

# **Computação Visual**

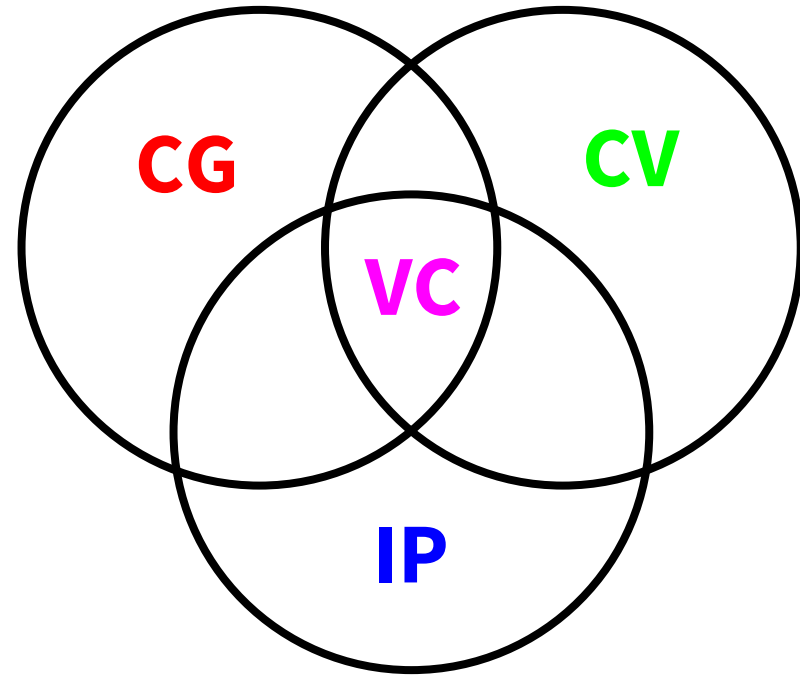
## **Ciência da Computação**

Prof. André Kishimoto  
2024

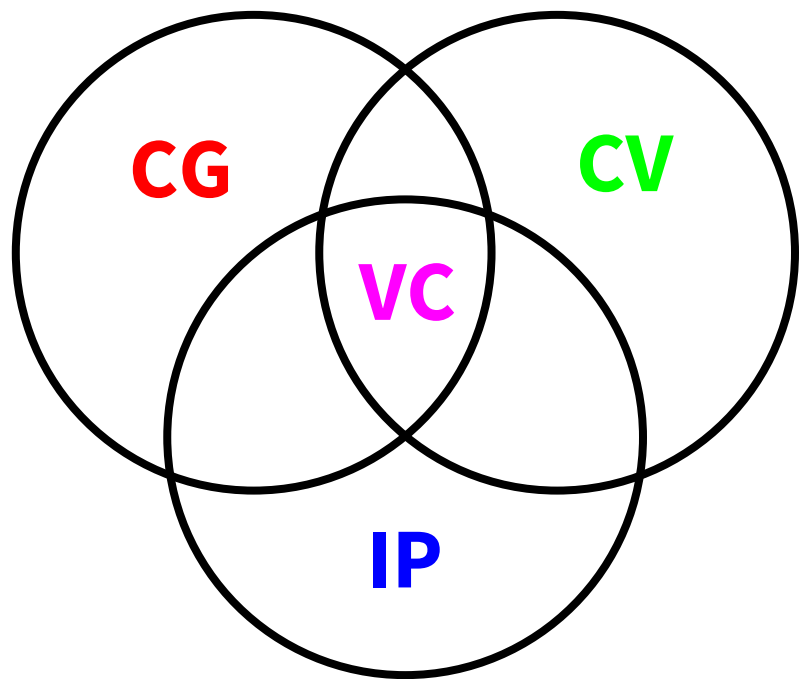
# Computação Visual

Há sobreposição de tópicos entre três áreas / domínios tradicionais (CG, CV e IP).

