

Lecture 1

Introduction to Computer Graphics

SCC-1010: Graphics, 2019

Christian Millán

1. Introduction



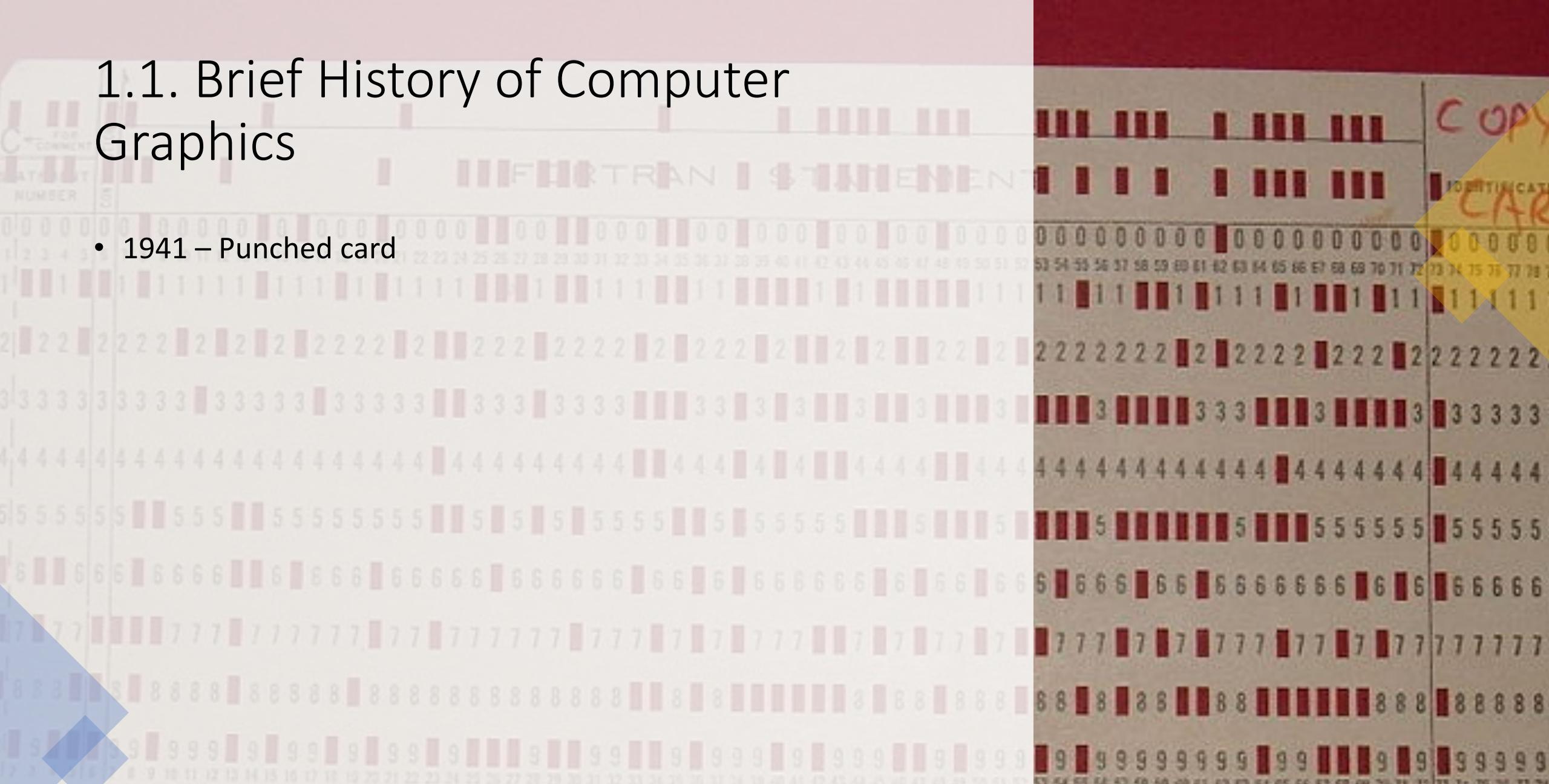
“Computer graphics provides methods to generate images using a computer.”
(Klawonn, 2012)

“Science and art of communication visually via computer’s display and its interaction devices .”
(Hughes, 2014)

“Computer Graphics (CG) is the use of computers to generate images”
(Guha,2019)

