

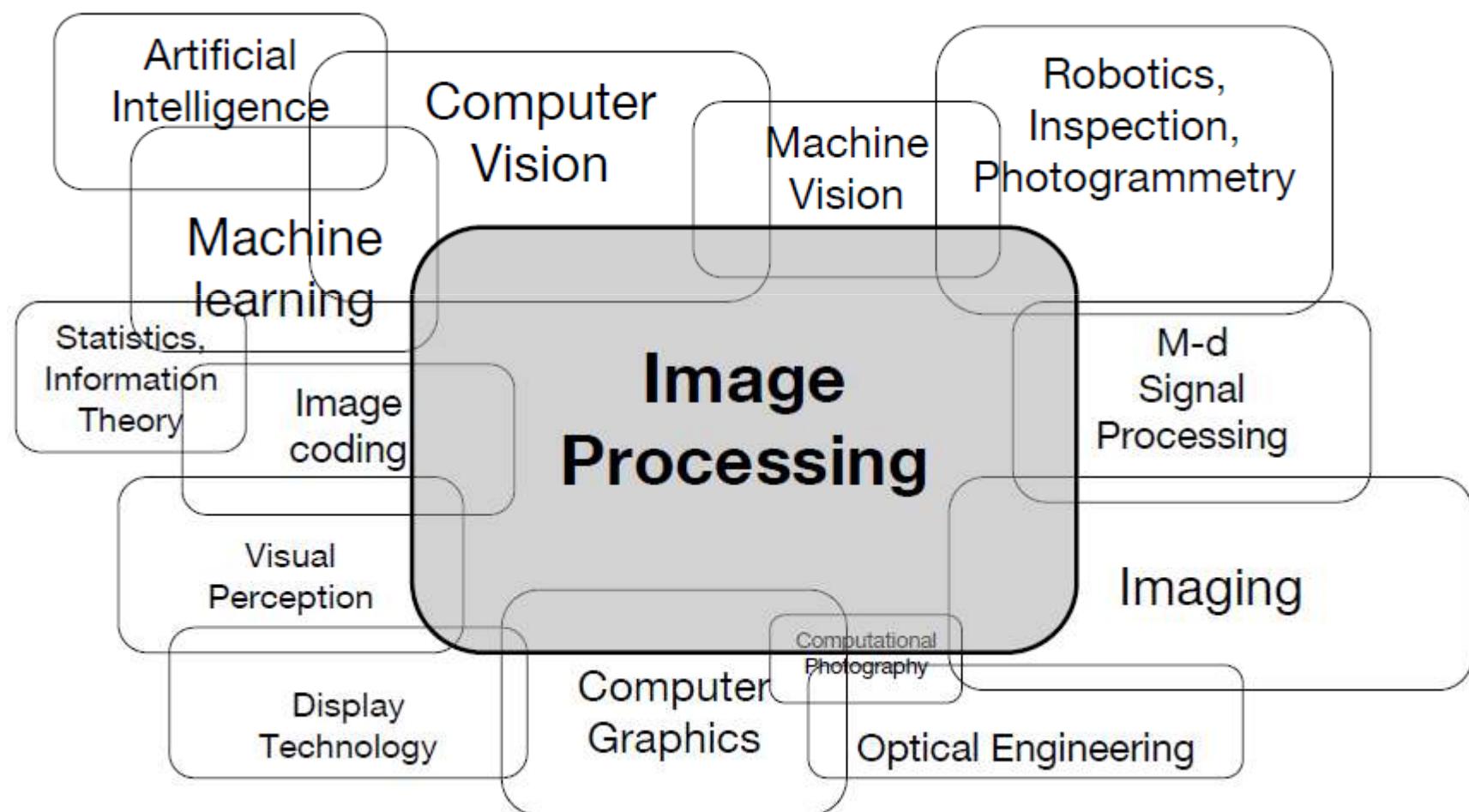
Image Processing

Presented by:
Andres Alarcon Ramirez, PhD

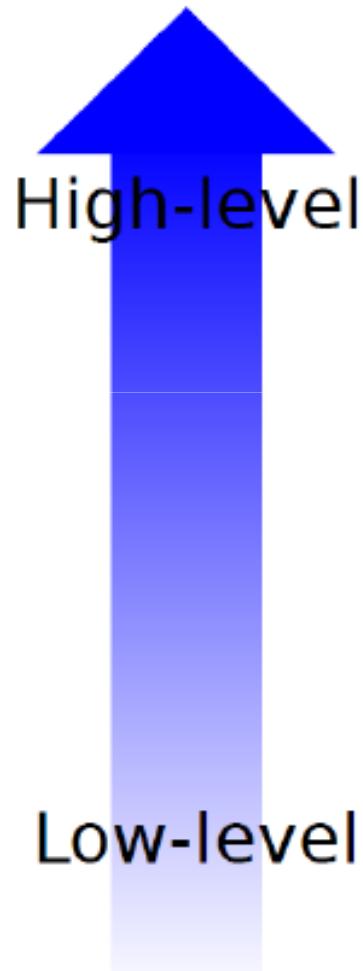
Image Processing

- Encompass a set of techniques that enhance, interpret, or filter an input image to create a new output image with better characteristics.

Image Processing



Relationship with other fields



Computer Vision

Object detection, recognition, shape analysis, tracking
Use of Artificial Intelligence and Machine Learning

