



# Chapter 1

## Introduction to image processing

# Topics

- Introduction
- What is digital image processing?
- Fundamental steps in digital image processing

# Introduction

- The goal of digital image processing is to manipulate images or to make the images more useful.
- Principle application areas of Digital Image Processing
  - Improvement of pictorial information for human interpretation.
  - Processing of image data for storage, transmission, and representation for autonomous machine perception.

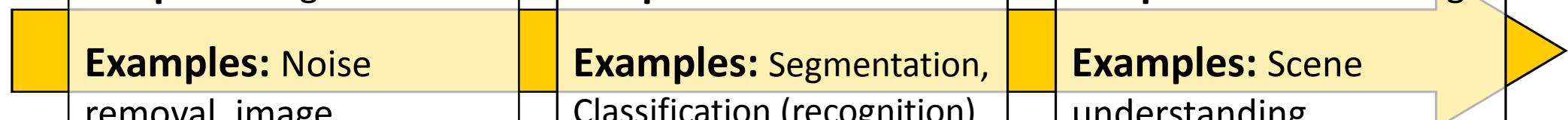
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# What Is Digital Image Processing?

- Definition : Digital image processing refers to processing of digital images by using digital computers.
- The continuum from image processing to computer vision can be broken up into low-, mid- and high-level processes.

Low Level Process	Mid Level Process	High Level Process
<b>Input:</b> Image <b>Output:</b> Image	<b>Input:</b> Image <b>Output:</b> Attributes	<b>Input:</b> Attributes <b>Output:</b> Understanding
<b>Examples:</b> Noise removal, image sharpening	<b>Examples:</b> Segmentation, Classification (recognition) of individual objects	<b>Examples:</b> Scene understanding, autonomous navigation