**VC**: Visual Computing  
**CG**: Computer Graphics  
**CV**: Computer Vision  
**IP**: Image Processing

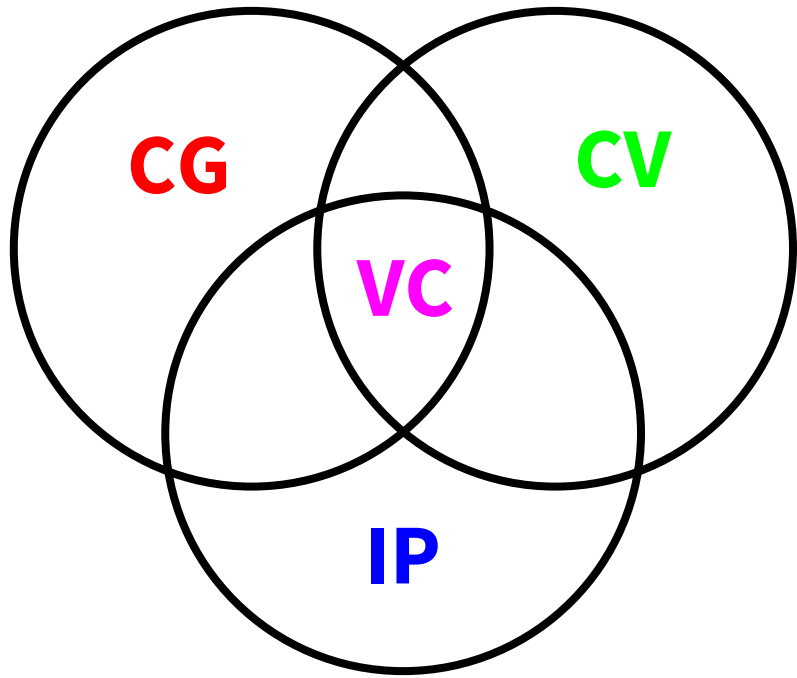


# Computação Visual



→ Interessou por alguma área? → Especialização

# Computação Visual

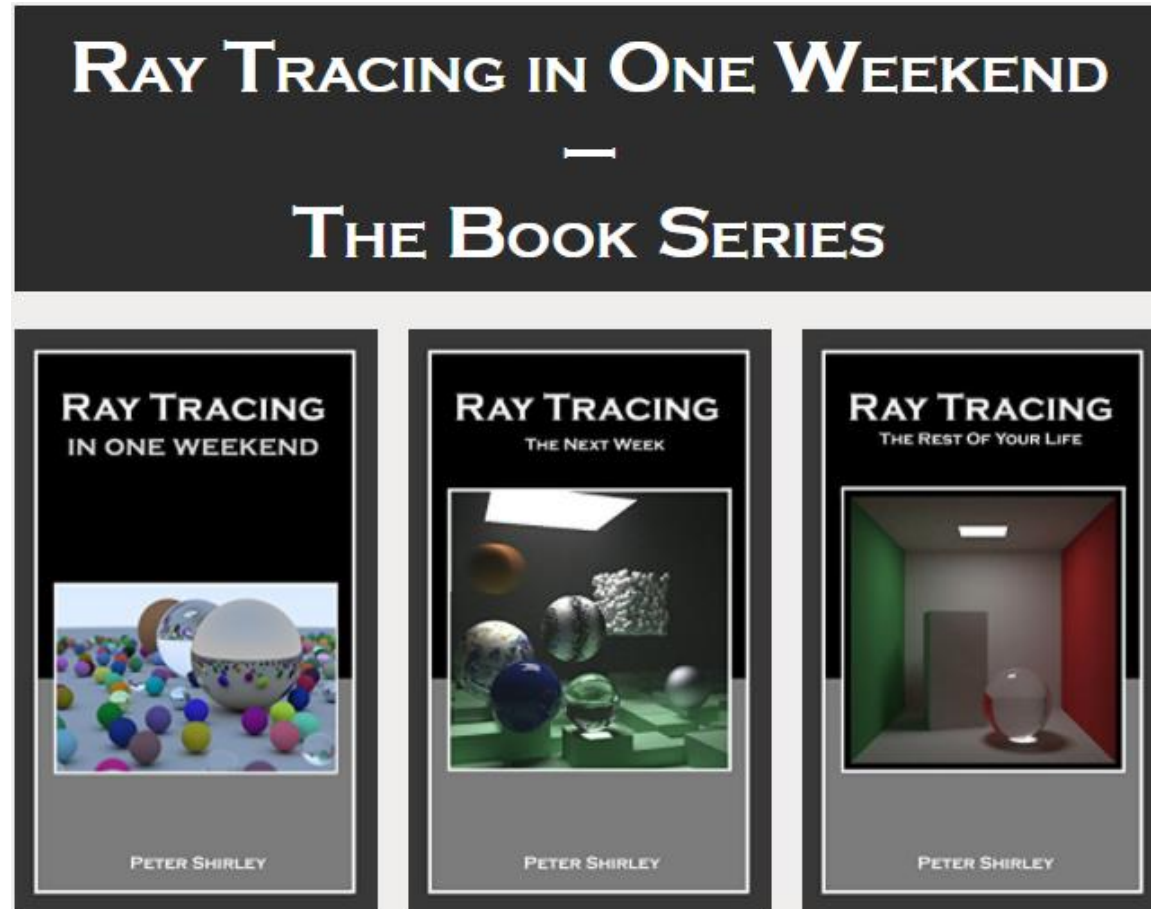


→ Interessou por alguma área?

→ Especialização

Cada área é um curso em si.