Image Analysis

Segmentation, image registration, matching

Image Processing

Image enhancement, noise removal, restoration,
feature detection, compression

Key Stages in Digital Image Processing

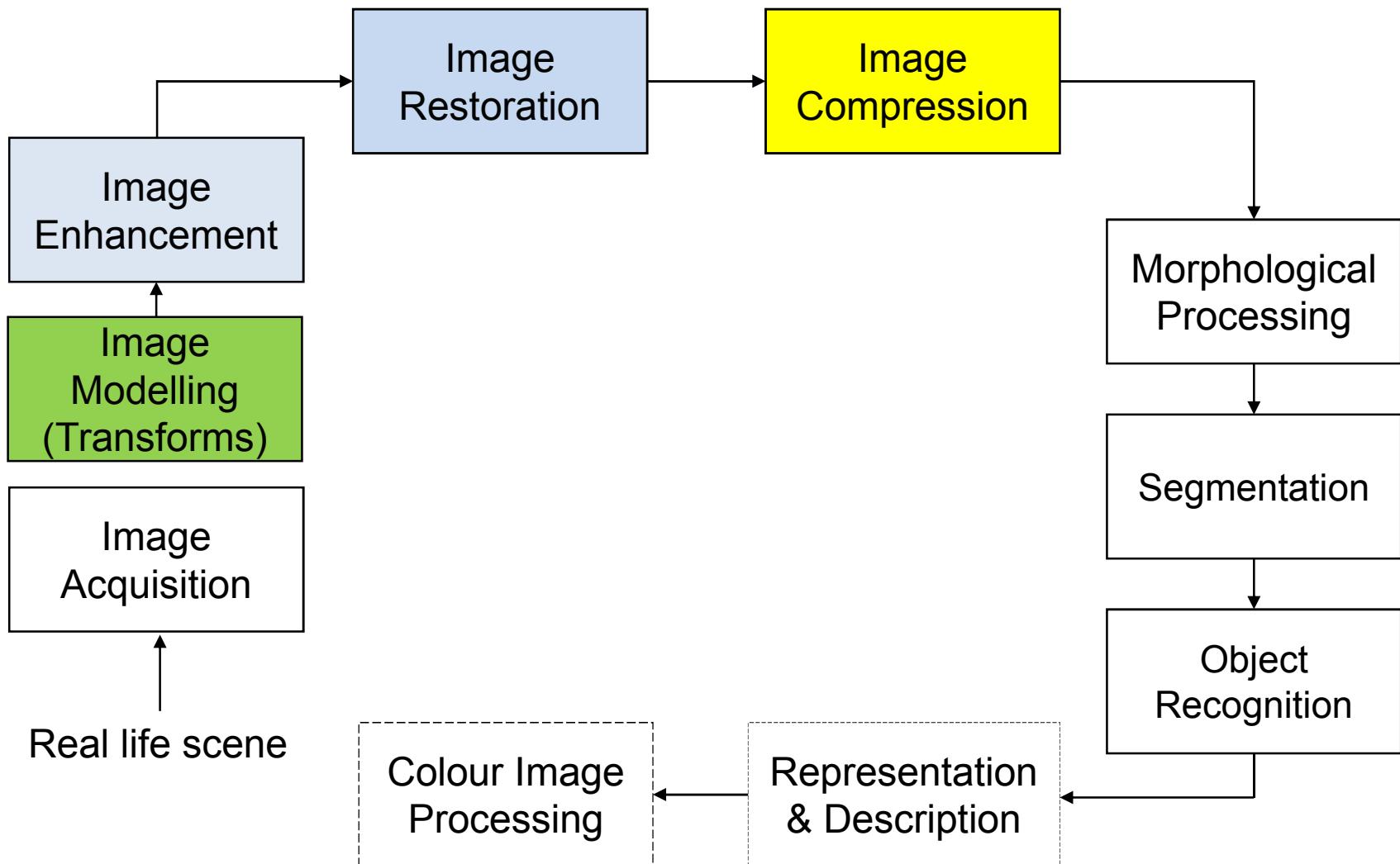
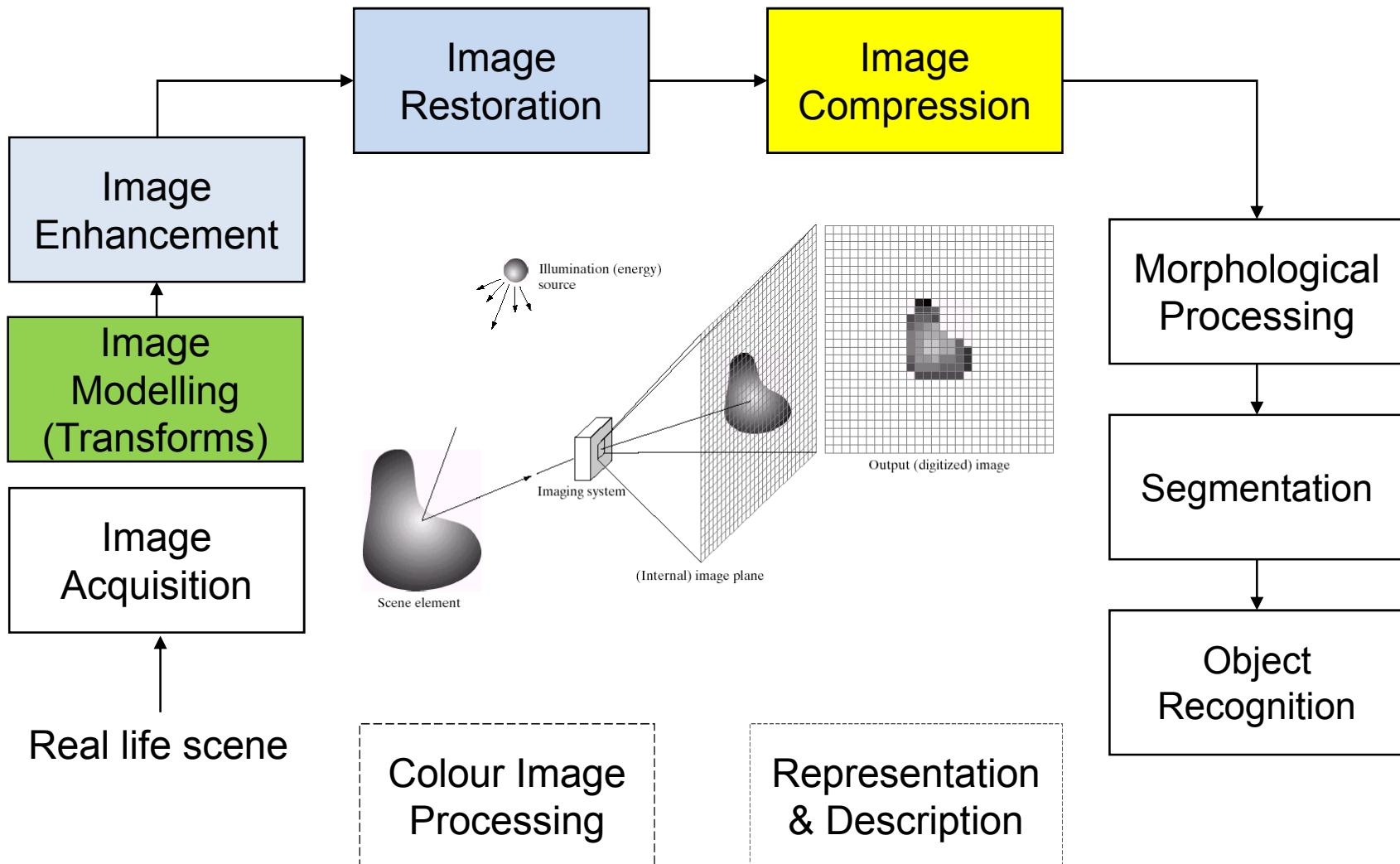