# Example : Noise Removal



Noise from Glass effect

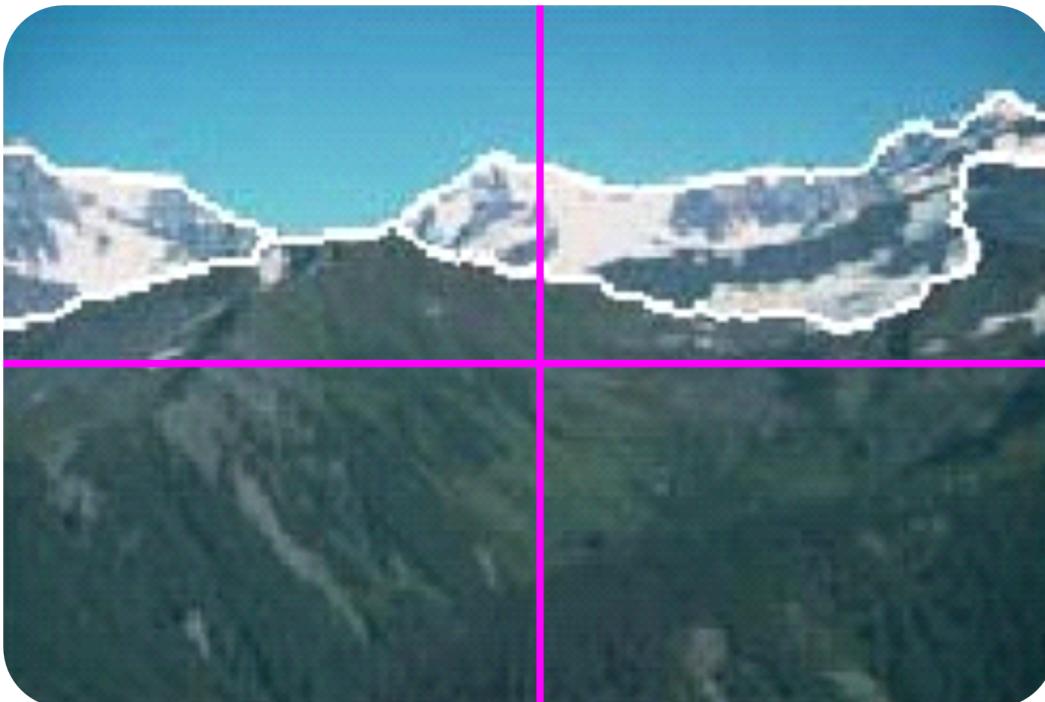


Remove noise by median filter

# Example : Image Sharpening

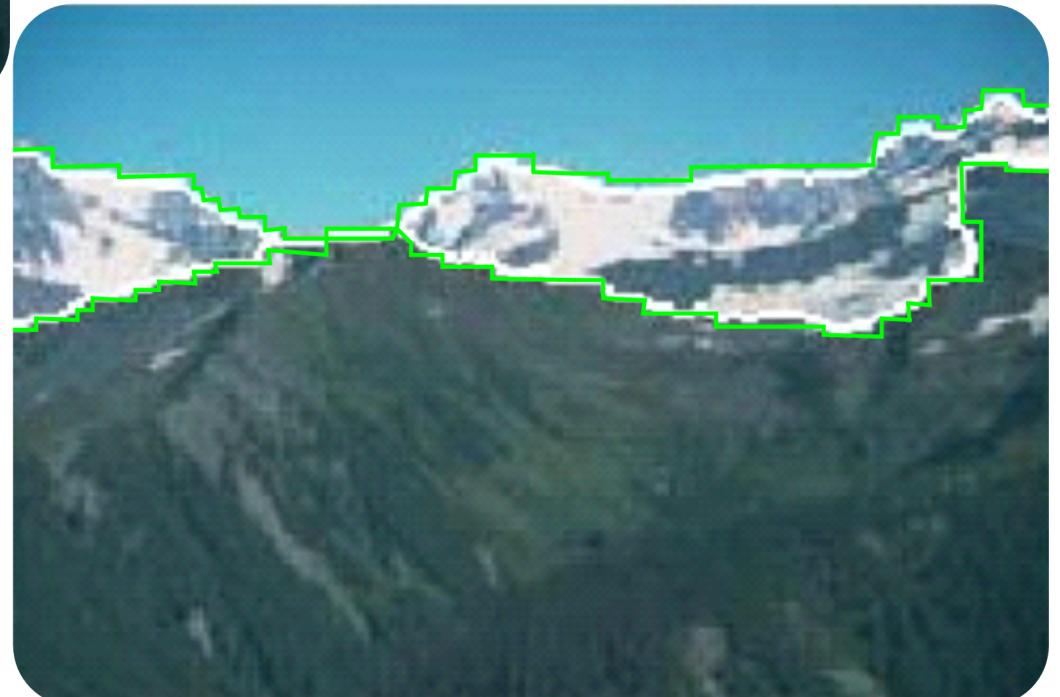