1.1. Brief History of Computer Graphics

- 1941 – Punched card



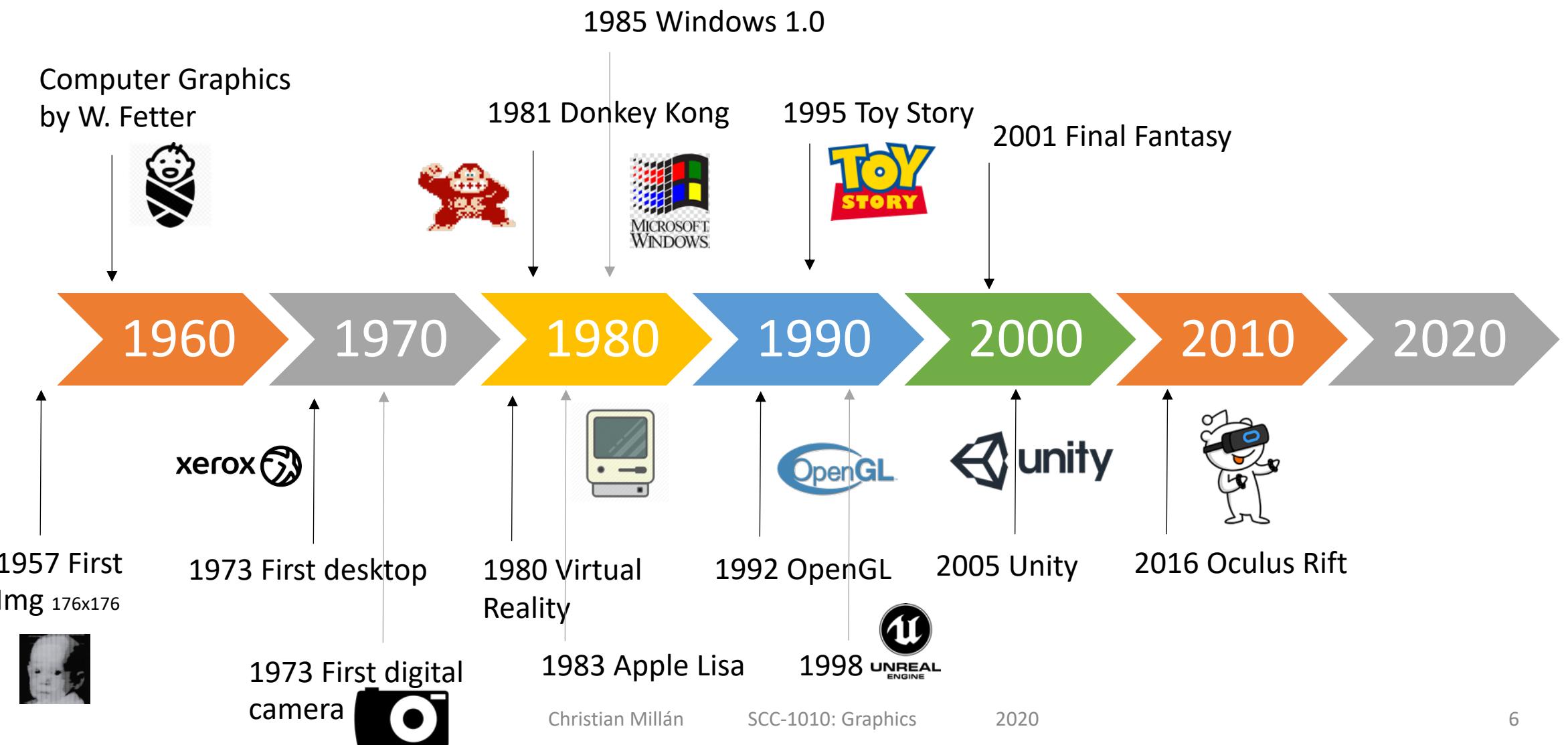


1.1. Brief History of Computer Graphics

- 1950 – First graphic images

1.1. Brief History of Computer Graphics

- 1951 – First computer with a video display of real time data



1.2. Applications fields

- **Animate movies**
- **Music**
- **Movie poster**
- **Advertising poster**
- **Video games**
- **Graphic user interfaces**
- **Charts**