Image Acquisition



Colour or gray level Image Processing

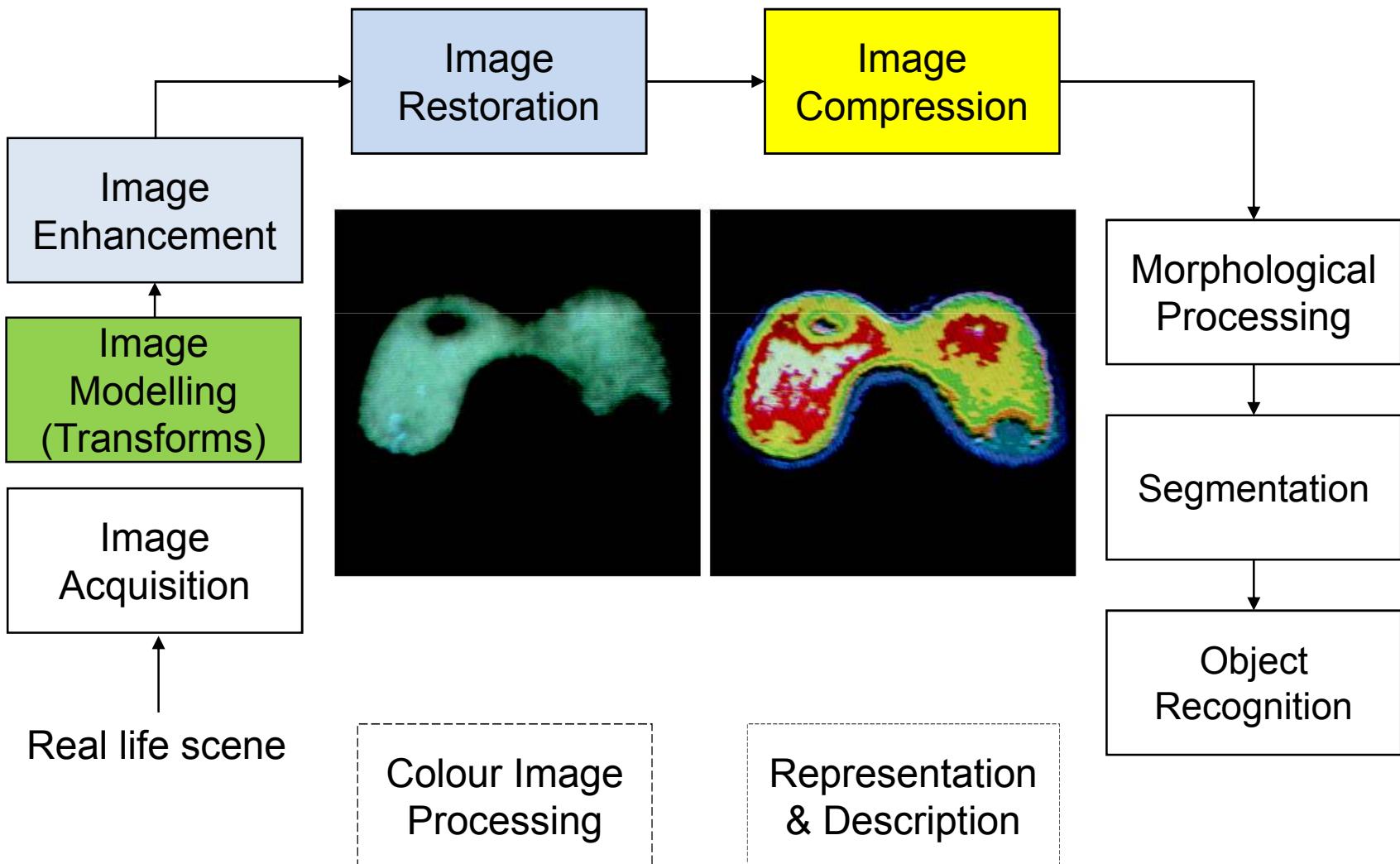


Image Modelling-Image Transforms (Part 1)

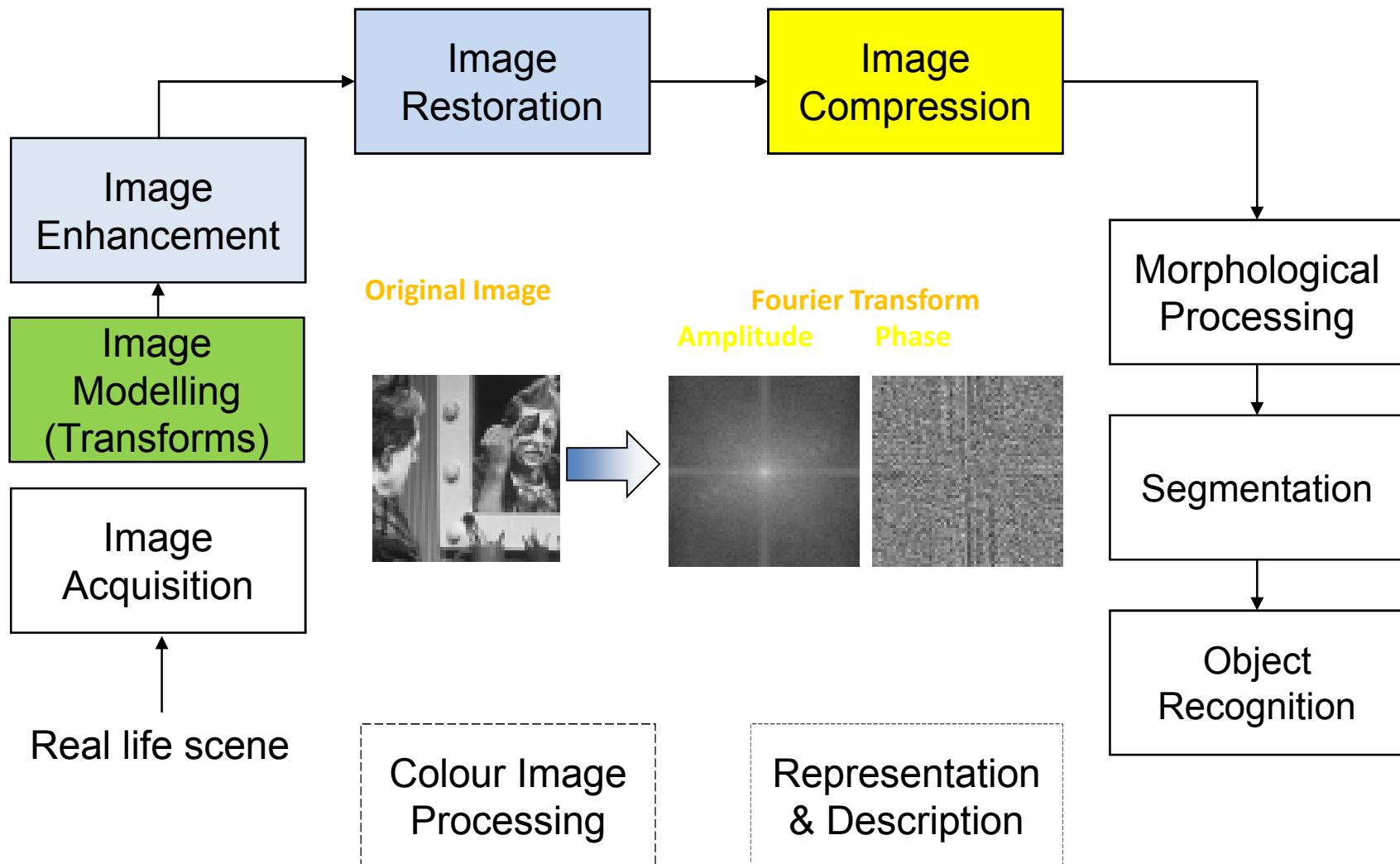


Image Enhancement (Part 2)

