Course Title:

Computer Vision with MATLAB

Course Purpose:

This one-day course provides hands-on experience with performing computer vision tasks. Examples and exercises demonstrate the use of appropriate MATLAB® and Computer Vision Toolbox™ functionality.
Topics include:

- Importing, displaying, and annotating images and videos
- Detecting, extracting, and matching object features
- Automatically aligning images using geometric transformations
- Detecting objects in images and videos
- Tracking objects and estimating their motion in a video

Pre- requisites:

MATLAB Fundamentals or equivalent experience using MATLAB.
Image Processing with MATLAB and basic knowledge of image processing and computer vision concepts.

Course Duration

- ✓ 1 training day
- ✓ Hours: 09:00-17:00
- ✓ Total training hours: 8

Teaching method

The course combines lectures, demonstrations and practical exercises in MATLAB, using original training books from MathWorks. The course is in Hebrew but the training materials are in English.

Training Center Systematics - Contact information:
Phone number: 03-7660111 Ext: 5 **Email:** training@systematics.co.il

Website: http://www.systematics.co.il/mathworks

Course Outline:

Importing, Visualizing, and Annotating Videos

Objective: Import videos into MATLAB, as well as annotate and visualize them.

The focus is on using System Objects™ for performing iterative computations on video frames.

- Importing and displaying video files
- Highlighting objects by drawing markers and shapes like rectangles
- Combining and overlaying two images
- Performing iterative computations on video frames

Detecting, Extracting, and Matching Image Features

Objective: Use corner and blob detectors to detect local features in images.

Extract and match features from two images. Use matched features to automatically align and stitch images.

- Detecting and extracting features in an image
- Matching features between two input feature sets
- Estimating geometric transformation between images
- Aligning and stitching images

Object Detection

Objective: Train a detector for flexible object detection. Detect moving objects by using a foreground detector.

- Marking objects of interest in training images
- Training and using the cascaded object detector
- Using foreground detection to detect objects

Motion Estimation

Objective: Estimate direction and strength of motion in a video sequence.

- Understanding motion perception in images
- Estimating motion using block matcher
- Estimating motion using optical flow methods

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Tracking*

Objective: Track single and multiple objects and estimate their trajectory. Handle occlusion by predicting object position.

- Tracking objects using histogram of pixel values
- Tracking points using a point tracker
- Predicting object position using the Kalman filter
- Tracking multiple objects

* If time permits

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