# E cada área pode ser uma carreira!



Fonte: <https://raytracing.github.io/>

# Computação Visual

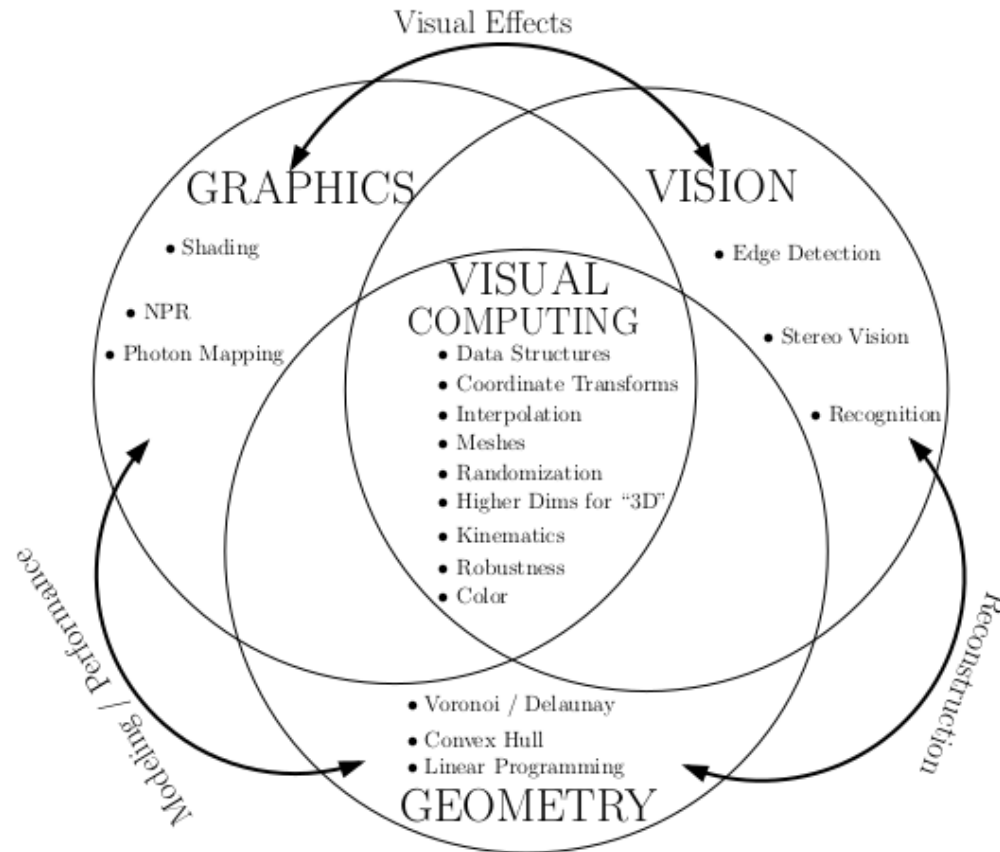


FIGURE 1.1 Overview of Visual Computing.

Fonte: Visual Computing: Geometry, Graphics, and Vision (NIELSEN, 2013)

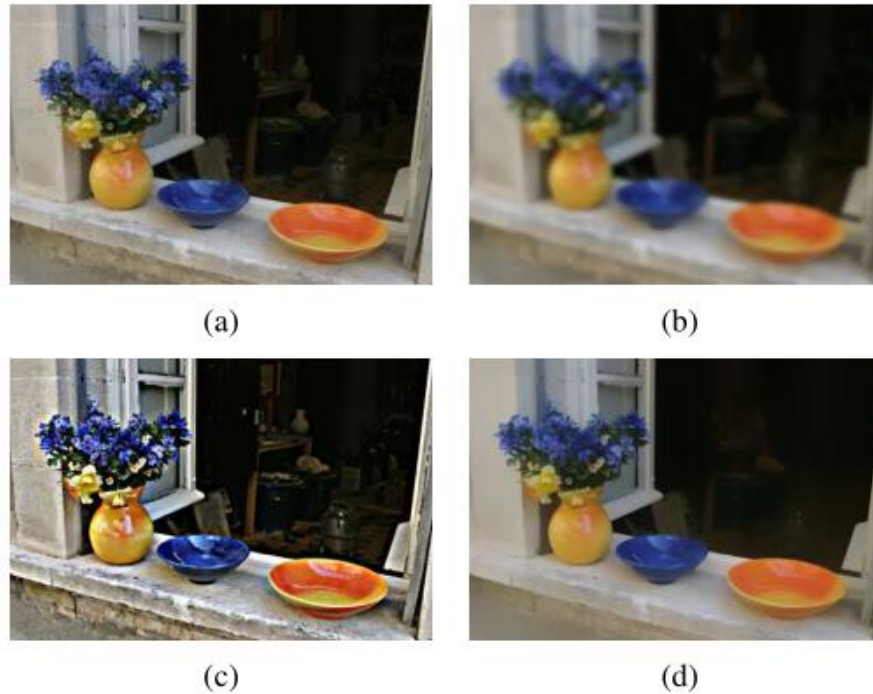
# Organização do curso

- Computação Visual baseada em Imagens
- Computação Visual Geométrica
- Computação Visual Radiométrica
- Síntese de Conteúdo Visual

## **Não abordaremos tudo sobre essas subáreas!**

- Veremos tópicos selecionados de cada subárea, de modo que você consiga estudar outros assuntos posteriormente.