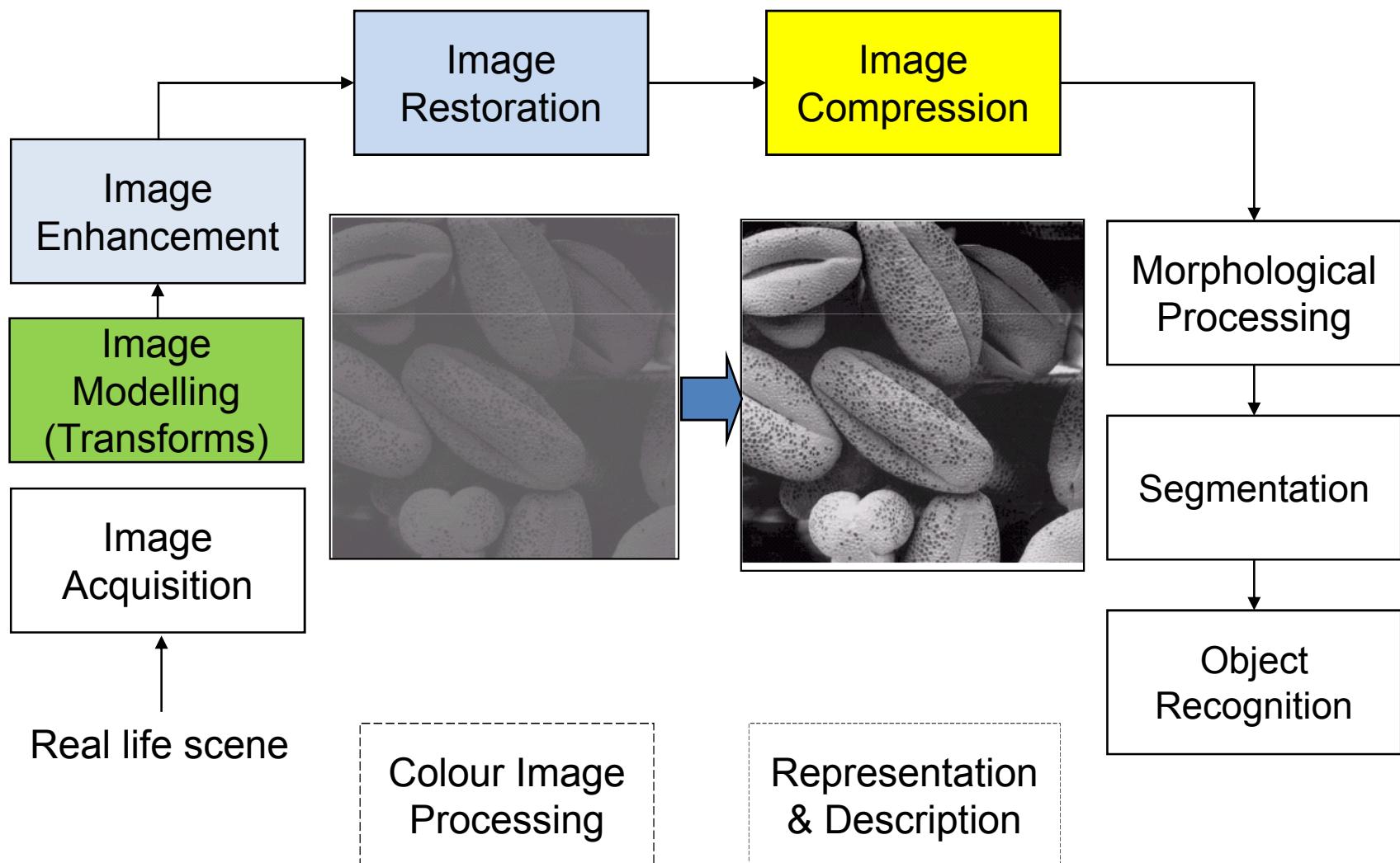


Image Restoration (Part 3)