1.2. Applications fields

Animate movies



Music



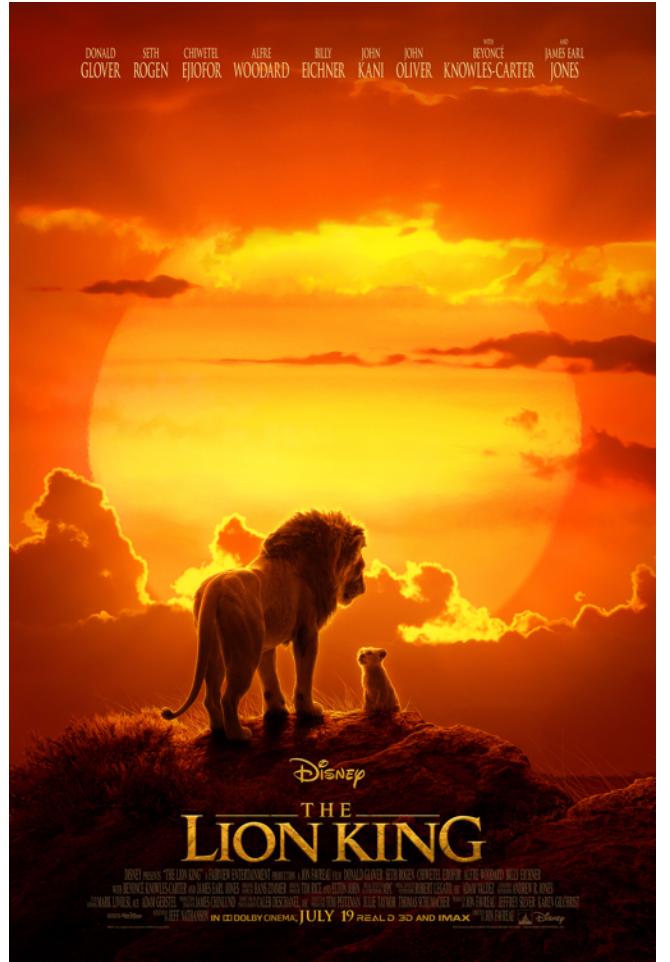
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2020