# Example : Image Segmentation

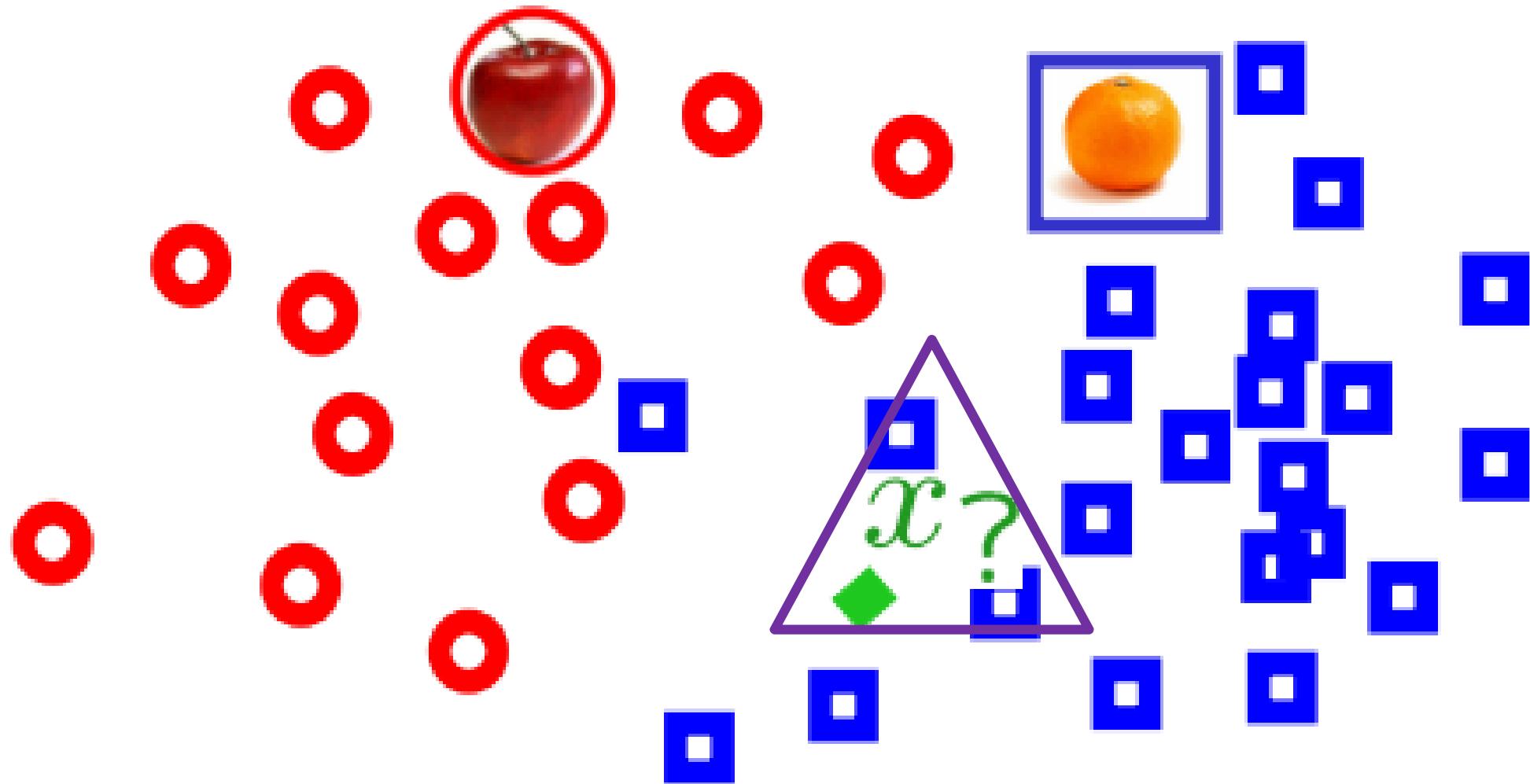


Splitting

Result of region  
splitting and merging



# Example : Object Recognition



# Example : Scene understanding

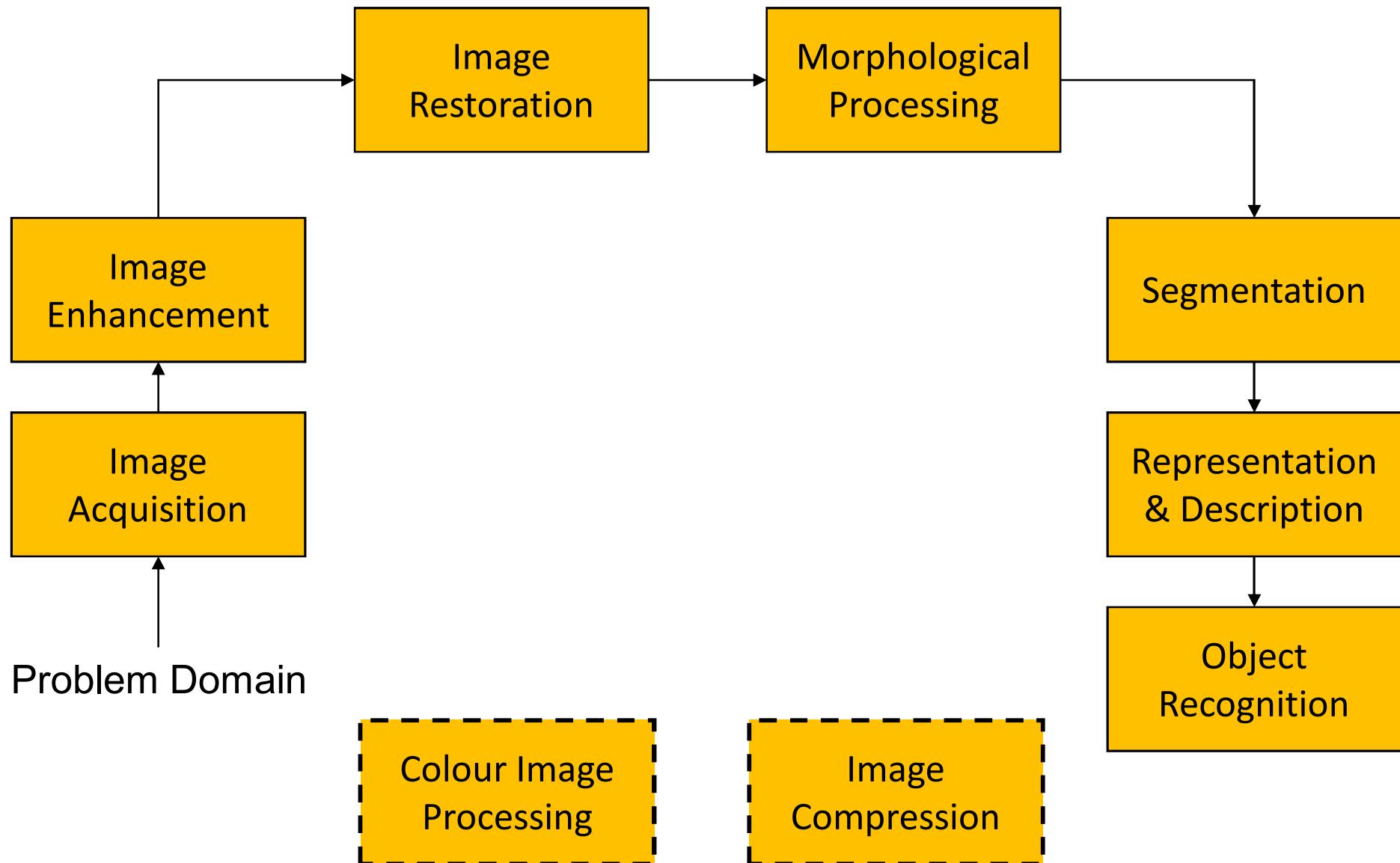