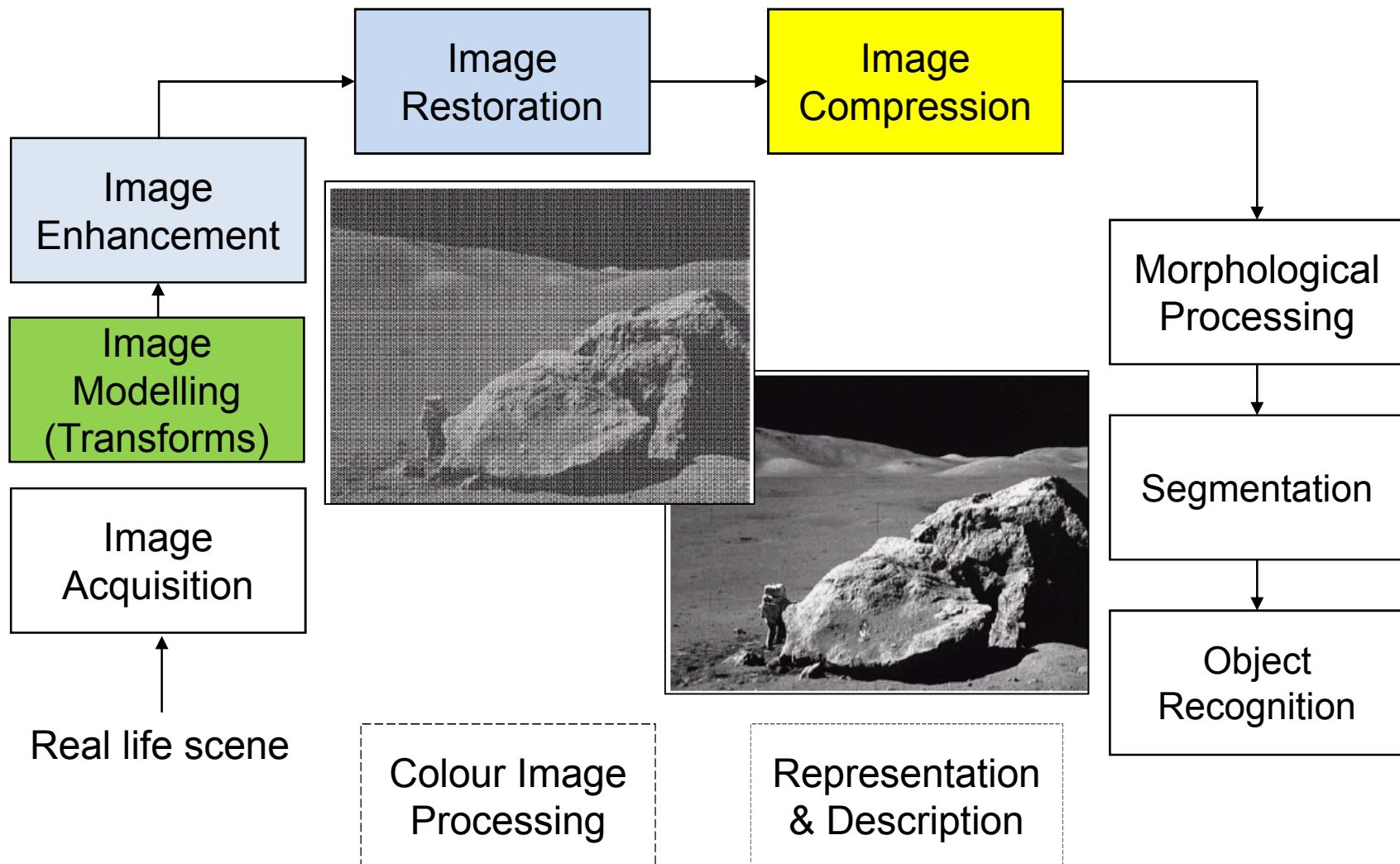
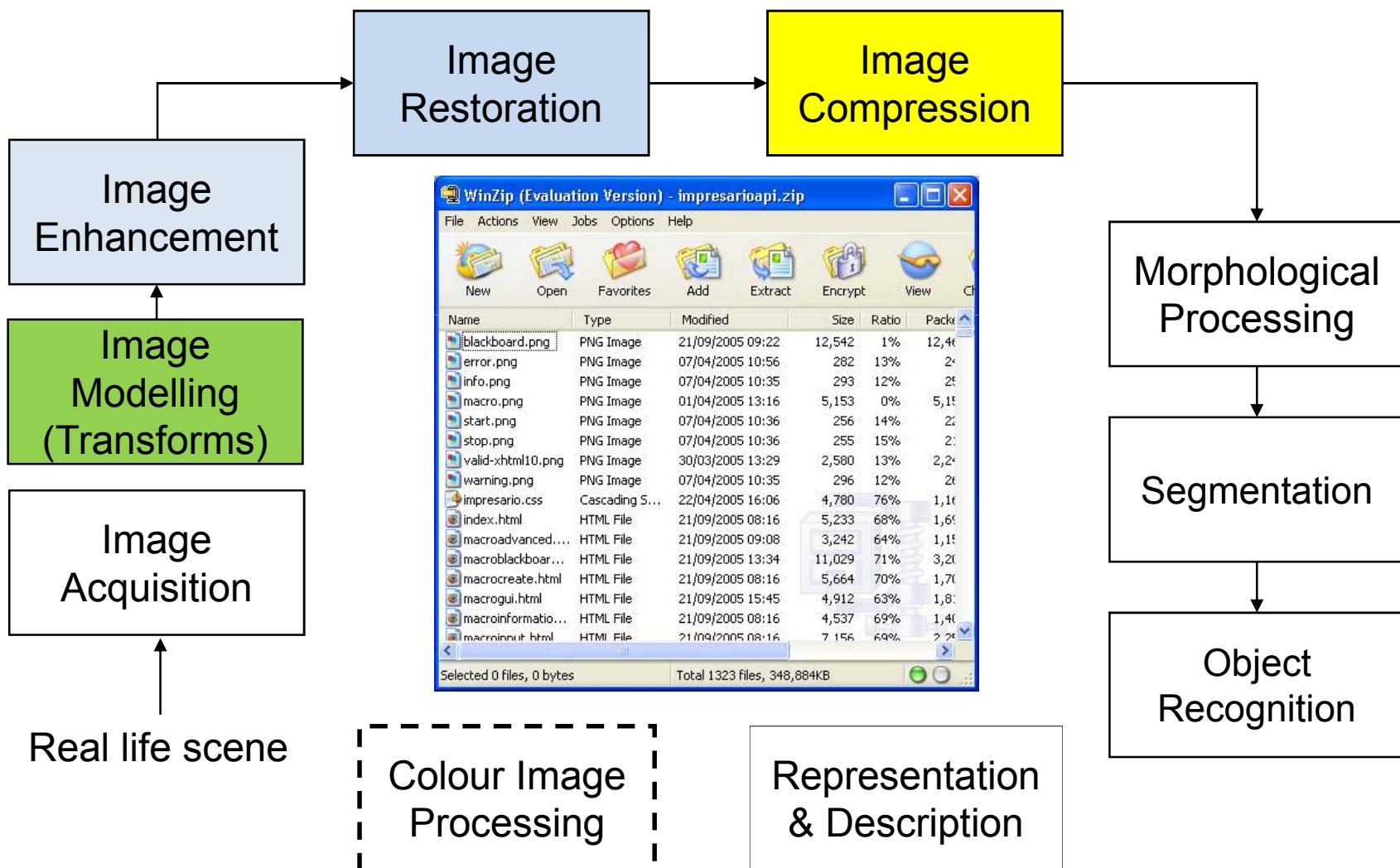
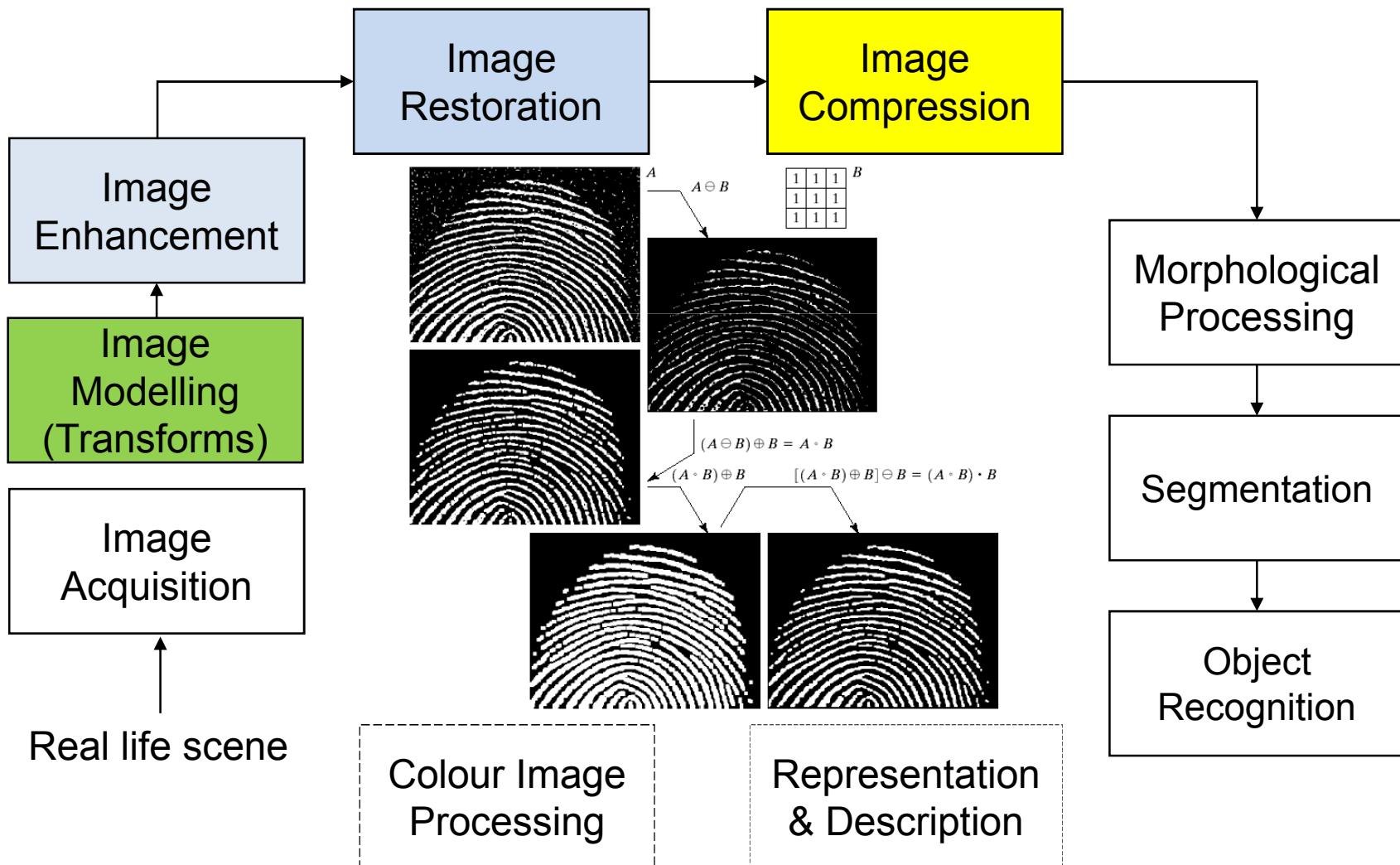