Movie poster



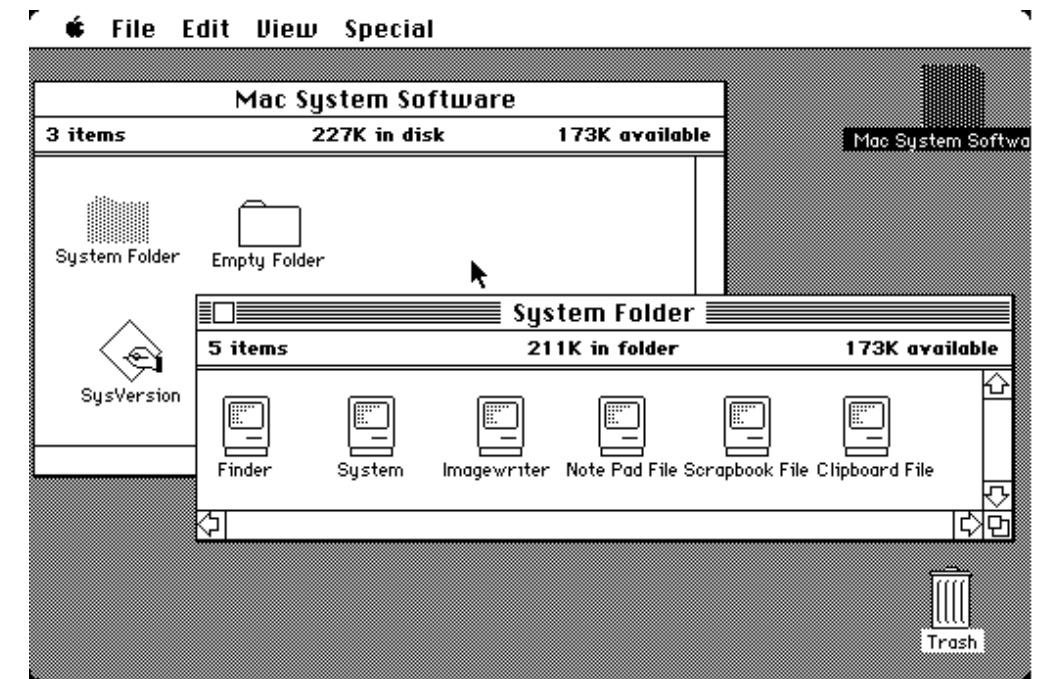
Advertising posters

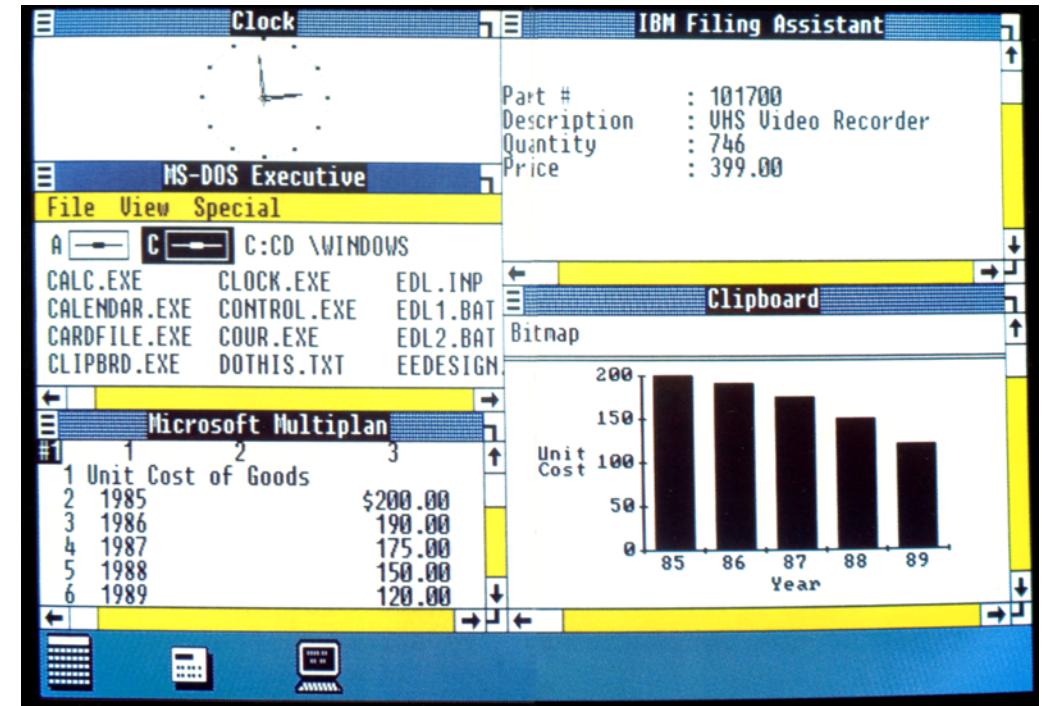
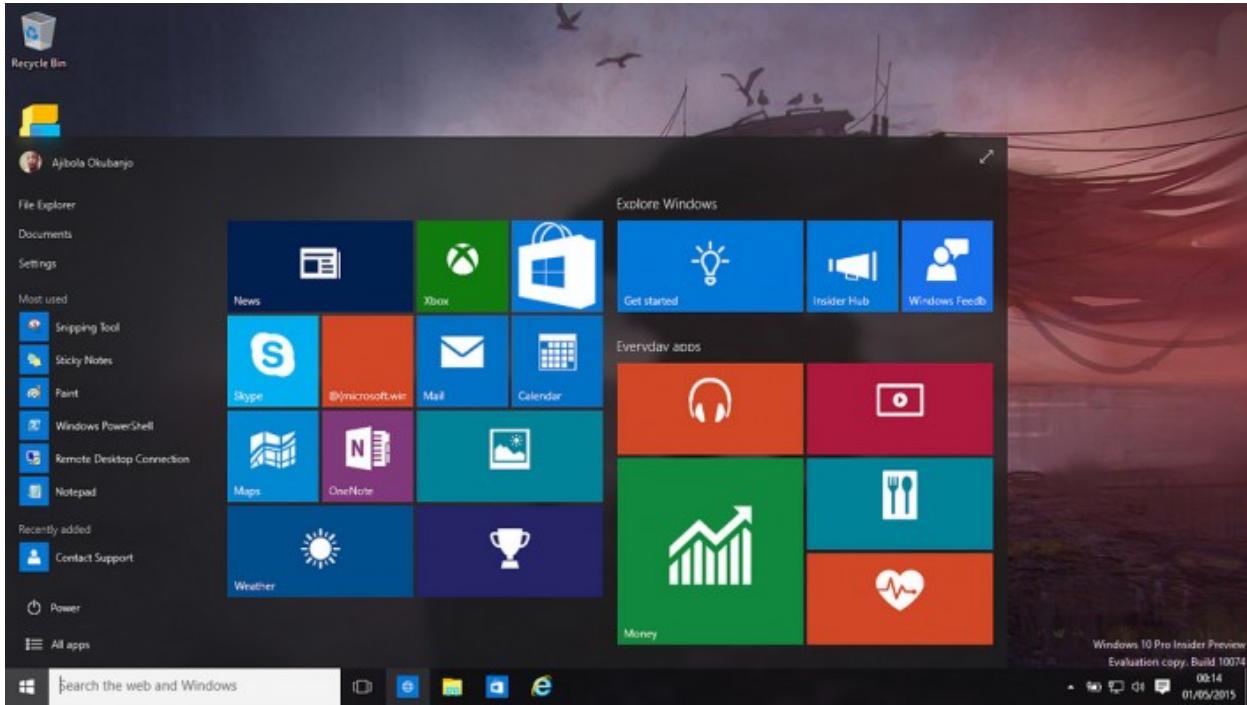