Reference to YUPENN Dynamic Scenes data

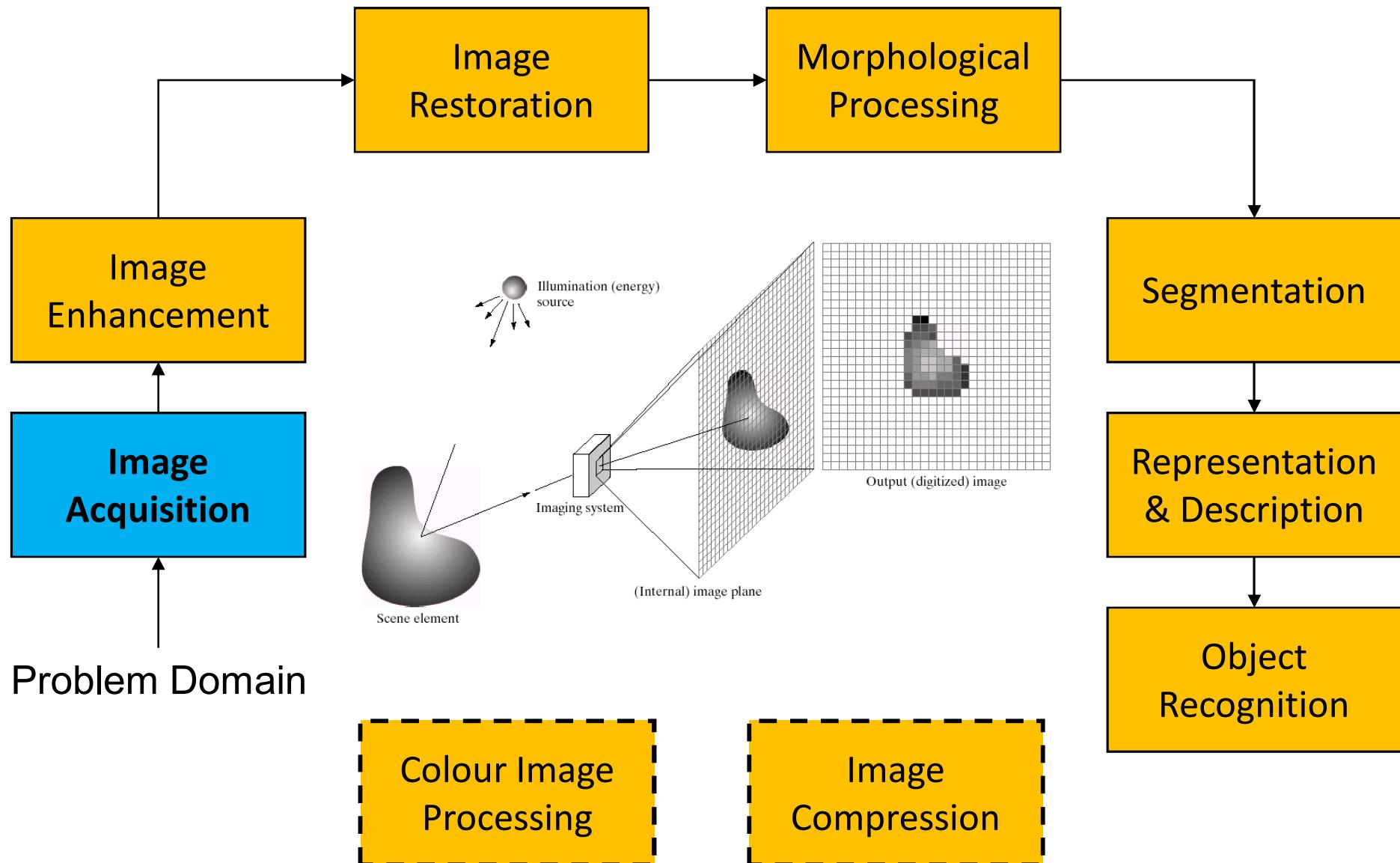
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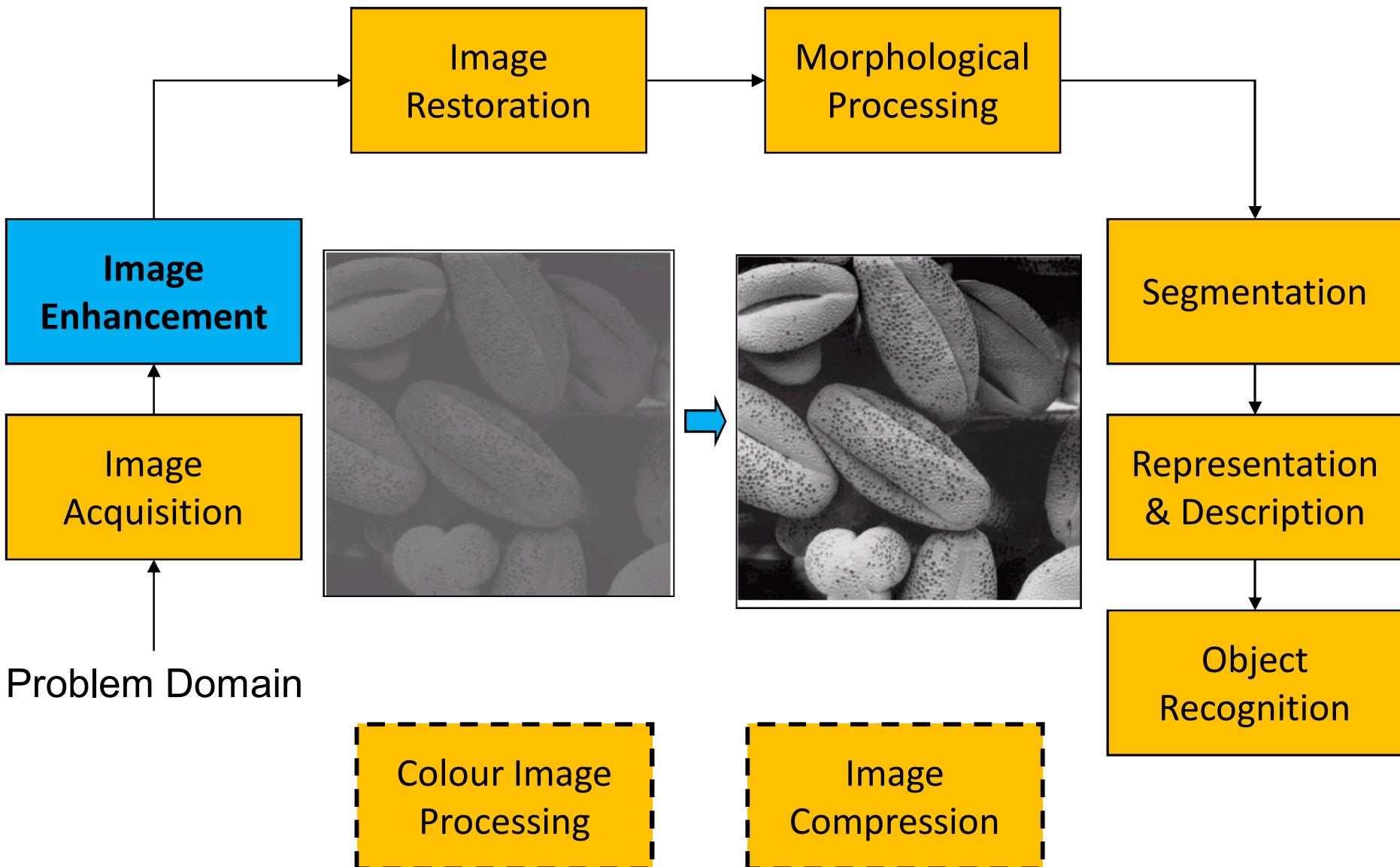
# Fundamental Steps in Digital Image Processing