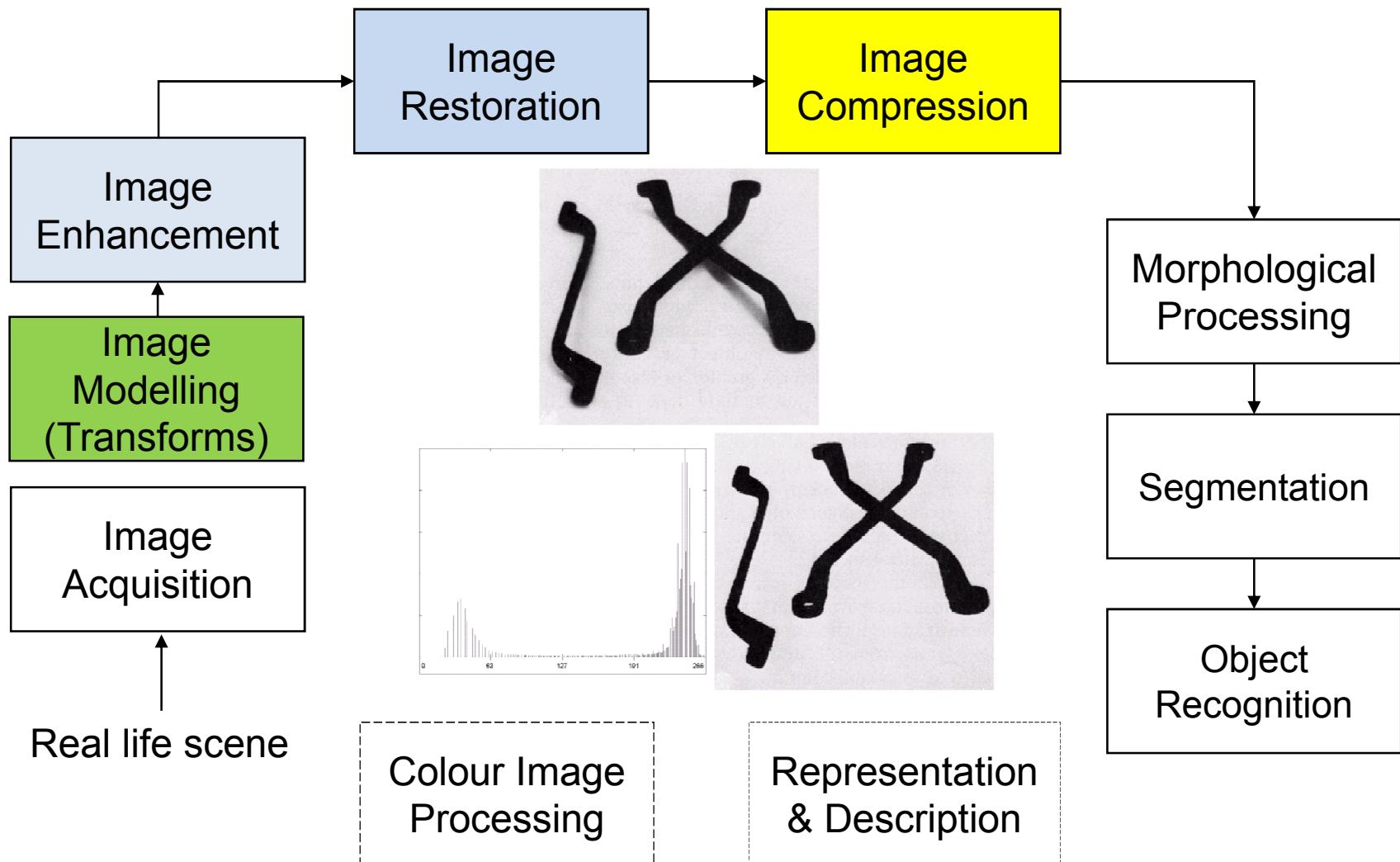
Image Compression (Part 4)