# Computação Visual baseada em imagens

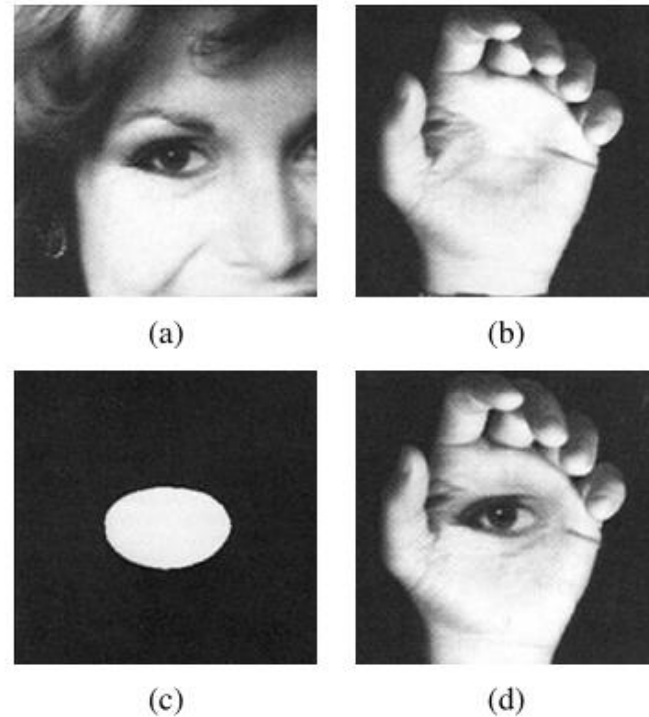


**Figure 3.11** Some neighborhood operations: (a) original image; (b) blurred; (c) sharpened; (d) smoothed with edge-preserving filter; (e) binary image; (f) dilated; (g) distance transform; (h) connected components. For the dilation and connected components, black (ink) pixels are assumed to be active, i.e., to have a value of 1 in Equations (3.44–3.48).

Fonte: Adaptado de Computer Vision: Algorithms and Applications, 2nd ed (SZELISK, 2021)



# Computação Visual baseada em imagens



**Figure 3.43** *Laplacian pyramid blend of two images of arbitrary shape (Burt and Adelson 1983b) © 1983 ACM: (a) first input image; (b) second input image; (c) region mask; (d) blended image.*

Fonte: Computer Vision: Algorithms and Applications, 2nd ed (SZELISK, 2021)

# Computação Visual Geométrica



**Figure 13.19** *Interactive architectural modeling using the Façade system (Debevec, Taylor, and Malik 1996) © 1996 ACM: (a) input image with user-drawn edges shown in green; (b) shaded 3D solid model; (c) geometric primitives overlaid onto the input image; (d) final view-dependent, texture-mapped 3D model.*

Fonte: Computer Vision: Algorithms and Applications, 2nd ed (SZELISK, 2021)

# Computação Visual Geométrica



**Figure 8.9.** This image shows two rectified images (on left) and the depth reconstructed from them (on right).

Fonte: Introduction to Visual Computing (MAJUMDER, GOPI, 2018)

# Computação Visual Radiométrica



**Figure 10.12** *A bracketed set of shots (using the camera's automatic exposure bracketing (AEB) mode) and the resulting high dynamic range (HDR) composite.*

Fonte: Computer Vision: Algorithms and Applications, 2nd ed (SZELISK, 2021)



# Síntese de Conteúdo Visual



**Figure 6.36.** An example of normal map bump mapping used in a game-like scene. Top left: the two normals maps to the right are not applied. Bottom left: normal maps applied. Right: the normal maps. (*3D model and normal maps courtesy of Dulce Isis Segarra López.*)

Fonte: Real-Time Rendering, 4th ed (AKENINE-MÖLLER et al., 2018)

# Síntese de Conteúdo Visual



**Figure 15.13.** Modified Sobel edge detection in the game *Borderlands*. The final released version (not shown here) further improved the look by masking out edges for the grass in the foreground [1761]. (Images courtesy of Gearbox Software, LLC.)

Fonte: Real-Time Rendering, 4th ed (AKENINE-MÖLLER et al., 2018)