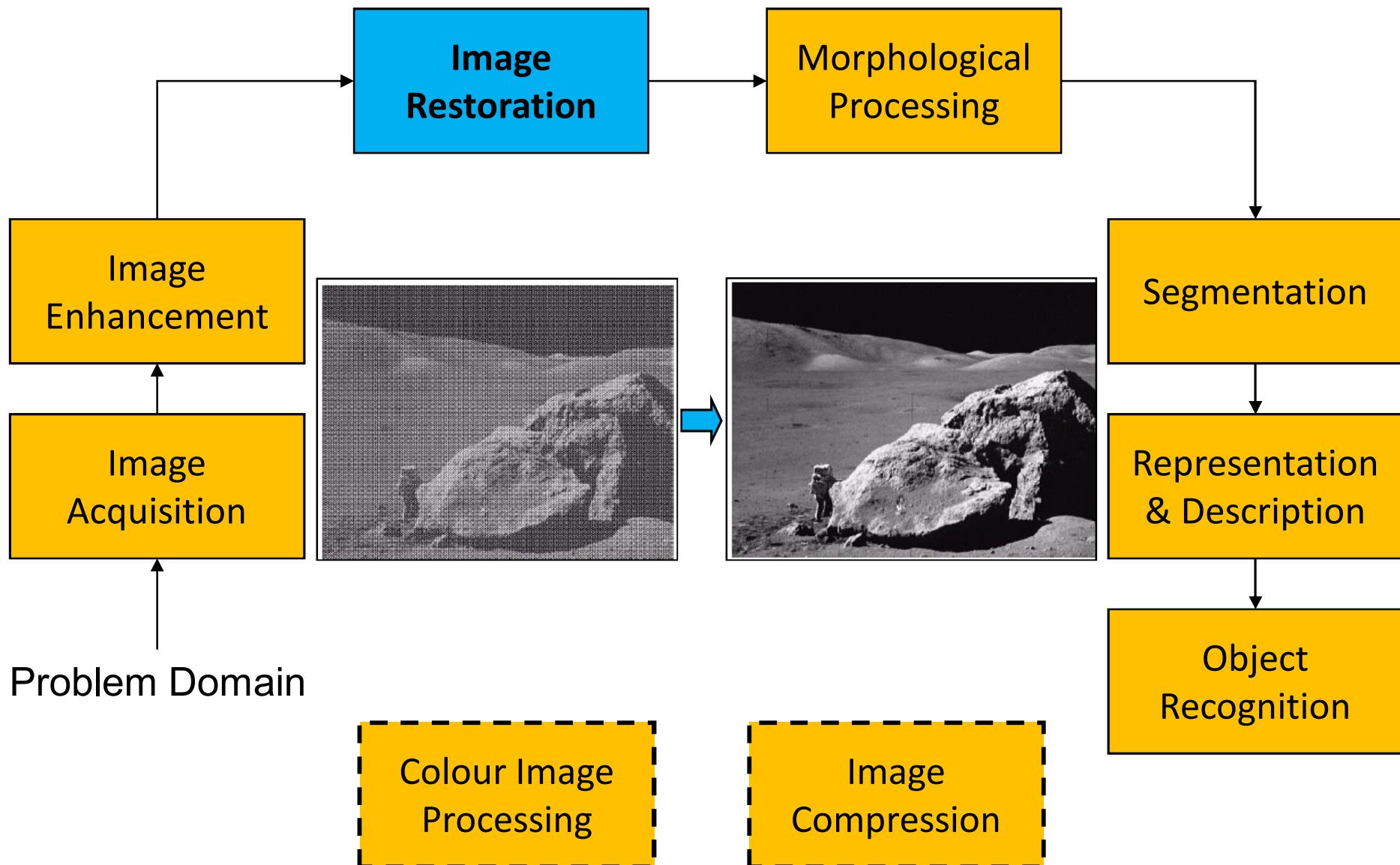
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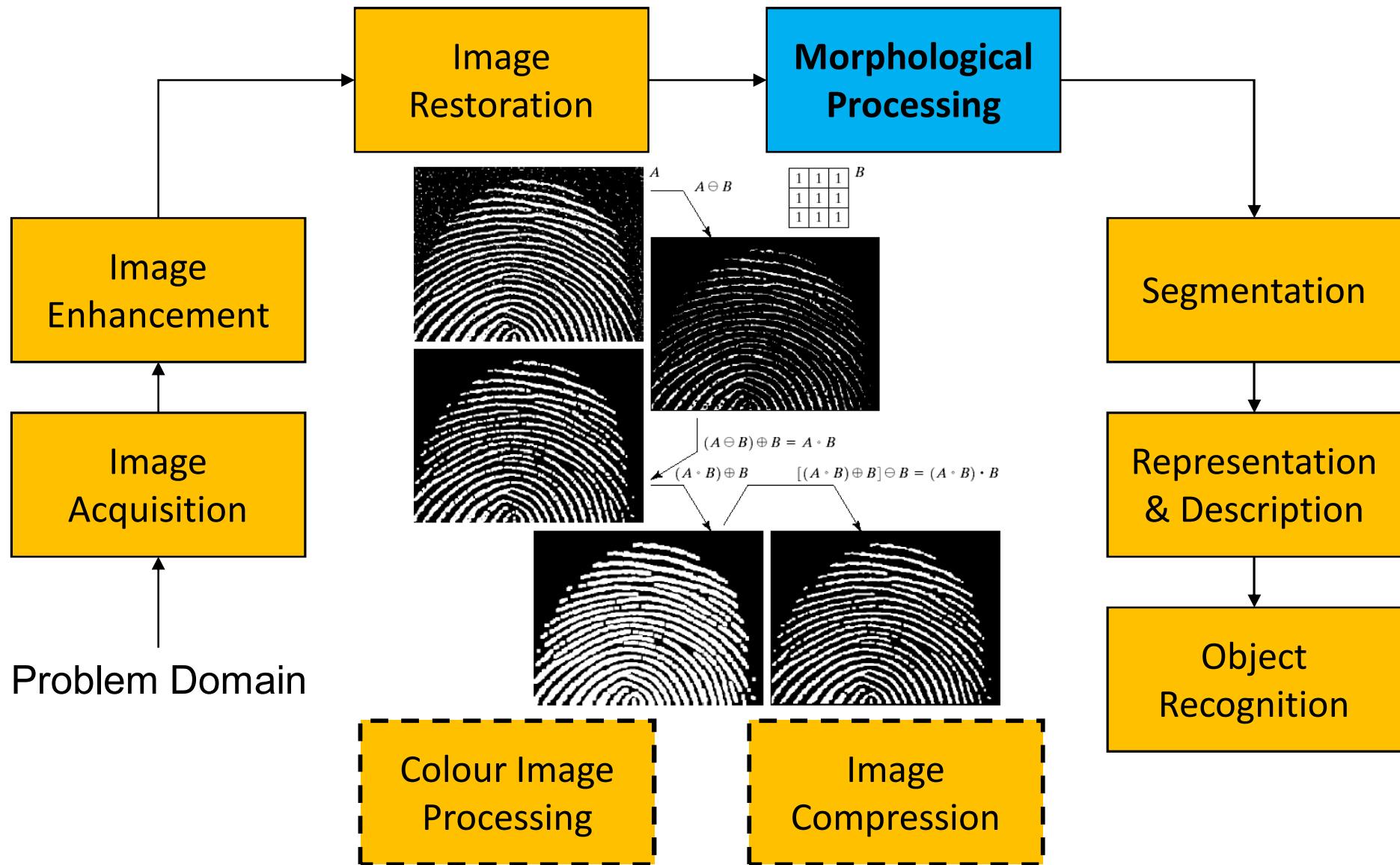
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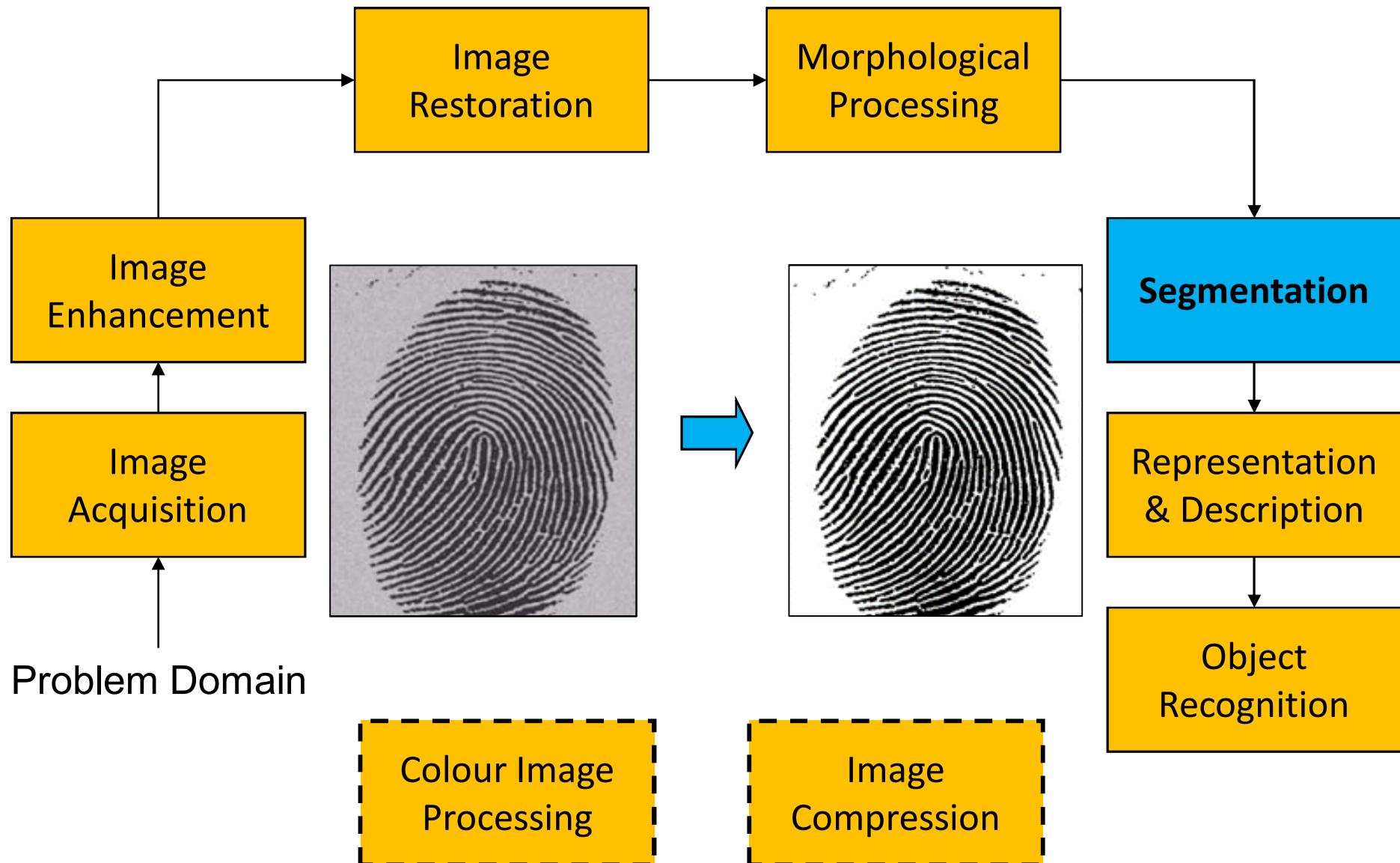
