

Shading

(Youtube links Included for explanation)

Shading is the process in rendering that consists of computing the color of objects in the 3D scene. Shading can usually be applied in several ways.

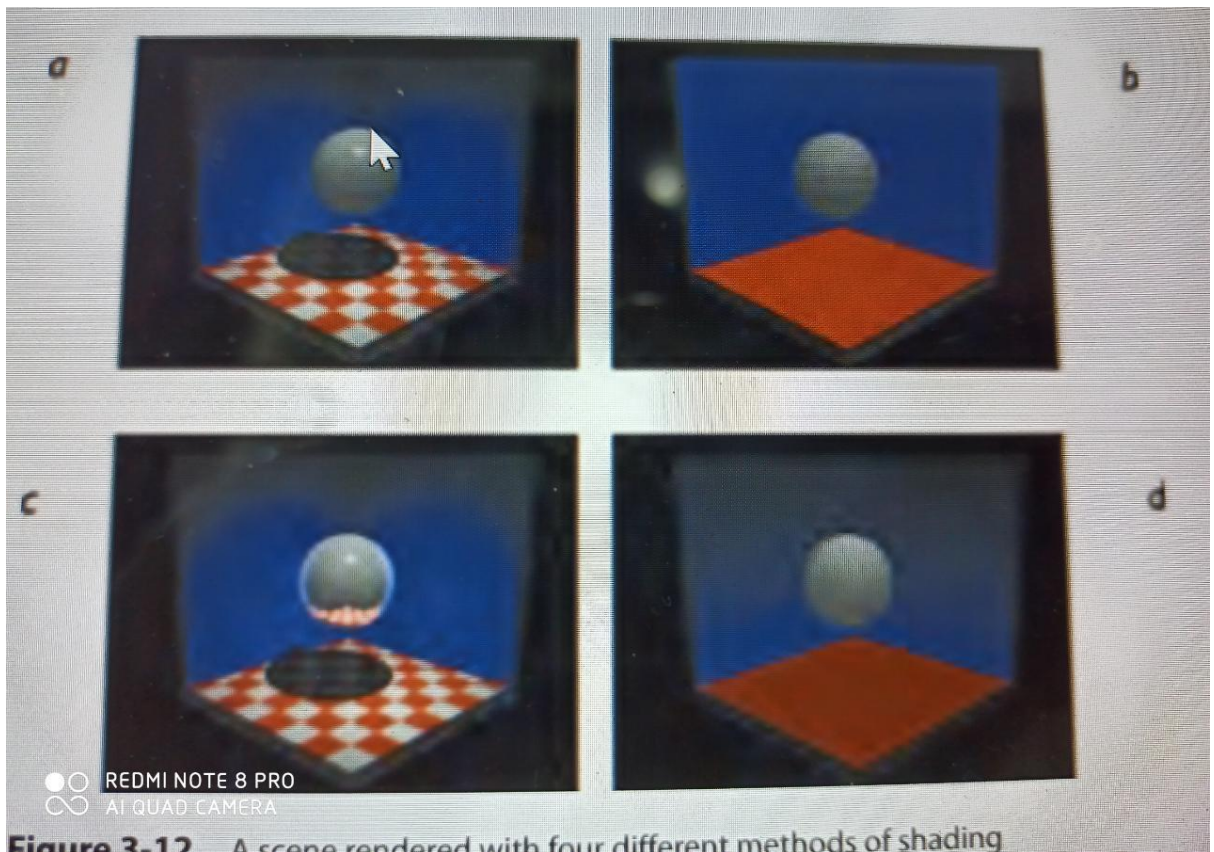
Flat, Gouraud and Phong Shading

<https://www.youtube.com/watch?v=Jh9QQVGupwc>

Ray Tracing

<https://www.youtube.com/watch?v=juWpuh23ch8>

- a. flat shading: In computer graphics, a technique for computing a one-tone shaded surface to simulate simple lighting.
- b. Gouraud shading : computes a shaded surface based on the color and illumination at the corners of every triangle.
- c. Phong shading :computes a shaded surface based on the color and illumination at each pixel. Phong shading is more realistic than Gouraud shading, but requires more computation.
- d. Ray tracing that takes longer to render but provide photo-realistic images. A rendering method that simulates light reflections, refractions and shadows. It follows a light path from a specific source and computes each pixel in the image to simulate the effect of the light.



Rendering

- Rendering is when the computer finally uses complex algorithms to apply the effects you have specified on the objects you have created.
- Rendering an image requires great computing efforts and often takes many hours for a single image, and you will feel the strength (or weakness) of your hardware. Indeed, some multimedia and animation companies dedicate certain computers solely for rendering.

Dithering

<https://www.youtube.com/watch?v=RoPUAgzxAEY>

- Dithering is a process whereby the color value of each pixel is changed to the closest matching color value in the target palette, using a mathematical algorithm.
- If you start out with a 24-bit scanned image that contains millions of colors and need to reduce it to an 8-bit, 256-color image, you get the best replication of the original image by dithering the colors in the image.
- The adjacent pixels are also examined, and patterns of different colors are created in the more limited palette to best represent the original colors.
- There are now only 256 colors available to represent the thousands or even millions of colors in the original image, pixels using the 256 remaining colors are intermixed and the eye perceives a color not in the palette, created by blending the colors mixed together. Thus any given pixel might not be mapped to its closest palette entry, but instead to the average over some area of the image; this average will be closer to the correct color than a substitute color would be.



- How well the dithered image renders a good approximation of the original depends upon the algorithm used and

whether you allow the image-editing program to select the best set of 256 colors from the original image (called an adaptive palette) or force it to use a predetermined set of 256 colors (as, for example, with a System palette or the browser-safe web palette). Figure 3-15 compares the same scanned image dithered from millions of colors to 256 colors, 16 colors, 16 grays, and black and white.

- Dithering concepts are important to understand when you are working with bitmaps derived from RGB information or based upon different palettes. The palette for the image of a rose, for example, may contain mostly shades of red with a number of greens thrown in for the stem and leaves. The image of your pretty Delft vase, into which you want to electronically place the rose, may be mostly blues and grays.
- A software will to generate a palette which is best for representing a particular image,

Image File Formats

<https://www.youtube.com/watch?v=eec2kteGkcM>

- Most applications on any operating system can manage JPEG, GIF, PNG, and TIFF image formats.
- An older format used on the Macintosh, **PICT** (for Picture), is a complicated but versatile format developed by Apple where both bitmaps and vector-drawn objects can be used.
- The **device-independent bitmap (DIB)**, also known as a **BMP**, is a common Windows palette-based image file format similar to PNG. (Portable network Graphics)
- **PCX** files were originally developed for use in Z-Soft MS-DOS paint packages; these files can be opened and saved by almost all MS-DOS paint software and desktop publishing software.

- **TIFF**, or Tagged Interchange File Format, was designed to be a universal bitmapped image format and is also used extensively in desktop publishing packages.
- Adobe creates a PSD file for Photoshop and an AI file for Illustrator; Corel creates a CDR file(Coreldraw).
- **DXF** was developed by AutoDesk as an ASCII-based drawing interchange file for AutoCAD, but the format is used today by many computer-aided design applications.
- **IGS** (or **IGES**, for **Initial Graphics Exchange Standard**) was developed by an industry committee as a broader standard for transferring CAD drawings. These formats are also used in 3-D rendering and animation programs.
- JPEG, PNG, and GIF images are the most common bitmap formats used on the Web and may be considered cross-platform, as all browsers will display them.
- Adobe's popular PDF (Portable Document File) file manages both bitmaps and drawn art (as well as text and other multimedia content).