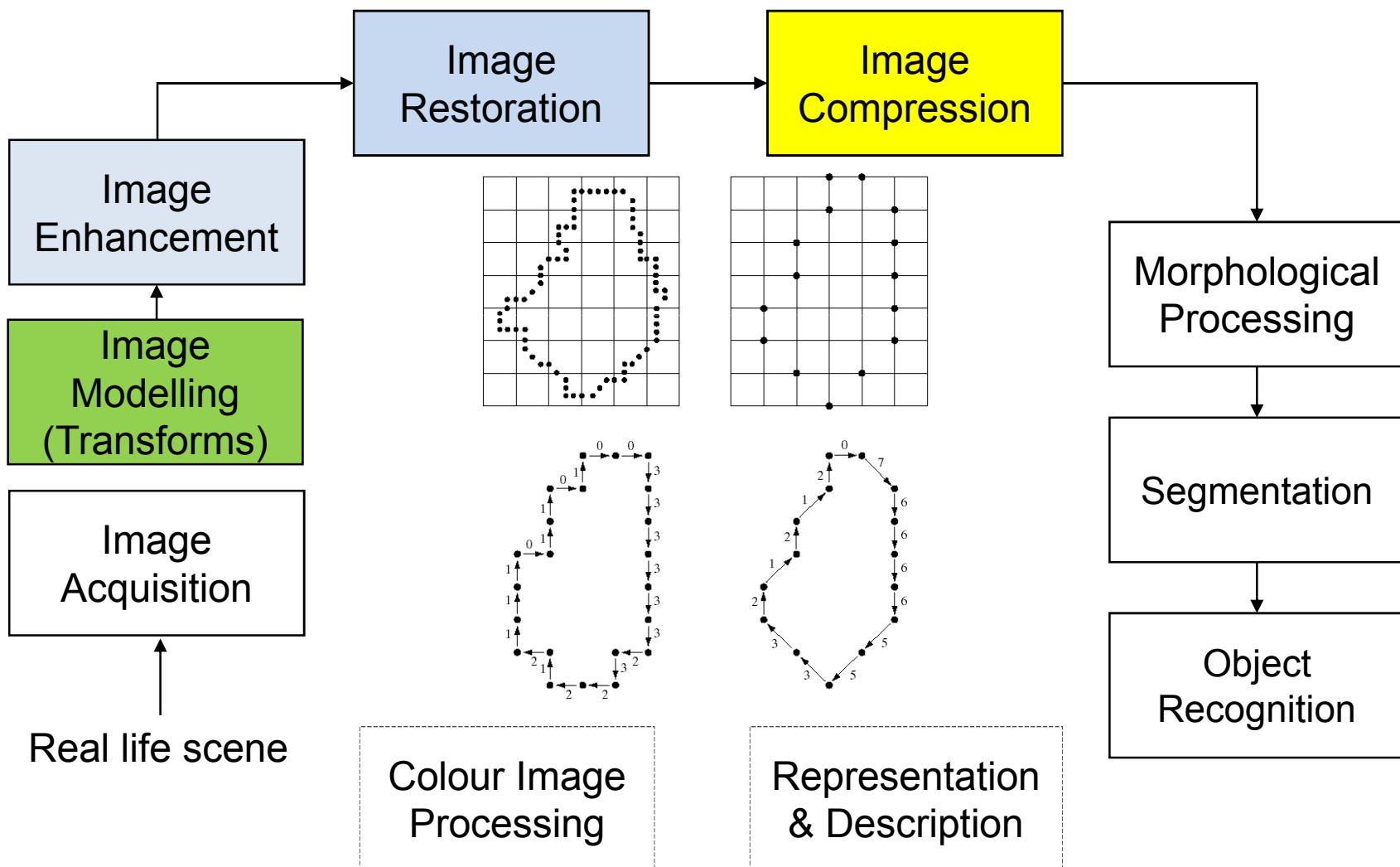
Morphological Processing



Segmentation



Representation and Description



Object Recognition

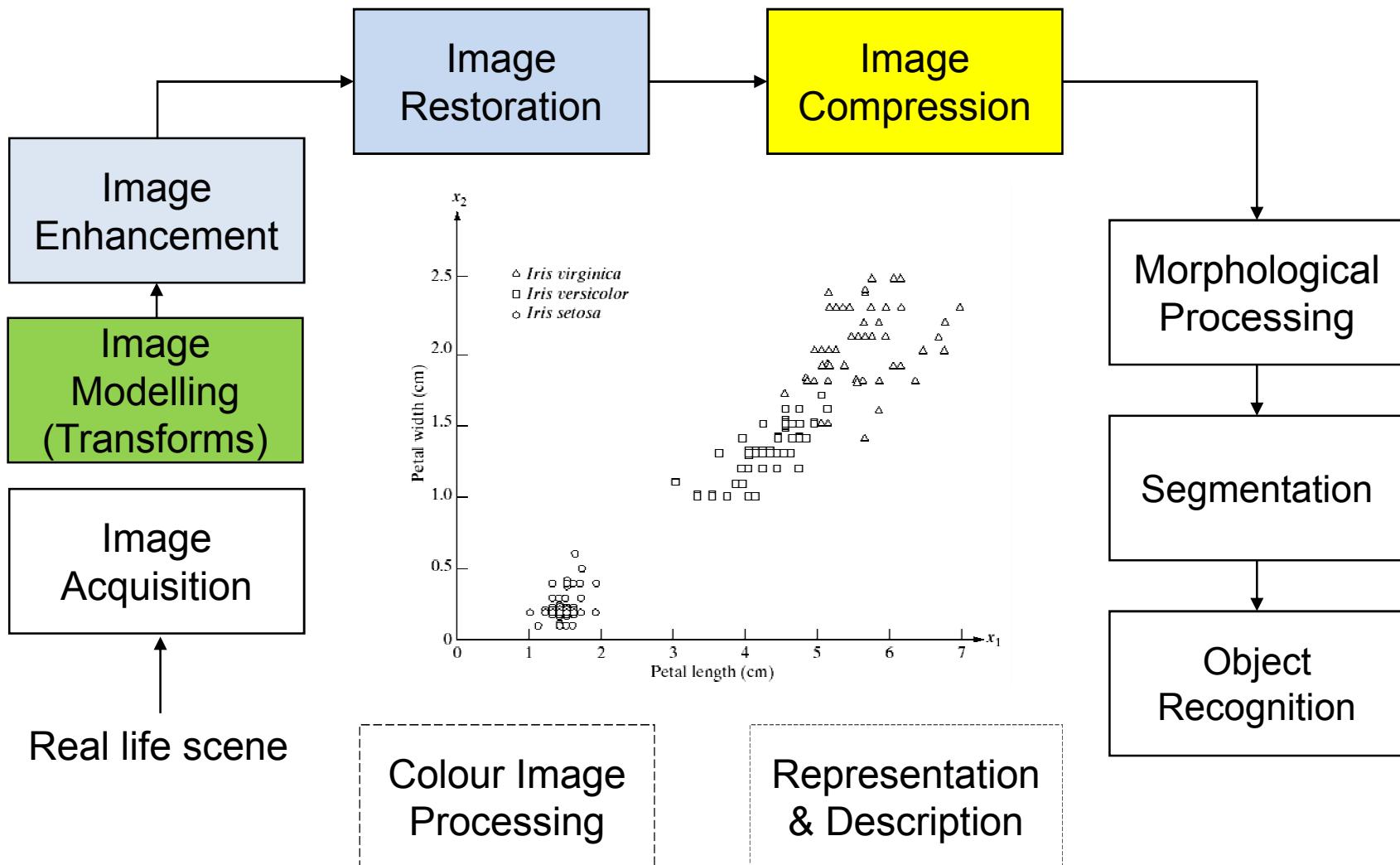


Image Preprocessing



Noise removal



Contrast enhancement



Blurring/smoothing

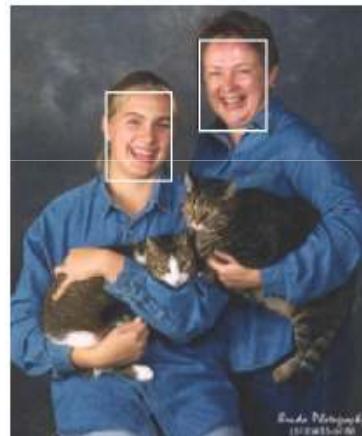


Alter appearance

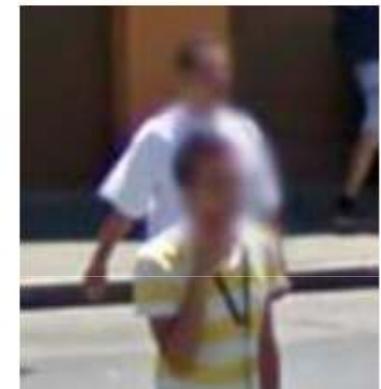
Object Recognition



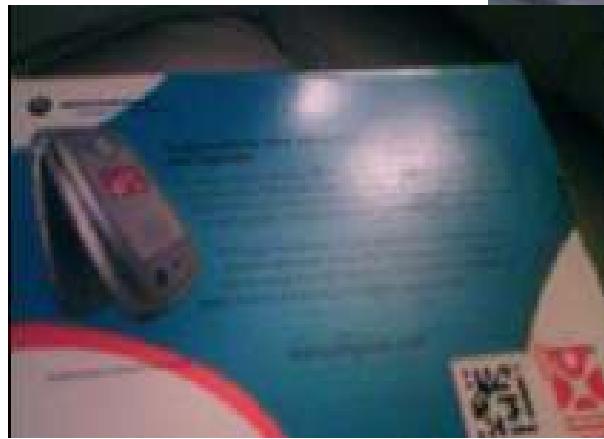
Face Detection



Face Detection and Processing



Bar Code Recognition



Identification of Solar Panels in Aerial Images

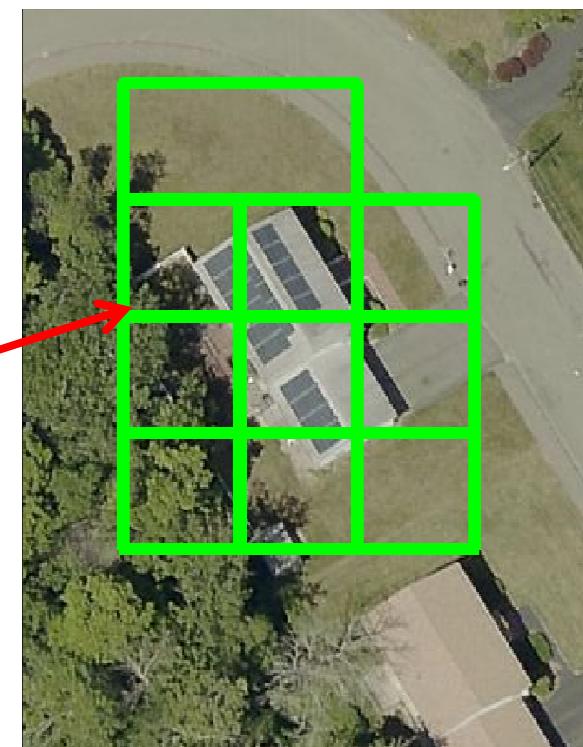
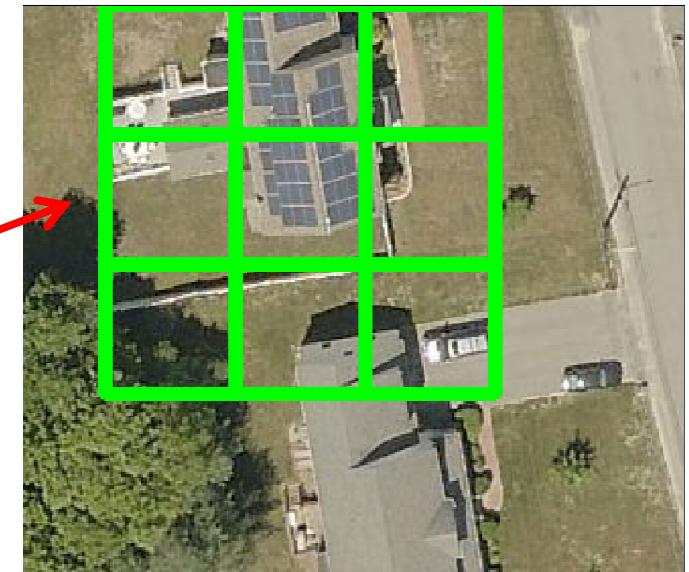


Image Registration

Mosaic from 33 source images



Mosaic from 21 source

Image Compression



