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Learning Style: On Demand

Technology: Microsoft

Difficulty: Intermediate

Course Duration: 16 Hours

Computer Vision and Image Analysis

About this course:

Computer Vision is the art of distilling actionable information from images.

In this hands-on course, we'll learn about Image Analysis techniques using OpenCV and the Microsoft Cognitive Toolkit to segment images into meaningful parts. We'll explore the evolution of Image Analysis, from classical to Deep-Learning techniques.

We'll use Transfer Learning and Microsoft ResNet to train a model to perform Semantic Segmentation.

Course Objective:

- Apply classical Image Analysis techniques, such as Edge Detection, Watershed and Distance Transformation as well as K-means Clustering to segment a basic dataset.
- Implement classical Image Analysis algorithms using the OpenCV library.
- Compare classical and Deep-Learning object classification techniques.
- Apply Microsoft ResNet, a deep Convolutional Neural Network (CNN) to object classification using the Microsoft Cognitive Toolkit.
- Apply Transfer Learning to augment ResNet18 for a Fully Convolutional Network (FCN) for Semantic Segmentation.

Audience:

- Vision Science specialist
- Mathematician
- Image Analysis

Prerequisite:

- Working knowledge of Python
- Skills equivalent to the following courses

Course Outline:

Introduction And Overview

- The Evolution of Computer Vision
- Preparing For The Labs
- Image Processing Basics
- Applications

Image Features And Classical Methods

- Introduction
- Thresholding
- Clustering
- Region Growing
- Template Matching

- Edges And Corners
- Module Review

Object Classification And Detection

- Module Introduction
- Viola-Jones
- HOG
- Classical vs Deep
- Deep Learning
- Classifiers to Detectors
- Object Proposals
- CNN Object Detectors

Deep Segmentation And Transfer Learning

- Introduction
- Super-Pixels And Conditional Random Fields
- Fully Convolutional Approaches
- Deep Segmenters
- Transfer Learning

Final Exam

- Final Exam?

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