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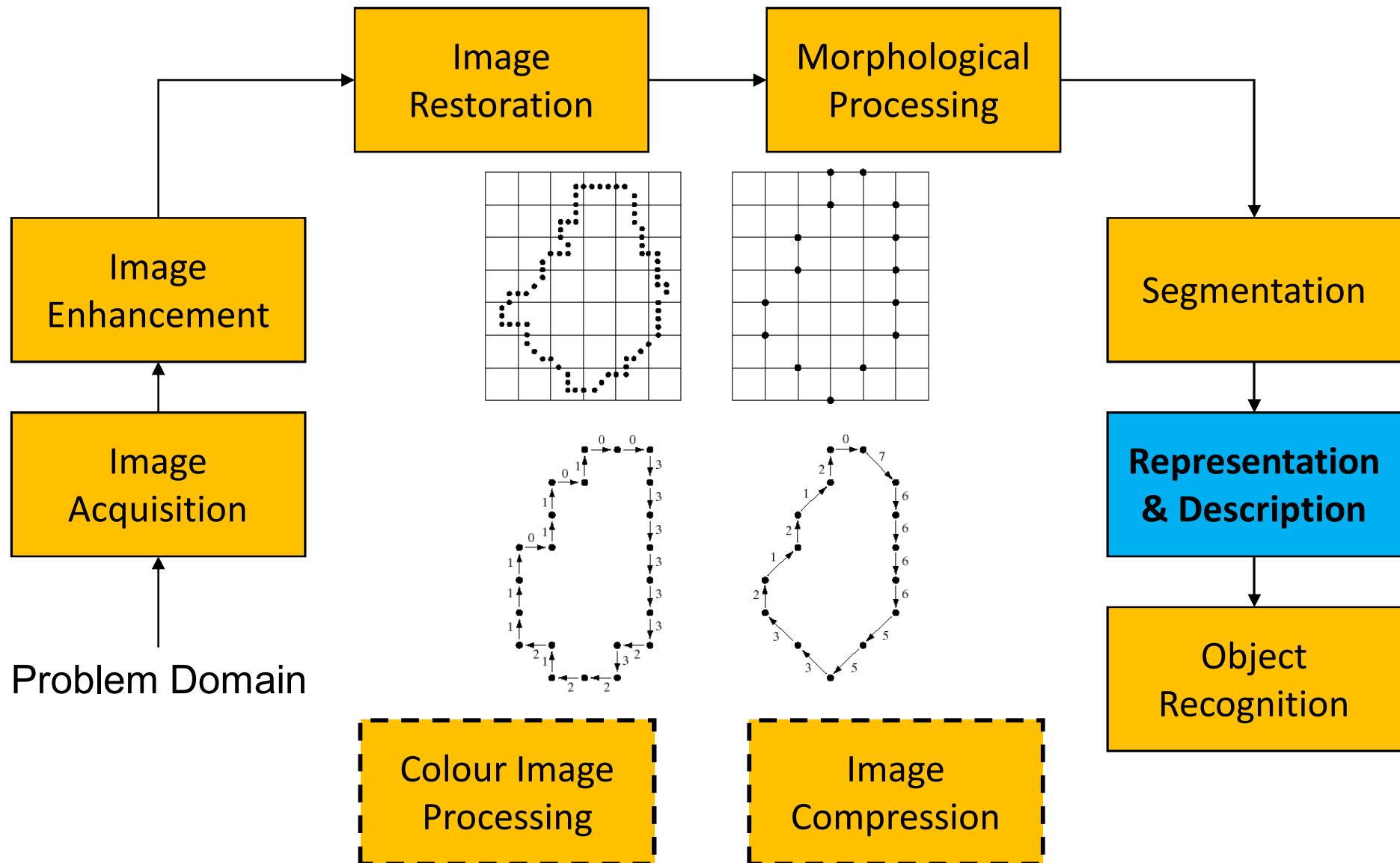
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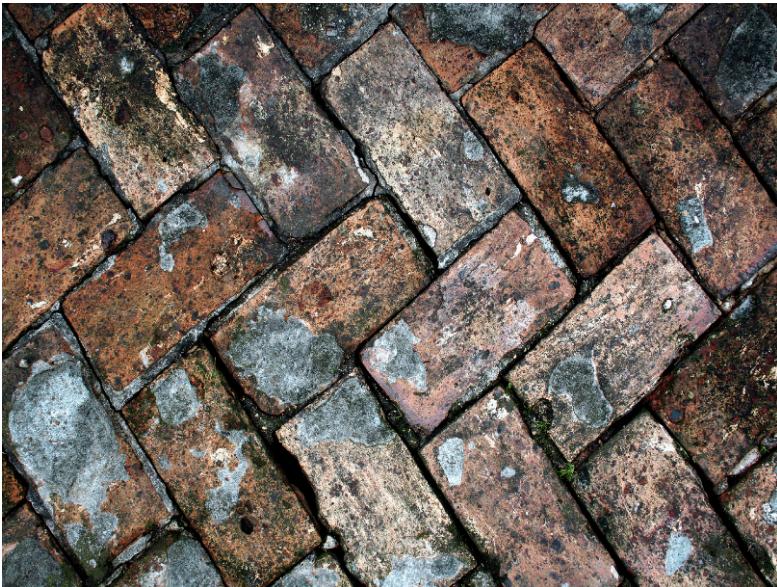