245,760 bytes



69,632 bytes

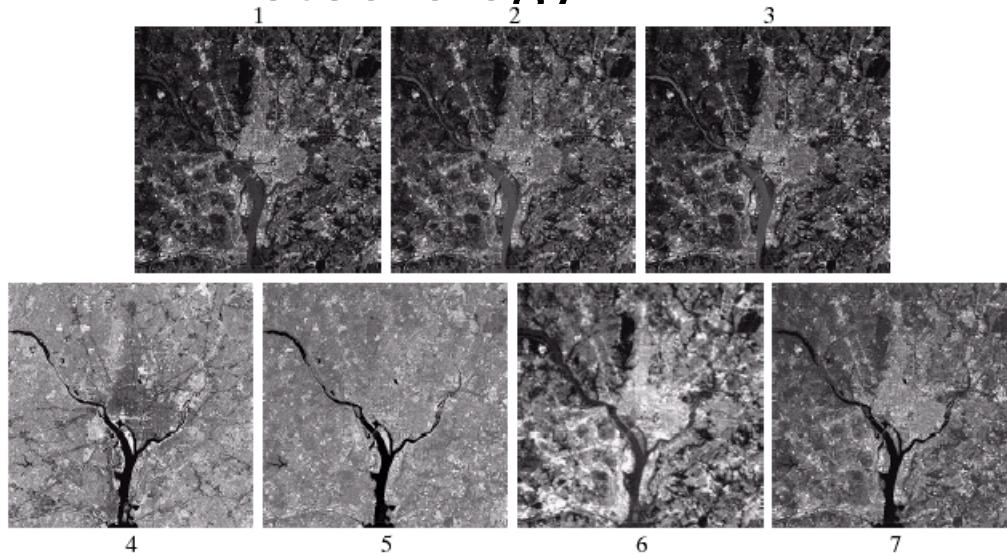


5,951 bytes

Geographical Information Systems

- Geographic Information Systems

- Digital image processing techniques are used extensively to manipulate satellite imagery
- Terrain classification
- Meteorology

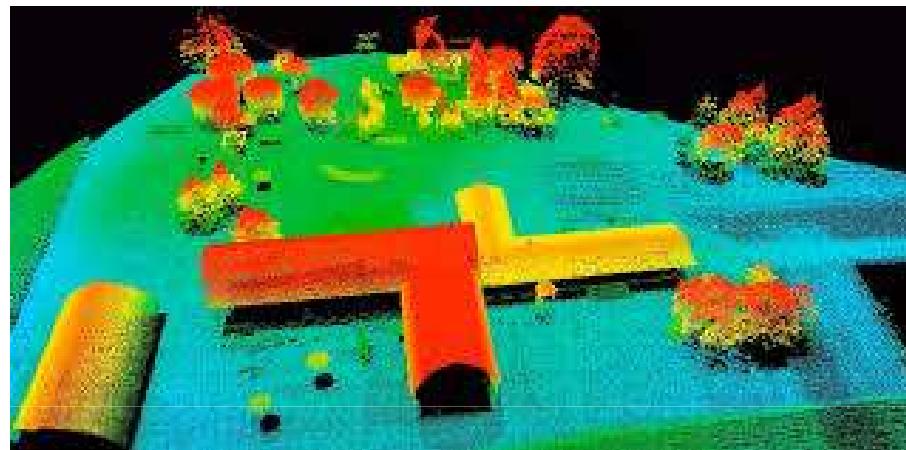


Law Enforcement

- Image processing techniques are used extensively by law enforcers
 - Number plate recognition for speed cameras/automated toll systems
 - Fingerprint recognition
 - Enhancement of CCTV images



Lidar Images for Cadastre



Industrial Inspection

- Human operators are expensive, slow and unreliable
- Make machines do the job instead
- Industrial vision systems are used in all kinds of industries