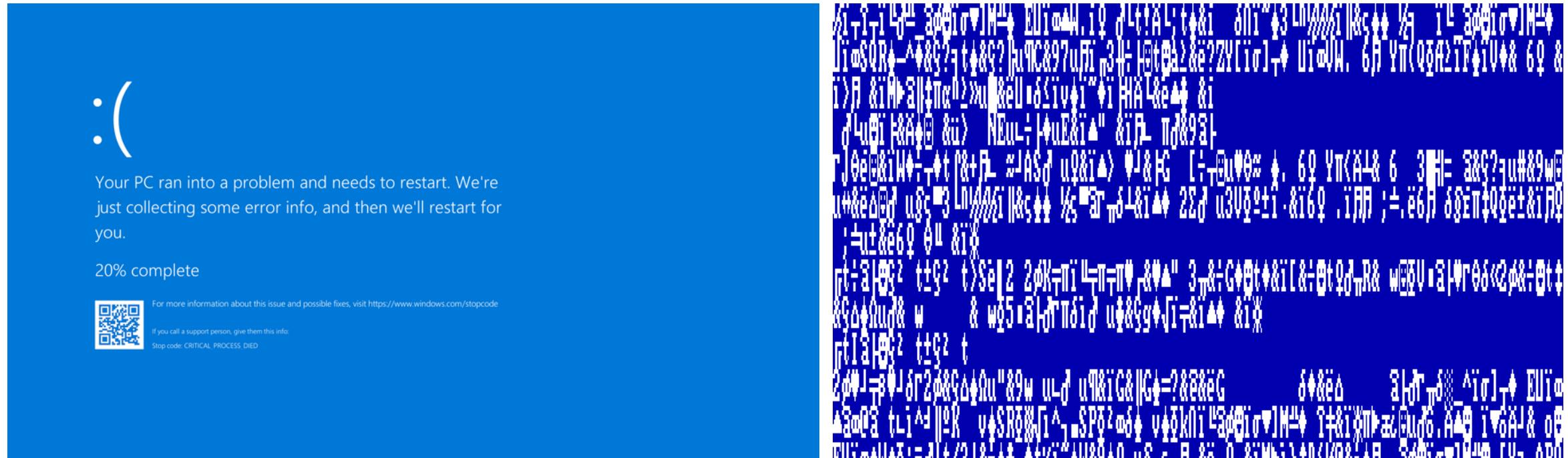
Video Games



Graphic User Interfaces







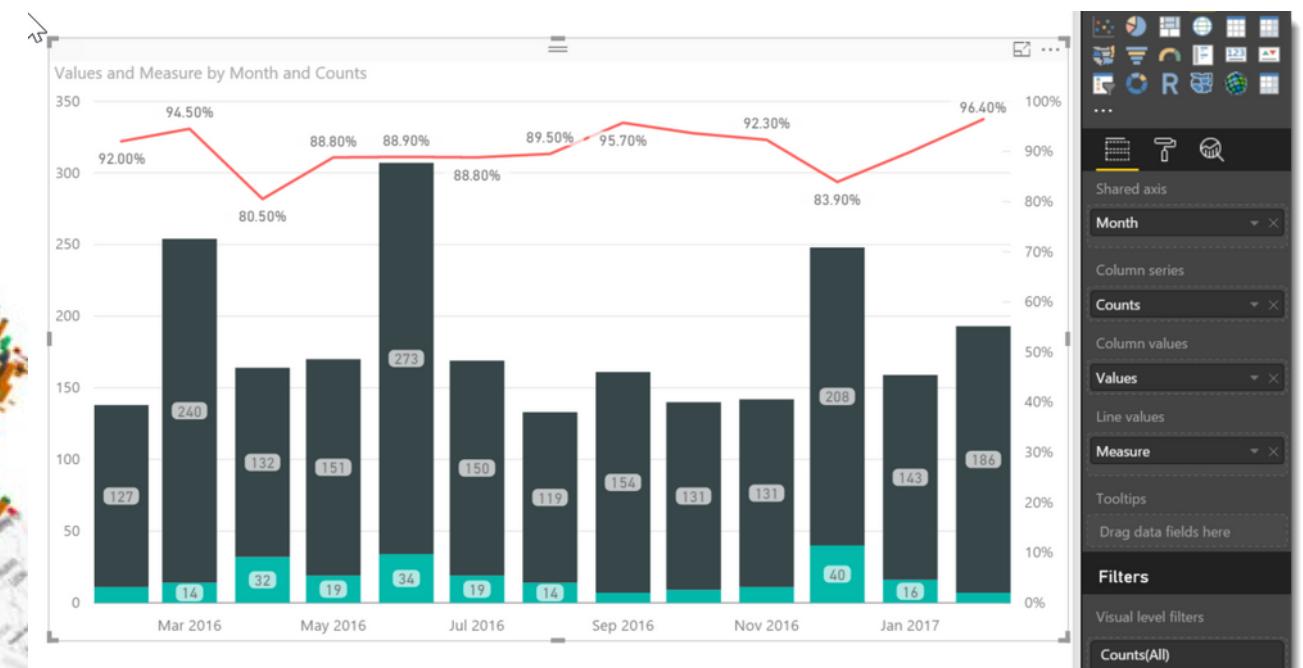
Charts

Capacity by Energy Source

When looking at capacity by source type, a few things jump out. First, notice the sheer number of energy sources used across the United States. More interestingly, notice the geographic stratification of energy sources...