# Representation & Description

Grass  
texture



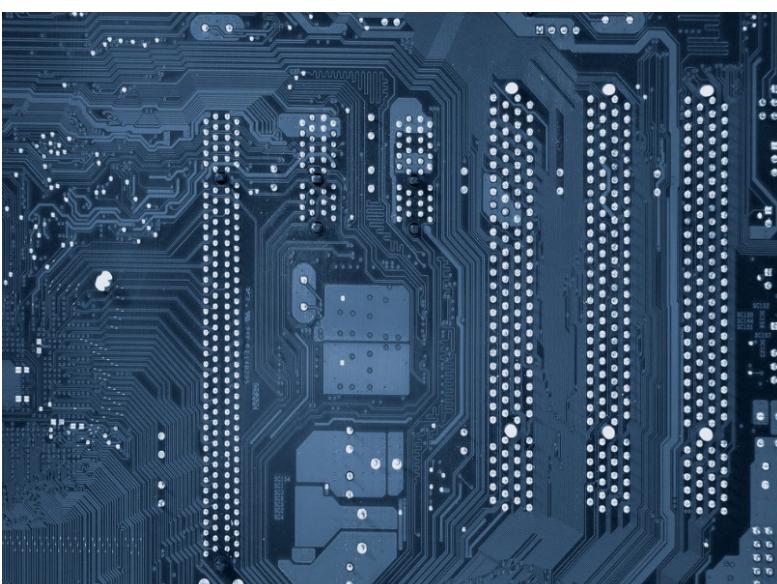
Brick  
ground  
texture



Wood  
texture



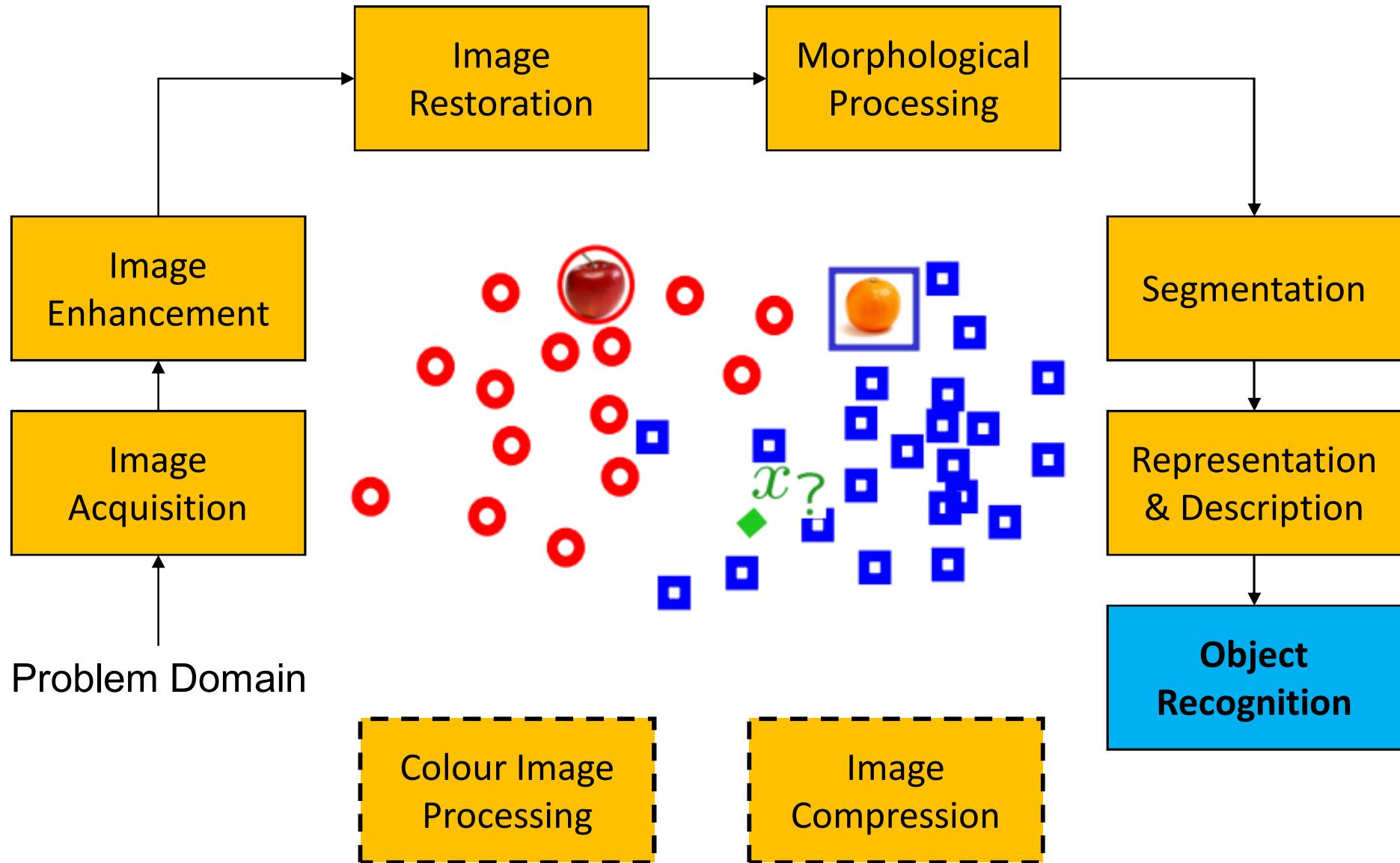
Circuit  
board  
texture



