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AI Tech Camp 2019 Syllabus

2019-9-06	Create this document	HL, PR, MO, YL

Item	Description	Speaker	Note
1	**1.1 Using TF Keras Tools for AI Deep Learning Applications** Installation of TF Keras and running your first program for hand-written digits recognition	PR	
2	**2.1 OpenCV Tools and Techniques for Deep Learning (Part 1)** a. Installation of OpenCV. b. OpenCV C++/Python: b(1). Read and display images. b(2). Read and save live videos. b(3). Read and save video files. c. Image augmentation techniques to prepare deep learning dataset. d. Image online harvesting techniques.	PR	
	2.2 OpenCV Tools and Techniques for Deep Learning (Part 2) a. OpenCV C++/Python canny edge detection on given: a(1). Image a(2). Live video a(3). Video file	PR	
	2.3 Computer Vision technique for ROI manipulations Objectives: 2.3.1. Digital Image definition and coordinate system of Image. 2.3.2. Use OpenCV to define rectangle ROI; (1) Define ROIs (2) Read image pixels from the ROIs (3) Write image pixels to ROIs (4) Write captions (text) on ROIs 2.3.3 Use OpenCV to define polygonal shape ROIs; (1) Define the polygonal shape ROI; (2) Read image pixels from the ROIs (3) Write image pixels to ROIs (4) Write captions (text) on ROIs 2.3.4. Use OpenCV to define rectangle ROI; 2.3.5. Use OpenCV to define polygon shape based on contour analysis; (1) Write a program to display the processed result (display on top	MO	

	of the original image) (4) Write captions (text) on the image contour . Another reference: https://github.com/hualili/CMPE297/blob/master/2018S-15-Contour-Inference-final-2018-4-12.pdf		
	2.4 Feature Extraction Based on Canny Objective: 2.4.1. OpenCV C++/Python (1) read test image pattern then Canny edge detection, then display both original image and the edge map (Canny result); Test image: https://github.com/hualili/CMPE297/blob/master/2018S-23-test1.jpg https://github.com/hualili/CMPE297/blob/master/2018S-23-4contourTesting.jpg (2) read test live video then canny edge detection, then display both original live video and live edge map (Canny result); (3) read video file then canny edge detection, then display both original live video file and edge map of the video file (Canny result); 2.4.2. OpenCV C++/Python (1) save canny image result, save (2) video Canny result;	MO	
	2.5 Feature Extraction Based on Contours Analysis Objectives: 2.5.1. OpenCV to compute contours (1) Use the reference below, write OpenCV program to compute contours for the test image listed above. Reference: https://github.com/hualili/CMPE297/blob/master/2019S/2019S-25-contourAnalysis-2018-9-13.pdf (2) Compute each type of 4 different types of contours, and understand the difference between them; (3) Read contours data, and display partial contours based on contours' size; (4) Primitive contour properties.	MO	
	2.6 Contour based ROI localization for Object Detection. a. Case study on handwritten digit recognition.	PR	
	2.7 Use ROI localization for Better Handwritten Recognition a. Combine OpenCV based techniques with handwritten recognition.	PR	
	2.8 Deep Learning based ROI localization for Object Detection. a. Utilization of Pedestrian Detection for ROI localization.	PR	
	2.9 Case study a. Use Keras to test your handwritten digits.	PR	

	2.10 Deep Learning based technique for ROI localization. a. Use pedestrian-based ROI localization and YOLO based ROI localization.	PR	
3	**3.1 Case Study: Cell phone detection.**	LY	
	3.2 Case Study: garbage detection 3.2.1 Computer Vision algorithm to detect garbage developed by CTIOne Corp. 3.2.2 Show a demo on garbage detection.	MO	
4	**4.1 Fine Tuning Techniques:** 4.1.1 Read information from the CNN basic building blocks (C2N for example); 4..1.2 Visualization of the information from the basic building blocks (C2N);	LY	
5	**5.1 Deployment techniques:** 5.1.1 Save training result; 5.1.2 Loading trained result 5.1.3 Selective training for limited layers by UN-freazing techniques	LY	
6	**6.1 Hardware Aspect for the Deployment** Objectives: 6.1.1 Introduce the hardware platforms for Deep Learning program. 6.1.2 Pros and Cons for selection of right platform.	PR, MO	

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