Power Stations

- Hydro
- Agriculture Crop
- Anthracite Coal, Bituminous Coal
- Black Liquor
- Blast Furnace Gas
- Distillate Fuel Oil
- Geothermal
- Jet Fuel
- Landfill Gas
- Lignite Coal
- Municipal Solid Waste
- Natural Gas
- Nuclear (Chernobyl, Plutonium, Thorium)
- Other
- Other Biomass Liquid
- Other Biomass Solid
- Other Gas
- Petroleum Coke
- Purchased Steam
- Residual Fuel Oil
- Sludge Waste
- Solar (Photovoltaic, Thermal)
- Subbituminous Coal
- Tires
- Waste/Other Coal
- Water (Conventional, Pumped Storage)
- Wind
- Wood Waste Liquids
- Wood/Wood Waste Solids



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1.3. Math in CGI

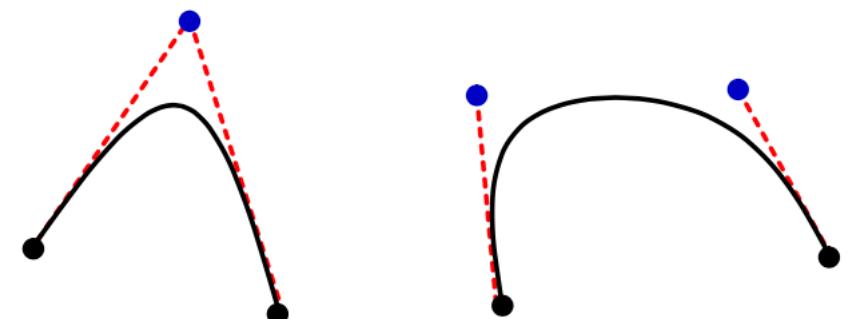
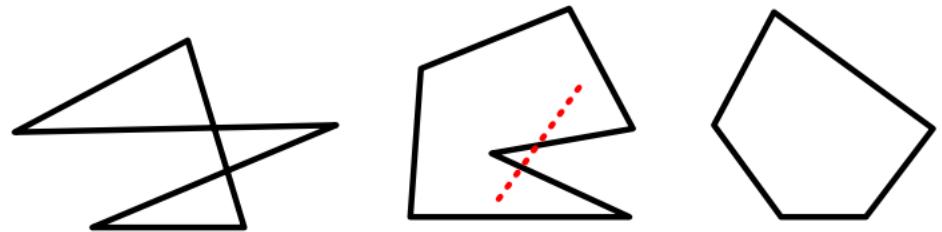
Basic geometric objects in CGI are usually called **primitives**.

- Points
- Lines
- Curved lines
- Areas
- Character strings

1.3. Math in CGI

Basic geometric objects.

- **Point** (x,y)
- **Lines, polylines or curves** by two or more points
- **Areas** are usually bounded by closed polylines or **polygons**
 - Circles
 - Ellipses
 - Circular and elliptic arcs



