Prerequisites

*MATLAB Fundamentals* or equivalent experience using MATLAB. Basic knowledge of image processing concepts is strongly recommended.

### Day 1 of 2

#### Importing and Visualizing Images

**Objective:** Import images into MATLAB and visualize them. Convert the images to a format that is useful for subsequent analysis steps.

- Importing and displaying images
- Converting between image types
- Exporting images

#### Preprocessing Images

**Objective:** Preprocess images by filtering, and using contrast adjustment to simplify or allow for image analysis steps.

- Adjusting image contrast
- Reducing noise in an image by filtering
- Handling inhomogenous background
- Applying custom functions block by block

#### Spatial Transformation and Image Registration

**Objective:** Compare images with different scaling and orientation by aligning them.

- Geometric transformations
- Image registration using point mapping
- Image registration using phase correlation

### Automating Image Registration with Image Features

**Objective:** Detect, extract, and match sets of image features to automate image registration.

- Detecting and extracting features
- Matching features
- Estimating geometric transformations between images

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### Day 2 of 2

#### Edge and Line Detection

**Objective:** Segment edges of objects and extract boundary pixel locations. Detect lines and circles in an image.

- Segmenting object edges
- Detecting straight lines
- Performing batch analysis over sets of images
- Detecting circular objects
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<th>Color and Texture Segmentation</th>
<th>Objective: Segment objects based on color or texture. Use texture features for image classification.</th>
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<td>Color space transformation</td>
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<td>Texture segmentation</td>
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<td>Texture-based image classification</td>
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<th>Feature Extraction</th>
<th><strong>Objective:</strong> Analyze and modify the objects’ shape to improve segmentation results. Count the detected objects and calculate object features like area or centroids.</th>
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<td>Counting objects</td>
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<td>Measuring shape properties</td>
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<td>Using morphological operations</td>
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