is rendered
 - file formats: SVG, PDF
 - common editors: adobe illustrator
- if a line covers fewer than 40 pixels—then raster consumes lesser memory than vector
- keeping the resolution constant, as the number of lines increases—the amount of memory used by a vector img. incr. while memory used by a raster img. remains constant.
- Drawing a circle- takes lesser space in memory
- Image raster of the vector data- 8points- point takes more space than a pixel in memory- so raster is better than vector
- **Raster or Vector?**
 - For infinite resolution- raster breaks the img. to small pixels to capture it
 - Text – raster or vector, both can be used-- if stored as vector data- it is resized- taking a vector format and increasing resolution thus rasterizing it
 - Geographical data- can be represented as a vector or raster
Boundaries- requires to define points- hence **vector repr.**
Relief (height map)- raster- not able to represent it with vectors

Population density- difficult to create a filled area with vectored values- requires vector to be resized to the level of pixels- filling spaces with varying values- **raster**
Capital cities- just a point information- **vector repr.**

Discussion—

1. About the storage of vector and raster images in terms of memory usage
2. Representation of histograms (as a raster img.) and sine waves (as a vector img.)
3. Google maps- uses both vector and raster repr.
4. Transmission of vector data – compression and decompression

Visualization Pallete: Mutation operations ---

1. Mathematical operations
2. Smoothing- reduces values in data w/o dumping the actual data
3. Histograms- creating a visual to represent data

Binning and Histograms:

1. Count- existence of data- dividing region into bins to count no. of circles in each bin
2. V_i - value of data point- considering values of points in each bin (eg.-total rainfall)
3. V_i/count – avg. value (eg.-average rainfall)
4. W_i - Weights of data points (eg.- freezing – more weight than normal rain)

Splitting operations

1. grouping data based on some characteristics
2. categorical division example- studying car accident effects based on the air-bag deployment system (deployed or not)