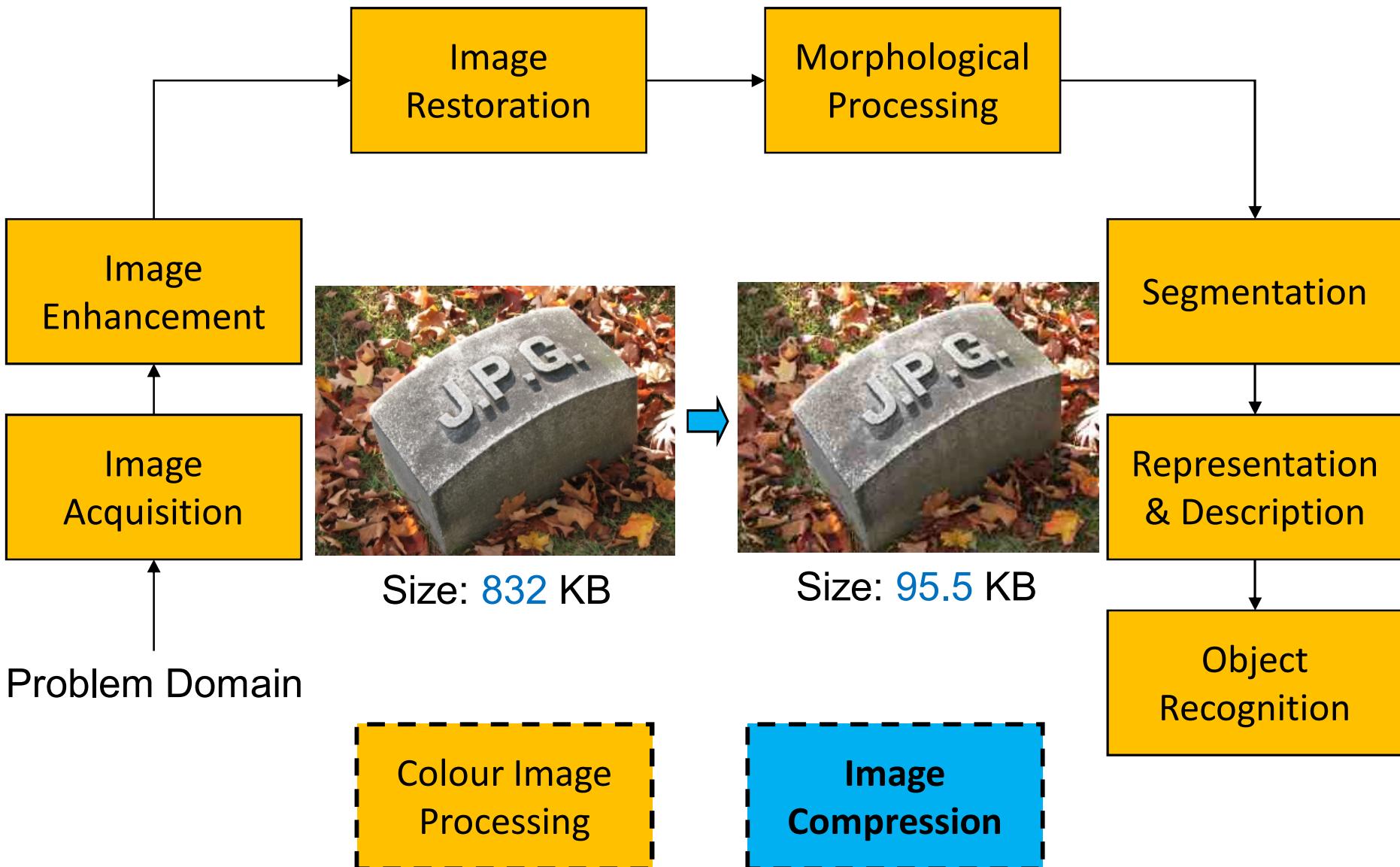
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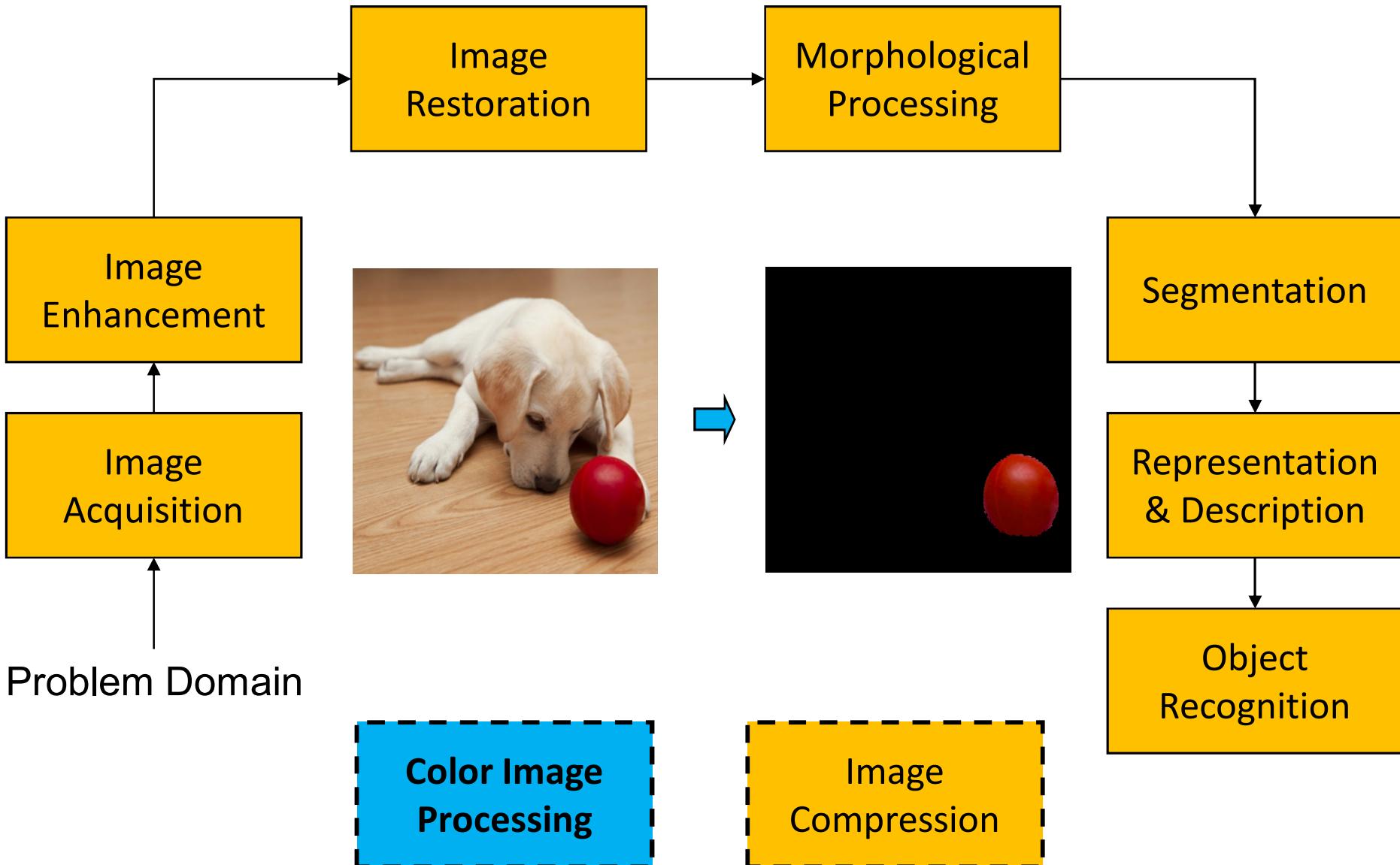
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**Thanks for your attention**