

# **Midterm Review**

Multimedia Techniques & Applications Yu-Ting Wu

### **Our Schedule**

- 1st week: Course Overview
- 2<sup>nd</sup> week: 228 Memorial Day (no class)
- 3<sup>rd</sup> week: Color / Graphics Overview
- 4<sup>th</sup> week: Bitmapped Images

**HW1: Poster** 

- 5<sup>th</sup> week: Bitmapped Images Editing with Photoshop (TA)
- 6<sup>th</sup> week: Vector Graphics / Icon Design with Vectr (TA)
- 7<sup>th</sup> week: Spring Vacation (no class)
- 8th week: Camera / HDR
- 9th week: 3D Graphics
- 10<sup>th</sup> week: Midterm

# **Our Schedule (cont.)**

- 11<sup>th</sup> week: Animation with Blender
- 12th week: MatchMove with Blender

HW2: MatchMove

- 13<sup>th</sup> week: Video Editing with Blender (TA)
- 14<sup>th</sup> week: Game with Unity
- 15th week: Stereo Vision / Virtual Reality
- 16<sup>th</sup> week: Final Exam (no class)
- 17<sup>th</sup> week: Final Project Production (no class)
- 18<sup>th</sup> week: Final Project Presentation

### **About the Midterm**

- Midterm exam will be held on April 24th, 2023, physically in class (room 資B1F-04)
  - Closed book
  - You can answer questions in Chinese/English
  - 30% of your final grade
- Scope
  - Introduction
  - Color
  - Bitmapped images and vector graphics
  - Camera
  - 3D Graphics



# You should refer to the original slides and recording for details!

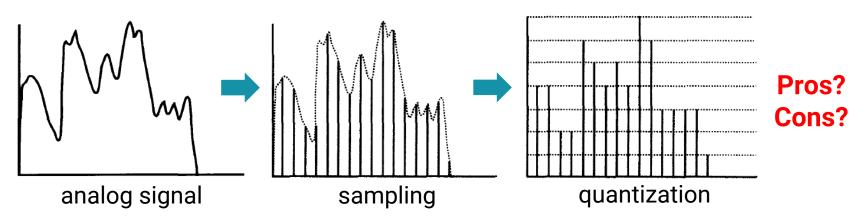
### Introduction

### Digitalization

 Definition: is the process that transforms the sensor inputs that makeup images, texts, moving pictures (animations or videos), and sounds into patterns of binary digits inside a computer

#### Process:

- Sampling: measure the signal's value at discrete intervals
- Quantization: restrict the value to a fixed set of levels

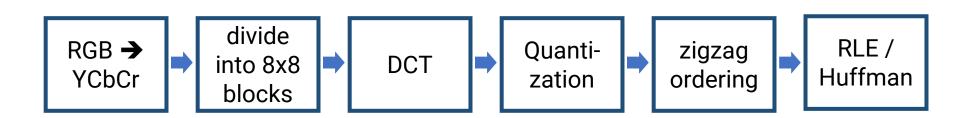


### Color

- How do we represent color?
  - Spectral power distribution
  - Tristimulus theory
- Color model
  - RGB
  - CMYK
  - HSV What are their targets?
- Color depth
  - The number of bits used for a color
  - How many different colors can be represented by a chosen color depth?

# **Bitmapped Images**

- What does a bitmapped image store?
- Image compression
  - Why can image compression methods reduce image size?
  - Lossy compression v.s. lossless compression
  - Some types of image compression
    - Run-length encoding
      Huffman coding
      JPEG compression



# **Bitmapped Images (cont.)**

- Image manipulation
  - Pixel point processing
    - Color curve, histogram (how do they work?)
  - Pixel group processing (filtering)
    - Box filter
    - Gaussian filter

How do they work?

- Bilateral filter
- Image scaling
  - Forward mapping (what's the problem?)
  - Inverse mapping
    - Nearest neighbor
    - Bilinear

How do they work?

# **Vector Graphics**

- What does a vector image store?
- Rendering of math and anti-aliasing
- Transformation of vector graphics
  - Types of transformation
    - Translation
    - Scaling
    - Rotation
  - How to represent a transformation?
    - Why use matrix form? Why 3x3
    - How to scale/rotate without shifting?

### Camera

- How does a camera work?
  - Pinhole camera
  - Lens camera
- Exposure
  - Aperture (depth of field)
  - Shutter speed (motion blur)
  - Sensitivity (noise)
- Color imaging
  - Color filter array and demosaicking
- White balance
  - Why do we need it?

# 3D Graphics

- How do we represent the virtual 3D world?
- What are the three major topics of computer graphics
  - Modeling
  - Animation
  - Rendering (what does it mean?)
- What are the two ways to bring 3D polygons to an image?
  - Ray tracing Pros?
  - Rasterization Cons?