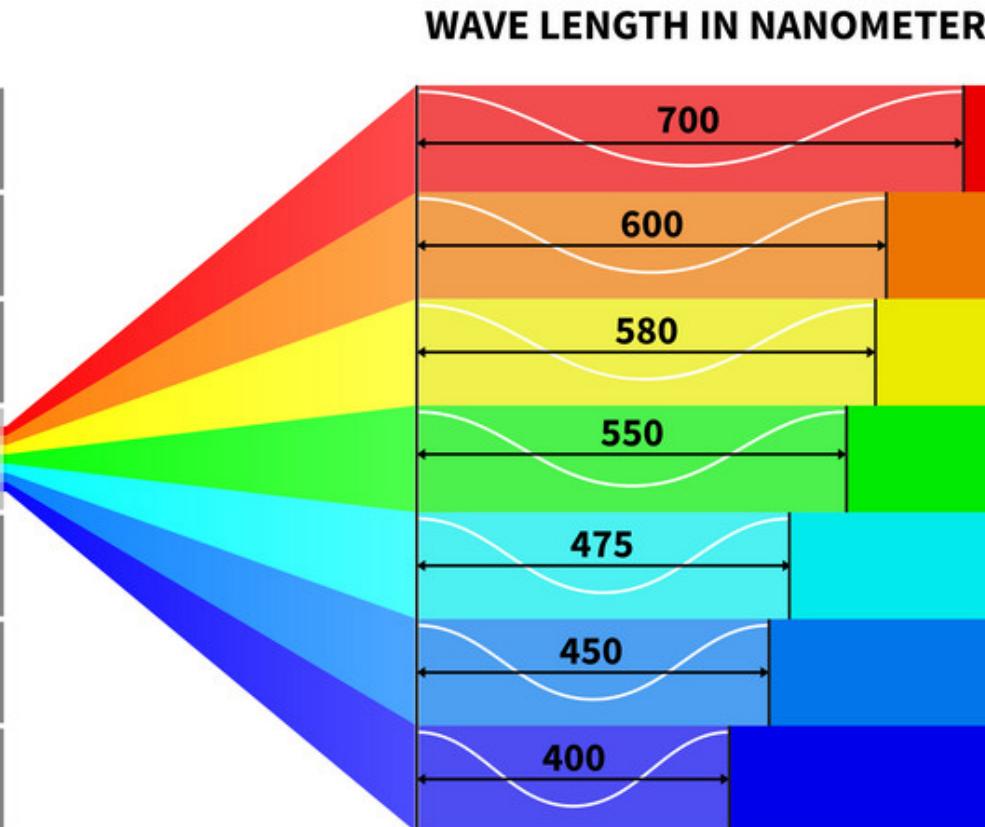
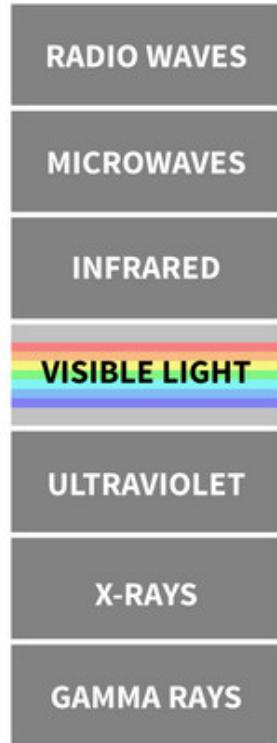
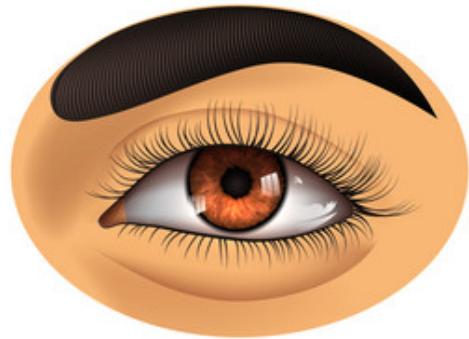
1.3. Math in CGI

Basic geometric objects.

- **Set-theoretic operations**
 - Union
 - Intersection
 - Difference
 - Symmetric difference

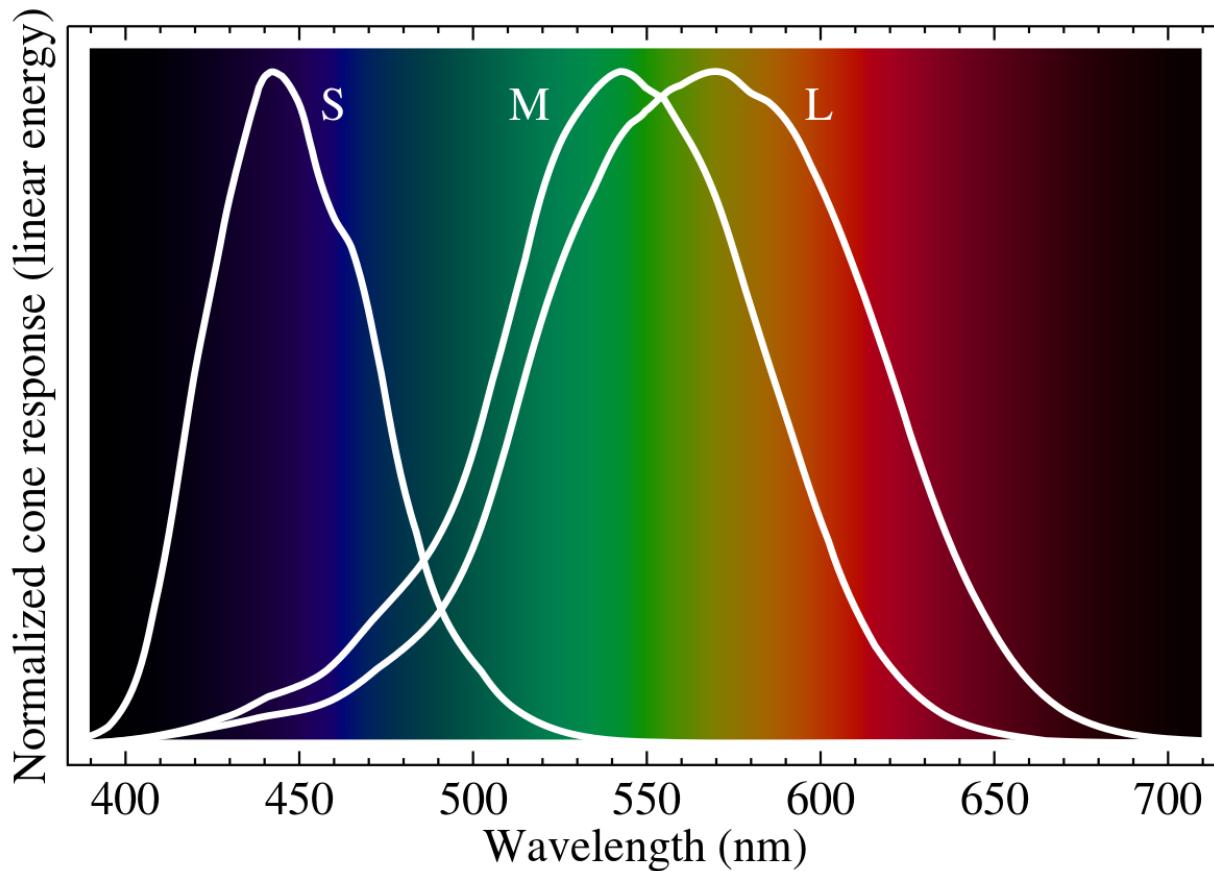


1.4. Colour model : RBG, CMY, HSV, and HLS



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- Colour is defined by the distribution of the intensities over the visible spectrum of the light.



1.4. Colour model : RBG, CMY, HSV, and HLS

- The main characteristics of a colour for human perception are the following ones.
 - **Hue**
 - **Saturation** or purity
 - Intensity or **lightness**

1.4. Colour model : RBG, CMY, HSV, and HLS

Colour models in computer graphics:

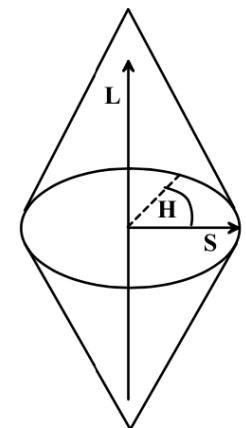
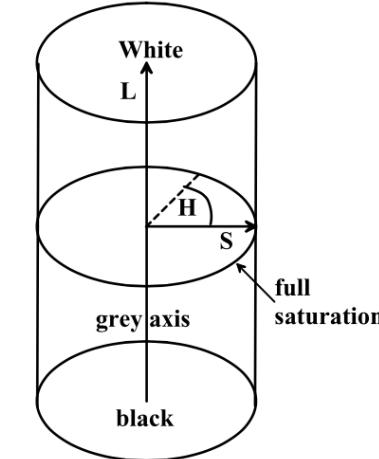
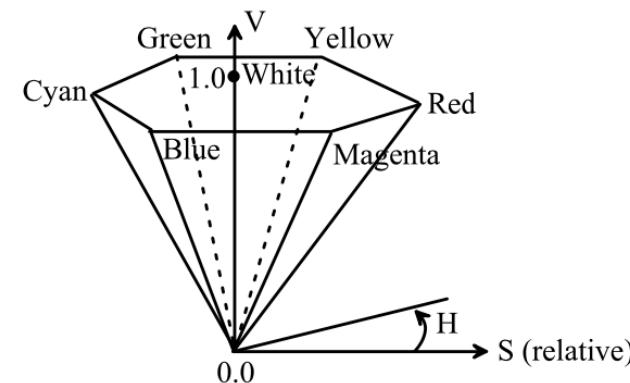
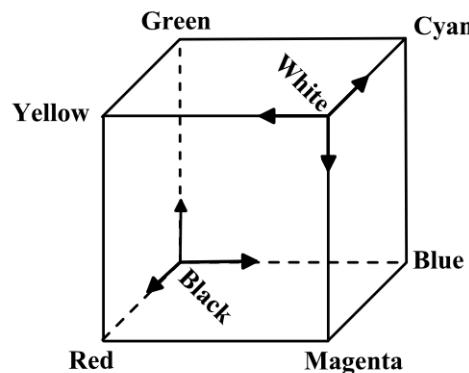
- Additive
- Substractive



1.4. Colour model : RBG, CMY, HSV, and HLS

Colour models in computer graphics:

- RGB
- CMY (CMYK)
- HSV
- HLS



1.5. Images formats

- GIF (Graphics Interchange Format)
- JPEG (Joint Photographic Experts Group)
- JPEG2000
- PNG (Portable Network Graphics)
- TIFF (Tag Interleave Format)
- PSD (Adobe Photoshop)
- CPT (Corel PhotoPaint)
- EPS(Encapsulated PostScript)
- SVG(Scalable Vector Graphics)
- BMP (Windows Bitmap)

1.6. Bit maps processing

